

The Expansion of
British Naval Hydrographic Administration,
1808-1829

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Abstract

The period from 1808 to 1829, largely neglected by those historians who have looked at the Hydrographic Office, was the crucial formative period for expansion that laid the solid foundations which later Hydrographers could then exploit. The context, achievements and failures of the Admiralty's hydrographic function, including surveying, chart production, supply, sales and its contribution to the Navy and the scientific world, as an all encompassing beast has been overlooked; the Admiralty placed the responsibility for those tasks on the shoulders of its Hydrographer.¹ Subsequently he determined the success or failure of the office, using his initiative to expand and develop opportunities benefiting the Admiralty, as well as managing a valuable resource of geographical intelligence, fostering links with scientists and the international hydrographic community. The Hydrographer also found himself creating his own policies, serving as Secretary to the Board of Longitude, being a consultant on navigational matters, taking responsibility for the acquisition, supply and maintenance of chronometers for the Navy, as well as being a focal point for issues concerning pay, promotion and manning for surveying specialists.

The period from 1808 to 1829 saw many changes, which gave rise to numerous opportunities for expansion. The Admiralty Board and William, Duke of Clarence (as the last Lord High Admiral), both had a direct influence in the way the office expanded, which saw innovation and experimental work become part of the Hydrographer's routine, especially after the Peace of 1815. But expansion required funding and at a time when internal economy appeared to be the main objective within the Admiralty, Captain Thomas Hurd managed not only to establish a 100% increase in surveying capacity but laid the foundation for a distinct specialist and professional core of survey officers. His successor, Captain William Parry, despite his absences, overhauled working practices in the office, set standards for surveyors to follow and continued to expand the number of survey ships in commission. Subsequently Captain Francis Beaufort was left the most highly efficient hydrographic office since its foundation in 1795.

¹ The use of the term Hydrographer with a capital letter signifies the man who served as Hydrographer to the Admiralty, as opposed to all those other men involved in hydrography.

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Abbreviations

AL	Admiralty Library, Portsmouth
BL	British Library
CTH	Corporation of Trinity House
GL	Guildhall Library
HEIC	Honourable East India Company
NMM	National Maritime Museum, Greenwich
RGO	Records of the Royal Greenwich Observatory, Cambridge
TNA	The National Archives [of England and Wales, formerly the Public Record Office, Kew]
UKHO	Hydrographic Office, Taunton
<i>GM</i>	<i>Gentlemen's Magazine</i>
LB	Hydrographic Office 'Out' Letter Book
MB	Hydrographic Office Minute Book
<i>MM</i>	<i>The Mariner's Mirror</i>
<i>ODNB</i>	<i>Oxford Dictionary of National Biography</i> Oxford University Press; online edn, http://www.oxforddnb.com
<i>OED</i>	<i>Oxford English Dictionary</i>
DE	Double Elephant paper size used for describing charts
MLWS	Mean Low Water Springs
LAT	Lowest Astronomical Tide

Introduction

In 1808 the Admiralty Board found itself in a position where for the last thirteen years it had employed one of the most suitable men in the country to be its Hydrographer, Alexander Dalrymple,² but he had become expendable. How such a learned man came to be in such a position was in some way due to circumstances beyond his control but in other ways he could have easily avoided it. The circumstances were ones formulated by the policies of the Admiralty Board - which effectively acted as a board of directors of the Hydrographic Office. Their policies were mostly driven by the British Government, which in turn was driven by global factors (particularly maritime ones). But the position of the Hydrographical, or Hydrographic, Office, was at that time barely classed as a cog within the wheel of the Admiralty, employing only a Hydrographer, his assistant, one engraver and two draughtsmen.³ By the time Parry resigned as Hydrographer in 1829 the office had employed 36 different men, two externally, and the number of dedicated survey vessels had risen from none to eleven vessels and four hired boats.⁴

Was the Hydrographic Office fit for the purpose of supplying charts and organising surveys to the satisfaction of the Admiralty Board? That is the main focus of this thesis. This question raises another of how did Hurd (the first naval officer to take charge of the Hydrographic Office) achieve the transformation of what was basically a chart reproduction outfit of limited capacity, which issued the occasional volume of sailing directions, into the pseudo-scientific office with a professional core of personnel that Parry⁵ inherited in 1823 and developed even further by 1829? To achieve an answer to this question a thorough examination of all of the activity being undertaken in the Hydrographic Office, with its connections to influential figures outside the office, has been attempted here. It is shown how over two decades two naval officers, assisted by a small group of civilians, developed Dalrymple's legacy into an office which Beaufort was able to take to a position of international pre-eminence. The Hydrographers' ideas were on the whole supported by the Admiralty

² A.S. Cook, 'Dalrymple, Alexander (1737–1808)', *ODNB* [accessed 19 Feb 2008].

³ A. Day, *The Admiralty Hydrographic Service 1795-1919* (London, 1967), 14. For a list of those employed during the period of this study see Appendix 1.

⁴ Appendix 1; Dawson, *Memoirs*, 102.

⁵ J.K. Laughton, 'Parry, Sir (William) Edward (1790–1855)', rev. A.K. Parry, *ODNB* [accessed 3 Feb 2008].

Board, allowing its output of publications to increase and for it to become a major player in the world of scientific data collection. Key to this was Hurd who expanded the 'hydrographic' specialism, recruiting well-educated young men from the middle to upper classes of society who were competent both in mathematics and showed promise in the field of hydrographic surveying. This involvement in scientific activity and the by-products from it, such as high quality data, were fundamental factors in the development of not only the hydrographic specialism but also that of the Navy.

In contrast to existing 'histories' of the Hydrographic Office which are very selective for this period, only concentrating on the most prominent events, and so completely ignore or fail to analyse all of the activity that was undertaken, an in-depth examination, analysis and comparison of both periods of hydrographership and a critical review of the achievements of both men has therefore been applied throughout. To achieve this the main areas of study are: the governance of the Hydrographic Office; managing civilians and surveyors; data acquisition; international relations; its contribution to science; the production of charts and their correction; the supply of information and instruments; sales of charts and publications. Each of these areas has the potential for broader study, beyond the main corpus of Admiralty records.

Survey of the existing literature on the subject

The influence and effect the Hydrographic Office had on the Navy is reflected (in historiographical terms) in histories of the Royal Navy, in which the most prolific work by Clowes devoted only three sentences to Dalrymple's appointment and achievements in a volume of over 500 pages of text covering a similar period.⁶ Even Rodger in his highly acclaimed *The command of the ocean. A naval history of Britain 1649-1815* did not mention the formation of the office, Dalrymple, Hurd⁷ or the Chart Committee.⁸ Such was the position of the Hydrographer of the Navy in terms of manpower, accountability and status within the Royal Navy, although the reality was very different as naval vessels relied heavily on Admiralty charts for navigation.

The first 'history', or historical account, of the Hydrographic Office was written by the sixth Hydrographer, Captain George Henry Richards R.N. (1820-1896),

⁶ W.L. Clowes, *The Royal Navy a history from the earliest times to the present* IV (London, 1899).

⁷ For Hurd, see A.C.F. David, 'Hurd, Thomas Hannaford (*bap.* 1747, *d.* 1823)', *ODNB* [accessed 2 Feb 2008].

⁸ N.A.M. Rodger, *The command of the ocean. A Naval history of Britain 1649-1815* (London, 2004).

and privately circulated in 1868. His brief account, containing many errors, has several useful recollections from staff who had first- (or second-) hand experience under Dalrymple, Hurd and/or Parry. Those recollections are a unique source for information on the internal politics of the office, mainly from the perspective of those who had worked for the early Hydrographers, rather than those who had an outside or what appeared to be a directorial view, such as John Wilson Croker (First Secretary to the Admiralty Board from 1809)⁹ and to a lesser extent John Barrow¹⁰ and Robert Dundas, Viscount Melville (First Lord of the Admiralty from 1812).¹¹ Croker dealt with many matters relating to hydrography and was known to have opened all of the Admiralty's post himself,¹² which may have been due to the need to keep sensitive matters to a limited number of people, rather than as general office gossip. Following on from Richards' *Memoir* appeared Dawson's *Memoirs of Hydrography*,¹³ which also contains many errors but has some useful facts concerning events during the nineteenth century and remained the standard work on the Hydrographic Office until the 1960s. It was in the 1960s when more recent writers on this subject tackled the 'history' of the office but in very different ways. It was only Steve Ritchie in his popular volume on the nineteenth century *Admiralty Chart* who touched on the broader perspective of hydrographic activity, but even this failed to address in detail some of the fundamental issues, such as scientific development, supply and international expansion during the early period, tending to concentrate more on the development of the Surveying Service.¹⁴

Day's *Admiralty Hydrographic Service 1795-1919* (1967), like Ritchie's *Admiralty Chart*, contains many useful facts but records items in chronological order with little analysis or comparison, using footnotes in an *ad hoc* fashion, unlike modern scholarly writing.¹⁵ Both works touch on the relationship between the Hydrographer and the Admiralty Board, but Ritchie (following in the wake of

⁹ W. Thomas, 'Croker, John Wilson (1780–1857)', *ODNB* [accessed 24 Nov 2007].

¹⁰ J.M.R. Cameron, 'Barrow, Sir John, first baronet (1764–1848)', *ODNB* [accessed 24 Nov 2007]. Barrow was knighted after the period of this study.

¹¹ M. Fry, 'Dundas, Robert Saunders, second Viscount Melville (1771–1851)', *ODNB* [accessed 24 Nov 2007]; Richards, *Memoir*; G. S. Ritchie, 'Richards, Sir George Henry (1820-1896)', rev. Elizabeth Baigent, *ODNB* [accessed 17 Oct 2007].

¹² Rodger, *The command of the ocean*, 487; M. Brightfield, *John Wilson Croker* (London, 1940), 34-51 covers his political activities as First Secretary of the Admiralty.

¹³ Cdr L.S. Dawson, *Memoirs of hydrography, including brief biographies of the principal officers who have served in H.M. Naval Surveying Service between the years 1750 and 1885* (Eastbourne, 1885, reprinted London, 1969).

¹⁴ G.S. Ritchie, *British Naval hydrography in the nineteenth century* 2nd edn. (Edinburgh, 1995).

¹⁵ Day, *Hydrographic Service*, passim.

Edgell)¹⁶ mistook the high number of matters dealt with by Croker, coupled with the fact that it often came down to him to minute their Lordships' decisions, as some sort of overbearing spectre of doom for the Hydrographic Office: this is a picture far from obvious from other works relating to Croker.¹⁷ However, both of those books are extremely useful because of their authorship by men who themselves served as Hydrographer of the Navy, thus giving them first-hand experience not only of surveying but administration, the relationship with the Admiralty, responsibility for running a much bigger office and a certain degree of scientific knowledge. Both were written within different parameters, with Day taking the more official line, ending up with something which is more of a chronicle, whereas Ritchie was less restricted and included a great deal of material of a less official nature. Day took the view that Ritchie's work would be all the more informative for following this approach,¹⁸ but the two taken together form a sound platform from which to launch this study. Both men were not unsurprisingly sympathetic to the situations and achievements of their predecessors, but being protective of former Hydrographers inevitably meant some degree of objectivity has been lost.

A work which also reflects a certain degree of personal bias is the late Ann Parry's account of her great-great-grandfather, Captain W.E. Parry. This work brought to light many unpublished papers, which had remained in the family archives, that gave the personal views of the Hydrographer which are absent from the official records. This has left us with a unique picture of the feelings of the Hydrographer during the period when absenteeism, changes in governance and opportunities outside of the Admiralty, were important factors influencing the decision-making during his administration.¹⁹ Naturally there is some overlap with both Day and Ritchie, which has made Parry's book complementary to the two modern Hydrographers' tomes, despite her view that she 'had to treat the whole subject much more briefly than I originally intended'.²⁰ Unpublished studies of Dalrymple (Hydrographer from 1795-

¹⁶ J.A.E. Edgell, *Charting the seas in peace and war the story of the Hydrographic Department of the Admiralty over a hundred and fifty years 12th August 1795 to 12th August 1945* (London, 1947), 8.

¹⁷ B. Pool, *The Croker papers 1808-1857* (London, 1967); C.I. Hamilton, 'John Wilson Croker: Patronage and Clientage at the Admiralty' *Historical Journal* 43 (2000) 49-77; Rodger, *The command of the ocean*, under 'Administration', especially 483-4.

¹⁸ Author's possession, letter from Day to R.T. Bailey.

¹⁹ A. Parry, *Parry of the Arctic. The life story of Admiral Sir Edward Parry, 1790-1855* (London, 1963), 118-38.

²⁰ UKHO, Ritchie Papers, uncatalogued letters from Ann Parry, 1963.

1808) and Beaufort (Hydrographer from 1829-55)²¹ provide the most in-depth examinations so far of office activity during those periods. Both of those PhD theses provide minutiae of both the wider context of the office of Hydrographer and of the achievements of both men, however there are some problems with both of these studies. Although not fundamentally flawed these two studies the following issues need to be addressed. Cook's desire to vindicate Dalrymple's actions, his surprising lack of any inclusion of the relevant experience Hurd brought to the office (as well as Hurd's subsequent achievements) and the political questions raised after Dalrymple's dismissal, make the last chapters of his *magnum opus* one-sided. Cook's dismissive nature of anything connected to hydrography prior to Beaufort having any scientific worth is challenging, especially when in view of the close association of Hurd to Flinders²² and Banks, as well as Parry's work on his northern voyages.²³ But these are minor criticisms.²⁴

Similarly other writers have ignored Hurd and Parry to focus on Beaufort as the Hydrographer who attached the Office to the scientific world of the mid-nineteenth century and have failed to utilise many (if any) of the early materials which this study has included.²⁵ Many other writers have also touched on this period but all have concentrated on a particular theme, or so superficially to have made little contribution to our knowledge of the administration. Of note amongst those thematic studies are the works of Ursula Lamb on Felipe Bauzá, the exiled Spanish

²¹ J.K. Laughton, 'Beaufort, Sir Francis (1774–1857)', rev. N.A.M. Rodger, *ODNB* [accessed 14 Aug 2009].

²² J.K. Laughton, 'Flinders, Matthew (1774–1814)', rev. A.C.F. David, *ODNB* [accessed 12 Aug 2009].

²³ A.S. Cook, 'Alexander Dalrymple (1737-1808), Hydrographer to the East India Company and to the Admiralty, as publisher: a catalogue of books and charts' (unpublished PhD thesis, University of St. Andrews, 1992); R. Cook, 'Sir Francis Beaufort and the co-ordination of British scientific activity, 1829-55' (unpublished Ph.D thesis, Cambridge University, 2003).

²⁴ Dalrymple's removal and the following political fall-out would clearly have affected Hurd, an action which ultimately vindicated the decision by the Admiralty Board. He was offered a pension of an equal amount to his salary which he refused, clearly leaving the Admiralty Board little choice if progress in chart production and supply was to be achieved but to dismiss him (Anon, *The parliamentary register; or, an impartial report of the debates that have occurred in the two houses of parliament in the course of the second session of the fourth parliament of the United Kingdom of Great Britain and Ireland III* (London, 1808), 1102-3, 1134-8).

²⁵ M. Deacon, *Scientists and the sea 1650-1900: a study of marine science* (London, 1971 and Aldershot, 1997); T. Rice, *Voyages of discovery. Three centuries of natural history exploration* (London, 2000). M.S. Reidy, 'The Flux and Reflux of Science: The Study of the Tides and the Organisation of Early Victorian Science' (unpublished PhD thesis, University of Minnesota, 2000) devotes a chapter on pre-Beaufort tidal work and his findings are similar to those unearthed during the research for my thesis. Similar conclusions can be drawn with those of D.P. Miller's 'The Royal Society of London (1800-35): A Study of the Cultural Politics of Scientific Organization' (unpublished PhD thesis, University of Pennsylvania, 1981). Although neither studies used records at the UKHO in any depth Miller's contains a great deal of relevance to Chapter Four.

Hydrographer, who gives an excellent account of his involvement with the Admiralty in the 1820s.²⁶ Similarly studies by Lt-Cdr Andrew David, R.N., over the space of thirty years have added greatly to the understanding of individual elements of British hydrography.²⁷ David made extensive use of the collections at the Hydrographic Office before they were split between Taunton, Portsmouth and Kew, giving him a unique view of the materials; coupled with his practical surveying experience, resulted in some noteworthy works on these obscure subjects. An exceptionally insightful work is that by Fisher on the private chart trade, which details the activities of seven men across three separate businesses who were involved in chart selling to the Navy and naval officers during the period 1808-1829. Fisher's work, which was many years in gestation, naturally includes a wide variety of material, most of which is in private hands, providing a thorough investigation of the extent of those business activities.²⁸ Private business held a virtual monopoly on chart sales until 1821 when the suggestion to sell charts to the public finally came to fruition. Other writers, including Terrell, Blewitt and Robinson all mention the period, but of these three only Robinson goes into any depth, in a masterly fashion picking out the salient points.²⁹

Primary sources available for researching this period

Fortunately the United Kingdom Hydrographic Office (UKHO) have retained a great deal of its correspondence, although material from Dalrymple's term as Hydrographer is sparse compared with that of Hurd, which in turn is much less frequent than those survivals covering Parry's Hydrographership. This may be a reflection of the amount of work which Dalrymple failed to involve himself in, beyond that required by the Admiralty Board, but more likely is the simple fact that the Hydrographic Office was in its infancy and was yet to develop into that mature publishing and geographical storehouse that Beaufort inherited in 1829. This lack of material can partly be

²⁶ U. Lamb, 'The London years of Felipe Bauzá: Spanish Hydrographer in exile, 1823-34', *The Journal of Navigation* 34:3 (September 1981), 321-40.

²⁷ 'British Hydrography in the Mediterranean in the Early Nineteenth Century', 'A Description of the Surveys of Sir Francis Beaufort' and 'Admiralty Sailing Directions' are unpublished but copies are held at the UKHO in the 'Andrew David Collection'. 'Bibliographical notes on nineteenth century British Admiralty charts' and 'Is it Hurd's or Dalrymple's Channel Atlas?' were printed in *The Map Collector*.

²⁸ S. Fisher, *The makers of the blueback charts: a history of Imray Laurie Norie and Wilson Ltd* (St Ives, 2001).

²⁹ C. Terrell, 'Captain Columbine, Alexander Dalrymple and the troubled birth of the British Admiralty Hydrographic Service', *Guerres et Paix 1660-1815* (Vincennes, 1987), 245-59; M. Blewitt, *Surveys of the seas* (London, 1957); A.H.W. Robinson, *Marine cartography in Britain. A history of the sea chart to 1855* (Leicester, 1962), 97-113.

explained by the time Dalrymple spent sorting the cartographic materials in the Admiralty, of which only one list of published charts survives from c.1800.³⁰ After 1815 the amount of correspondence increased, which was due to the opportunities for expansion after the Peace. This is reflected in the letter books from 1815³¹ and increased again when the Lord High Admiral gave Parry more autonomy in 1828.³²

The method of archiving adopted in the Hydrographic Office means there is no single discrete series of correspondence; 'in' letters can be found amongst five different types of documents, but there is no one single catalogue of all the letters. The core materials for the history of the office (in addition to correspondence) are minutes to and from the Board held at the National Archives which survive for the whole period, including the Chart Committee papers.³³ There are also the Hydrographer's own more thorough minutes from 1825, original volumes of receipt ledgers, sailing directions, remark books as well as record copies of printed charts and chart catalogues at the Hydrographic Office, and Hurd's office expenses for 1818-1823 at The National Archives. The receipt ledgers were not started until 1826 for 'receipt' purposes, but the earliest volume records what is thought to be all the surviving cartographic source material in the Hydrographic Office when established in 1795. Although Dalrymple's list of published charts has survived,³⁴ a similar list of manuscript charts has not, leaving only the catalogue (in one volume) by Lieutenant A.B. Becher R.N. started in 1823³⁵ as the nearest thing to a complete record of charts and surveys for the period of this study.³⁶ These records taken together give a unique insight into the office activity; details of their coverage can be found in the bibliography. Also at Taunton are the Parry papers, which are a mixture of original and copy reports, correspondence and office memoranda. These were retained by Parry and returned to the office many years after he left, thus they form no part of the official run of minutes and 'out' letters, but they are particularly insightful as well as an invaluable source for the 1820s.³⁷ Lesser amounts of original material are found

³⁰ UKHO, MLP183.

³¹ UKHO, LB1-2, 'out' letter books, 1815-32.

³² See the increase in the number of 'in' letters which survive at Taunton in the 'SL' and 'LP1857' series.

³³ TNA, ADM1/3524.

³⁴ UKHO, MLP183.

³⁵ Ritchie, *Admiralty chart*, 177; UKHO, Book A.

³⁶ UKHO, Ledger Book 'A'. This also includes all the privately published printed charts received, or found, from 1800 to 1826 which are not in Dalrymple's list.

³⁷ UKHO, MLP 1-5. The minute books and 'out' letters are in the MB and LB series respectively.

scattered among the Admiralty records at Kew, such as the records of salaries, digests of Admiralty correspondence with the Board, contingent accounts, as well as numerous letters relating to Hurd's experience prior to his appointment amongst letters from commanders-in-chief and Lords' Commissioners letters and instructions.³⁸ The cartographic records of chart production at the Hydrographic Office are mostly in the record copies of printed charts at Taunton, but as this is far from complete the collections at the National Maritime Museum, The National Archives, The British Library, The Royal Geographical Society, The Bodleian Library and the Somerset Archives and Record Service have been searched. Many of the original surveys from which these charts were derived have survived and are either at Taunton or Kew.

Thesis arrangement

The arrangement of this thesis is on a thematic basis, rather than strictly chronologically as previous writers have chosen, for good reason. Chronological accounts have concentrated on events, often missing the important connections, implications and longer term issues which arose because of them. Thus a thematic analysis allows a much closer scrutiny of events between 1808 and 1829, with a focus given to a wider range of subjects never before covered in one volume. Chapter One covers the terms of reference under which its Hydrographers were employed, how those terms changed and the reasons for those changes. This higher level management, influenced by political factors, drove the office down particular routes which were not always beneficial to the Navy, or for the greater maritime community in which Britain played an ever increasing role, especially during the years of *Pax Britannica*. Chapter Two examines how the Hydrographers managed people, including surveyors who were thousands of miles away, civilians working in the office and naval personnel who occasionally came in to the Admiralty to make fair copies of their surveys ready for the engraver. There were also lieutenants working in the office for the Hydrographer as his 'naval assistants', as well as Mr John Walker, engraver, right-hand man to Dalrymple, reliable and efficient, who was the backbone of production throughout the period. Those men were essential during the Parry years,

³⁸ TNA, ADM1/492-4; ADM1/3524; ADM2/118, 264; ADM7/816-823; ADM12/133-262; ADM17/8-9.

but ironically their roles established a stronger office structure thanks to Parry's absenteeism and Croker's appointment of Becher.

Chapter Three identifies one of the key factors in the expansion of hydrography, that of data acquisition, which outside of the slow accrual of Royal Navy surveys has been mainly overlooked. The numbers of foreign government charts which were adopted during this period merely as reprints and other types of data, mainly topographic, which were purchased (such as Dalrymple's own collection of books³⁹ and charts from private publishers) or exchanged are examined, along with the issues relating to their use. From a Royal Navy perspective how surveys were planned was critical, especially in the years before the Peace when resources were tight because of the pressures of war,⁴⁰ as well as to a certain extent after the Peace when the pressure was on to make cuts. Chapter Four looks at the introduction and use of technology and its interaction in the field of science. The opportunities opened up after 1815 for experimentation and expansion involving anything relating to navigation that should have been referred to the Hydrographer, ranged from buoyage to new lights, sailing directions to anchorages, to name a few. Other matters of a more scientific nature such as Flinders' trials with magnetism,⁴¹ Stackhouse's waterproof charts,⁴² Burt's sounding machine⁴³ and Hurd's involvement with the Board of Longitude⁴⁴ are just a few of the areas in which the Admiralty benefited from having a Hydrographic Office and an experienced Hydrographer to deal with such matters.

Chapter Five examines the benefits of international relations and the unique position hydrography played in the maritime world, also how the overriding principle of safety of life at sea opened many doors. It is argued that surveyors and the Hydrographer were heavily involved with international relations and through this study the extent of those relationships is identified, especially after 1815 when the international scene changed dramatically. Questions as to whether there was already an international movement for the free exchange of hydrographic data before this time, and whether the Peace of 1815 affected this, are addressed. Whilst Britain was at war the exchange of data was highly limited but the availability of commercial charts

³⁹ TNA, ADM1/3458, Hurd to Pole, 24 August 1808.

⁴⁰ A useful view of the number of operations before the Peace is given in R. Woodman, *The victory of seapower. Winning the Napoleonic War 1806-1814* (London, 2005).

⁴¹ G.C. Ingleton, *Matthew Flinders: navigator and chartmaker* (Surrey, 1986).

⁴² UKHO, MB1 fos 19-22, 41, 196-7, 201-2, 205, 210, 220.

⁴³ TNA, ADM1/3459, Hurd to Croker, 8 June 1815.

⁴⁴ Hurd was appointed to the Board of Longitude on 26 April 1810 (TNA, ADM7/819).

and sailing directions went some way to alleviate that need. Dalrymple paved the way with the acquisition of materials from France, and Hurd opened up a healthy and productive relationship with Denmark in 1819,⁴⁵ as well as using a network of consular officials. Parry's high profile scientific voyages to the Arctic established him as a man of science who was internationally recognised, which had long-term benefits for the Hydrographic Office including international relationships with France.

Chapter Six follows on from the benefits of Chapter Five to show how the data obtained through international partnering was used to prepare charts and how they were kept in use, through correction and the issues, especially to Parry's reforms, which accompanied their production. A detailed examination of their compilation, issue and correction shows how data made its way through the office. How charts were compiled, whether solely from one source, or from a combination of sources from different periods of time (maximising the best use of the data which had been stored in the attics of the Admiralty for decades) was critical for safe navigation. Examples can be found of a genuine effort to compile multiple original sources for use as an Admiralty chart.⁴⁶ This suggests that the ethos within the office for chart production purposes was not purely of a reproductive nature. This chapter also includes information on the production of sailing directions and argues for a revision of the current misconception that they were first produced in 1828.

Chapter Seven covers the logistics of supply of not only charts to the Fleet but other navigational information, as well as chronometers and instruments, from the Hydrographic Office. Here can also be seen areas of hydrographic administration, which as a result of some highly superficial examination by previous historians has resulted in a less than satisfactory understanding of the extent of this subject. Here I argue that the supply of charts alone was exceptionally time consuming, even after 1815 when the number of ships in commission was reduced, but the number of charts in circulation grew year on year. Chapter Eight deals with the last major issue during this period, that of selling charts to the public. This includes the establishment of agents, numbers of sales, the success of the venture, the impact on the private chart trade and the position in which the Hydrographic Office found itself in by being backed by Government funding in competition with private industry. This was yet another area that reaped the benefits of reform during Parry's term as Hydrographer.

⁴⁵ UKHO, LB1 f.260, Hurd to Löwenörn, 30 December 1819.

⁴⁶ UKHO, E143, composite fair sheets of a survey of the Bristol Channel.

Chapter 1

Governance

The relationship between the Hydrographer and the Admiralty Board was one that changed over the period of this study. This change was fundamentally driven by the personalities of those involved, changing demands for ‘internal economy’ by the Admiralty and the seemingly endless expansion of office activities. Key to the governance of the office was the Admiralty Board, headed by the First Naval Lord, who the Hydrographer was directly answerable to, except for a brief period when Clarence served as Lord High Admiral in 1827 and 1828.⁴⁷ In addition to that examination other factors involving the subject of governance are examined in this chapter.

Dalrymple was set a difficult task when he was appointed Hydrographer to the Admiralty Board, as his remit was to arrange and digest the existing information, as well as ‘selecting and compiling all such information as may appear to be requisite for the purposes of improving navigation’. The time came, in his advancing years, when he failed to deliver what the Admiralty expected of him so he was replaced⁴⁸ by a much younger man, but more importantly by a naval captain.⁴⁹ During those years following Hurd’s appointment the relationship with the Board was without incident as Hurd found himself too occupied with supplying the Fleet with charts to look to areas of expansion or reform. This changed after the Peace in 1815 when financial pressure drove down the numbers of men in the Navy and all areas of Admiralty activity were

⁴⁷ The background of the three main Board members, as well as Clarence, and their relationship with Hurd and Parry has been examined at more length in my paper ‘Who ran the British Hydrographic Office, 1808-1829?’ in *Proceedings of the International Cartographic Association*, Portsmouth 2008 (Johannesburg, 2009) also available on-line through the International Cartographic Society website for the Commission for the History of Cartography (<http://www.stub.unibe.ch/ica-chc/>).

⁴⁸ J. Nichols, *Literary anecdotes of the eighteenth century: comprising biographical memoirs of William Bowyer, printer, F.S.A. and many of his learned friends; an incidental view of the progress and advancement of literature in this kingdom during the last century; and biographical anecdotes of a considerable number of eminent writers and ingenious artists* vol. viii (London, 1814), 36; Sir J. Barrow, *Sketches of the Royal Society and Royal Society Club* (London, 1849), 138-9. This is based on Barrow’s own dealings with Dalrymple. In Dalrymple’s defence he did not mention in his *Case of Alexander Dalrymple, late Hydrographer to the Admiralty* (London, 1808) the withholding of information from the Board and its Chart Committee as the reason of his being offered a pension. See also J. Greig, ed., *The Farington diary vol. 2* (London, 1922), 74 for the view of Fellows of the Royal Society and E.P. Brenton, *Life and correspondence of John, Earl of St. Vincent, G.C.B., Admiral of the Fleet, &c. &c. &c.* 2 vols (London, 1838), 292-3, for the identification of Dalrymple’s shortcomings in office.

⁴⁹ The date of his appointment was 28 May 1808 (J.C. Sainty, *Office-holders in modern Britain*, IV, *Admiralty officials 1660-1870* (London, 1975)).

looked at for savings. The Hydrographic Office was no exception to this and it is from then that certain misconceptions in the historiography of the governance of the office have occurred in the writings of three former Hydrographers, Edgell, Day and Ritchie.⁵⁰ However, as the office occupied more rooms than it had staff, if any cuts were made it is most likely it would have ceased to function altogether, or only to have acted as a supply depot with no capacity to draw and print any new charts, thus becoming reactive rather than proactive.

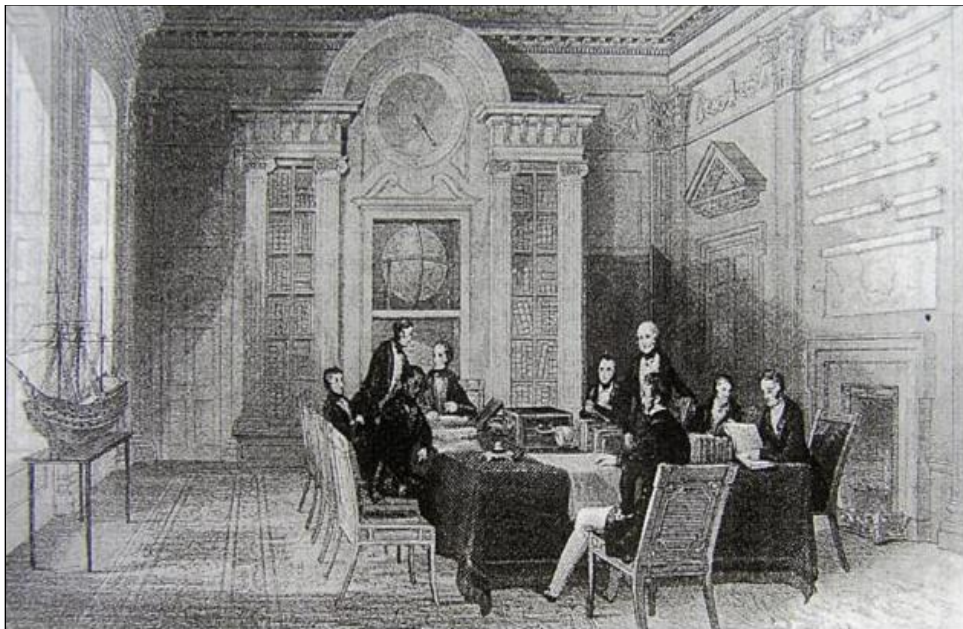


Illustration 1.1 The Admiralty Boardroom in the early nineteenth century where the governance of the Hydrographic Office was determined. Note the map or chart hanging on the wall over the fireplace and the globe, showing how important geographical knowledge was to Admiralty policy and strategy (Ackerman's *Microcosm of London*).

Lord Melville

Out of all the Board members it was Croker in particular who appears to have had more direct involvement with the governance of the office,⁵¹ who almost exclusively dealt with business from or to Hurd.⁵² Historiography shows how unimportant

⁵⁰ J.A.E. Edgell, *Sea surveys. Britain's contribution to hydrography* (London, 1948); Day, *Hydrographic Service*; Ritchie, *The Admiralty chart*. See the 'Introduction' and the section within this chapter under Croker, for details of those misconceptions.

⁵¹ Out of the 1020 letters entered in the Hydrographers' out-letter books from 1815-1829 some 49 are addressed personally to Croker, which compares with 16 to Barrow and three to Melville (UKHO, LB1 and 2, *passim*).

⁵² More importantly, of the 584 documents in the out-letter book from 1815-1822 when Hurd was Hydrographer, all 49 (to Croker) fell within that period, accounting for just under a tenth of all the letters Hurd wrote from the office on official business. In addition to these there were 56 which had some recourse to instructions given by the Lords Commissioners (*i.e.* the Admiralty Board), another 19

hydrography was to the Board, as only Barrow mentions it in his autobiography,⁵³ thus placing the Hydrographic Office on a level of importance with the Admiralty's necessary woman and the head gardener! Similarly the £5,000 upper limit for Hydrographic Office contingencies in 1821 (when they were voted at the highest level) and the salaries of six members of staff, pales into significance compared to the £6,400,000 naval estimate for that year.⁵⁴ However, before thinking the office was totally insignificant, to this small sum must be added the cost of manning and fitting vessels to collect the data the Admiralty needed and the cost of vessels lost because they were using charts which were not fit for purpose.

With Croker predominantly dealing with the day-to-day issues this left Melville to implement political policy and promotions, and Barrow to formulate his agenda for scientific voyages of exploration.⁵⁵ Although Melville 'could be ruthless when necessary'⁵⁶ this was not the case with the Hydrographic Office and he certainly did represent its best interests, especially on those handful of occasions when Hurd approached him concerning promotions. Hurd also showed the Board the achievements and abilities of his officers by showing them their surveys, so they could make an informed decision regarding promotability,⁵⁷ which was a successful strategy⁵⁸ much to Croker's liking.⁵⁹ In October 1822 Hurd brought to Melville's

mentioning Barrow, Croker or Melville during Hurd's term and 13 afterwards. Notably only six occurred during Hurd's term, but the 50 during Parry's term reflect a much closer grip by the Board on matters during this period than when Hurd was in office. But the 50 letters are out of a total of 436, being just over a tenth of all business, suggesting that the Admiralty Board actually paid its Hydrographic Office approximately equal attention under both Hydrographers. Another way of explaining this is by analysing the fact that the amount of business (in the form of letter writing), remained relatively stable between 1815 and 1829, and one in every ten letters involved recourse to the Board's decision. Another way of looking at this was that if the Hydrographer (or his deputy) worked on average five days a week, he could have spent at least half a day each week dealing directly with Board issues and correspondence (UKHO, LB1, passim).

⁵³ R.A. Morriss, *Cockburn and the British Navy in transition. Admiral Sir George Cockburn 1772-1853* (Exeter, 1997), passim; Sir J. Barrow, *An auto-biographical memoir of Sir John Barrow, Bart., late of the Admiralty, including reflections, observations and reminiscences at home and abroad, from early life to advanced age* (London, 1847), in particular page 394 for the appointment of Beaufort; F. Fleming, *Barrow's boys* (London, 1998); Pool, *Croker papers*; Brightfield, *John Wilson Croker*; L.J. Jennings, (ed.), *The correspondence and diaries of the late Right Honourable John Wilson Croker . . . 3 vols* (London, 1884).

⁵⁴ House of Commons, *The ordinary estimate of His Majesty's Navy for the year, 1821* (London, 1821); Day, *Hydrographic Service*, 348; A. Lambert, *The last sailing battlefleet: maintaining naval mastery 1815-1850* (London, 1991), 16.

⁵⁵ The Admiralty Board was usually made up of up to seven commissioners until 1822 when it was reduced to five ('Lord High Admiral and Commissioners of the Admiralty 1660-1870', *Office-Holders in Modern Britain: Volume 4: Admiralty Officials 1660-1870* (1975), 18-31).

⁵⁶ M. Fry, 'Dundas, Robert Saunders, second Viscount Melville (1771-1851)', *ODNB* [accessed 24 Nov 2007]; M. Fry, *The Dundas despotism* (Edinburgh, 1992).

⁵⁷ UKHO, LB1 fos 20-1, Hurd to Melville, 13 September 1815.

⁵⁸ UKHO, LB1 fos 286-7, Hurd to Croker, 5 February 1820.

attention midshipman Denham, who had been a ‘very useful and meritorious assistant . . . expressing a hope that some mark of Lord Melville’s approbation of his services may be bestowed on him’.⁶⁰ Denham’s promotion to lieutenant followed two months later and he eventually rose to the rank of vice-admiral, clearly realising the faith Hurd, Melville and his commanding officer, Martin White (at that time), had in him. Melville also got involved with other matters outside of promotions that concerned the Hydrographic Office, such as the precise position of the Plymouth breakwater and chart supply to the royal yacht,⁶¹ but his main preoccupation was his ‘constant struggle . . . to find every possible economy’.⁶²

As First Lord it was also his duty on 19 October 1823 to offer Parry, after the latter’s return from the Arctic, the position of Hydrographer, which Parry wrote to his brother was undertaken in a ‘very handsome manner’.⁶³ However, as it had been some seven months since the demise of Hurd, and possibly longer since he was last in the Hydrographic Office,⁶⁴ the delay by the Board in making an appointment is questionable. It was not a case of Parry being the only man who was considered for the post, as Beaufort wrote to the Board in May stating his wish to be Hydrographer, only to be told by the Board that they had no immediate intention of filling the post.⁶⁵ Captain Peter Heywood was offered the position by Melville but declined the

⁵⁹ For examples of patronage see, Captain W.H. Smyth, *Sketch of the present state of the Island of Sardinia* (London, 1828), iii-iv. Smyth had the potential to become Hydrographer because of his scientific and knowledge of a broad field of hydrographic subjects, but it was only Beaufort’s great length of time in office which prevented the opportunity of this post becoming available. Another letter to Melville sought to promote Commander Martin White, as Hurd thought him ‘an officer particularly gifted for scientific researches and worthy of your Lordships particular patronage’ (UKHO, LB1 fos 102-3, Hurd to Melville, 26 May 1817). Hurd was again successful as White was promoted to captain in the following year and to show his gratitude named Melville Pit at the mouth of the Channel after his patron (D. Syrett and R.L. DiNardo, *The commissioned sea officers of the Royal Navy, 1660-1815*, Navy Records Society (1994), 467).

⁶⁰ UKHO, LB1 f.508, Hurd to the Admiralty Board, 26 October 1822.

⁶¹ UKHO, LB1 f.483, Hurd to Whidbey, 25 April 1822. Whidbey served as master under Captain Vancouver during his voyage of exploration and later as Master Attendant at Sheerness Dockyard. He was selected by St Vincent to construct the breakwater at Plymouth (H. Craig (ed.), ‘Letters of Lord St Vincent to Thomas Grenville, 1806-1807’ in C. Lloyd, *Naval miscellany IV*, NRS 92 (1952), 483). For the supply of charts to the royal yacht see UKHO, LB1 f.485, Hurd to Allen, 26 April 1822.

⁶² M. Fry, ‘Dundas, Robert Saunders, second Viscount Melville (1771–1851)’, *ODNB* [accessed 24 Nov 2007].

⁶³ The original letter was in private hands and is quoted in Ritchie, *Admiralty chart*, 175. A transcript of this letter is in the Ritchie Papers at the United Kingdom Hydrographic Office. For letters to the Admiralty Board relating to his appointment from Parry see William L. Clements Library, Croker box 6 Parry to Melville, 26 November 1823; *ibid*, Parry to Croker, 7 December 1823.

⁶⁴ Possibly the last letter signed by Hurd is dated 11 April 1823 (TNA, ADM3/201).

⁶⁵ A. Friendly, *Beaufort of the Admiralty. The life of Sir Francis Beaufort 1774-1857* (London, 1977), 228. Despite this snub by the Board, and having to wait six years, Beaufort became Hydrographer after Parry resigned in 1829.

position, because he thought Beaufort was the most suitable officer to run the Hydrographic Office.⁶⁶ Despite Friendly thinking it was Croker's decision not to fill the post,⁶⁷ it appears Melville was in no hurry to make such an appointment and even went as far as keeping the position open for Parry whilst he was away on another expedition. Similarly, when Parry's successor was being chosen, it was Melville who held the strings and asked the Second Secretary to choose between the two candidates.⁶⁸ Melville also had the last say when it came to appointing additional resources such as the Frenchmen, St Amand, although it was often Croker who wrote out the orders and minutes.⁶⁹ Only the First Lord could hold such power. Despite one historian stating how Melville was 'completely at sea' when it came to naval matters,⁷⁰ his administration and governance of hydrographic matters was fair, informed and supportive.

John Wilson Croker

Although Melville clearly had the greatest influence, it was Croker who appears most in the correspondence with the Hydrographer, but it is impossible to establish just how much influence one person had within the Board over the Hydrographic Office alone.⁷¹ Melville, as leader of the Scottish peers, was more involved in politics than running the Admiralty, coupled with his many absences, left Croker mainly in charge of the day-to-day administration.⁷² What is difficult to establish is when the Hydrographer wrote to Croker, was he only going to receive a reply reflecting Croker's own views and opinions, or did Croker discuss the matter with his fellow

⁶⁶ *The Nautical Magazine and Naval Chronicle for 1858. A journal of papers connected with maritime affairs* (London, 1858), 98-99.

⁶⁷ Friendly, *Beaufort of the Admiralty*, 229.

⁶⁸ Ritchie, *Admiralty chart*, 209.

⁶⁹ Cook 'Alexander Dalrymple ...', 171. Officers who spent time in the office included Captain William Bligh, who was called in for six weeks to cover during Dalrymple's absence and Hurd, who spent several years using the office to draw up his survey of Bermuda; both appointments were made by the Board and were relatively straight forward as both men were naval officers. Gould suggested that St Amand was a friend of the First Lord, the Rt Hon. Charles Yorke (UKHO, MLP4, R.T. Gould, 'A history of the Hydrographic Department of the Admiralty', chapter 2 (n.d.), 4); see also TNA, ADM1/3458, Hurd to Yorke, 13 February 1812.

⁷⁰ C. Lloyd, *Mr Barrow of the Admiralty. A life of Sir John Barrow, 1764-1848* (London, 1970), 89.

⁷¹ This is due to a lack of verbatim minutes that would quantify this statement. The minutes at the National Archives are a mixture of notes, memoranda and final decision, with little indication of the discussions over their content.

⁷² Parry, *Parry of the Arctic*, 124. Melville was absent from the Admiralty for long periods from the summer to autumn, either at Melville Castle, or yachting on the Solent but is known to have used the telegraph from Portsmouth to relay decisions using his own private code, see C.I. Hamilton, 'Expanding naval powers: Admiralty private secretaries and private offices, 1800-1945', *War in History* 10 (2003), 126.

Board members and then write the reply signing his name as if the decision was his own and not a collective one? Either way the decision he made would have been influenced in some part by the views and policies of the Board, which in turn were driven by political and operational demands. Croker was driven by the political need, even more so after the Peace of 1815, to obtain full value for money. Although his ‘manner was often overbearing and harsh’⁷³ as First Secretary he dealt with a phenomenal amount of work and naturally the pressure of office would leave little time for the niceties and formalities some people expected.

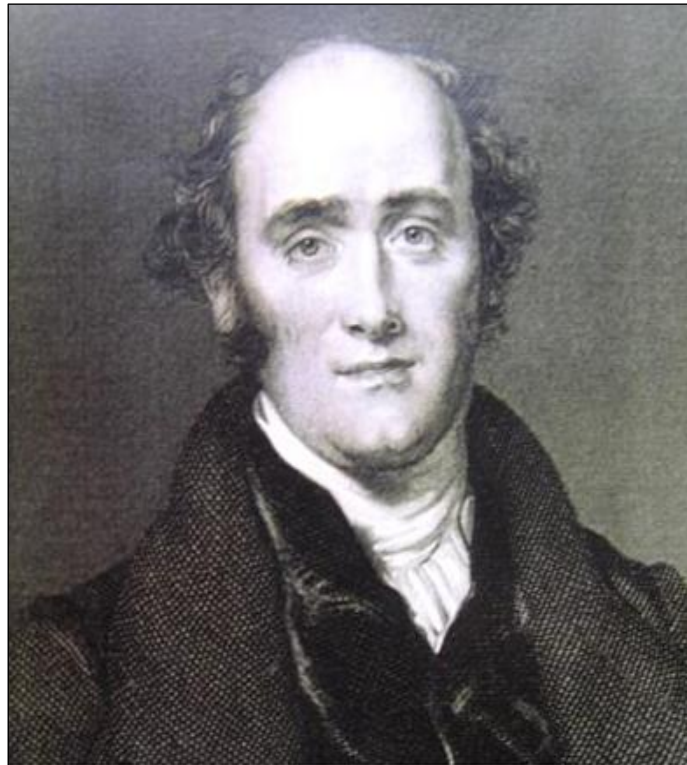


Illustration 1.2. John Wilson Croker (L.J. Jennings, *The Croker Papers*).

Historians of hydrography have portrayed Croker in a very unfavourable light.⁷⁴ Such views were not put in context and only highlighted a small number of potentially damaging events, without any great substance. Those views suggest that Clarence’s governance was against the plans of Croker, but this minute under Clarence’s rule was only a revision of one that had been drawn up by Croker in

⁷³ Day, *Hydrographic Service*, 13.

⁷⁴ This is mainly due to two sources; the comments by Parry and the dealings Croker had with the Walker family, in particular John Walker. A pencilled note, most likely written by one of the Walker family, in the margin against a minute from the Duke of Clarence, states the original minute ‘was in Croker’s hand writing – what a leek for him to swallow. It condemned all his mischievious [*sic*] doings’ (UKHO, MLP 77).

1825.⁷⁵ More tangible is the letter the Chief Clerk John Dyer wrote to John Walker in 1823 in which he stated:

It having been some time in contemplation to reduce the present establishment of the Hydrographical department it is Mr Croker's direction that you inform W. Brown and J. Anderson that their services will be no longer necessary, . . .⁷⁶

Both of these pieces of evidence, which are still in the Hydrographic Office archive, could have been used in Richards' historical notes he put together in the 1860s.⁷⁷ Richards' *Memoir* certainly promoted the unfavourable image of Croker and his dealings with some issues relating to hydrography came to light.

In the 1880s Dawson wrote of his governance of the office as ' . . . that Mr. Croker . . . was using his energy and strong will not altogether in favour of the department . . .'⁷⁸ and how he thought he was its enemy. Dawson hypothesized that Croker looked unfavourably upon the office and how the sheer vitality of the office saved it without quoting any substantial evidence.⁷⁹ This theme was copied by Gould, Edgell, Ritchie and Day, which only served to exacerbate a poorly understood relationship.⁸⁰ Similarly when Captain Smyth was ordered out of the Hydrographic Office by Croker (taking all his charts with him), Ritchie called it an 'apparent high-handed action',⁸¹ later stating how Croker's dislike of naval officers preparing their fair charts in the Office and his request for weekly progress reports drove both Peter Heywood and Smyth out of the office.⁸² Whether the Board required them to leave, or whether they decided to resign because of the alleged conditions they had to work in, is far from clear. Smyth's departure from the office in October 1826 appears to have been due to the fact that he had finished the compilation of his fair charts. It was then up to the civilian draughtsmen to 'facilitate the reduction copying or engraving of the

⁷⁵ UKHO, MLP 5/3iv, draft minute of 1828; Ibid, MB1, Board minute of 1825.

⁷⁶ UKHO, MLP 2/1, Dyer to Walker, 7 July 1823.

⁷⁷ Richards, *Memoir*, 6.

⁷⁸ Dawson, *Memoirs*, 100.

⁷⁹ Dawson wrote ' . . . an institution of highly-skilled map makers, who, encouraged by a few enthusiastic naval officers, were likely to make work for work (not without profit's sake). It has been said that he imposed upon the traditionally credulity of the naval members of the Board, using the oft repeated arguments so dear to the naval mind – that they had managed to navigate ships and conduct operations without such scientific charts in their day; why, therefore, should not the navy of the period, and posterity, do the same?' (Dawson, *Memoirs*, 101).

⁸⁰ UKHO, MLP4; Edgell, *Charting the seas*, 8; Ritchie, *Admiralty chart*, 153, 176-7.

⁸¹ Ritchie, *Admiralty chart*, 11.

⁸² Ritchie, *Admiralty chart*, 177.

charts made under his orders',⁸³ using a list of charts to be prepared for publication drawn up by Smyth.⁸⁴ Day was also of a similar opinion about Croker and how he 'was concerned to limit the autonomy of the department'.⁸⁵ Day quotes how Croker wrote to Walker in 1823 to inform him that 'it was merely a branch of this office',⁸⁶ which while apparently dismissive was entirely correct on Croker's part. As the Hydrographer had no directorial autonomy and as the office was still in its development, even the most trivial of matters had to be approved by the Board who had the final say on any matters of importance.

When Croker had to take a back seat during those halcyon days when the Lord High Admiral was in charge at the Admiralty, Parry wrote of the post of Hydrographer that

It is now, in short, fit for a gentleman and an officer to hold, which was by no means the case, when a certain person whose name begins with a C, was allowed to govern the Admiralty from top to bottom. This is all over now, and, under the Duke's government, every-body minds their own business.⁸⁷

It is also highly likely that in 1827 Parry was referring to Croker (rather than Cockburn), when he wrote about the high popularity of the Duke of Clarence 'with certain exceptions' *i.e.* Croker being one of the exceptions.⁸⁸ Indicating how the Parry family had little time for Croker's interference and his style of management was (to Parry's mind) detrimental. But it was not just Croker who was open to criticism as an Admiralty clerk, Thomas Crofton Croker (1798-1854), who owed his position to John Wilson Croker,⁸⁹ wrote very unfavourably of Parry in April 1828, indicating a possible rift between the Houses of Parry and Croker. He referred to Parry as jealous, 'the very reverse of a manlike openhearted sailor' and how the 'Northern expeditions', *i.e.* to the Arctic, would before long be shown 'in their true light of most

⁸³ UKHO, MB1 fos 60-1, minute dated 7 October 1826.

⁸⁴ UKHO, MB1 f.73, Parry to the Board, 12 October 1826. The MS of Smyth's work is divided into chapters, with each chapter wrapped in a sheet of Whatman paper with an 1825 watermark. However, his sailing directions which should have accompanied the charts were not published at that time although they appear to have been compiled in 1825 (UKHO, MLP 790).

⁸⁵ Day, *Hydrographic Service*, 35.

⁸⁶ UKHO, MLP2, Croker to Walker, 7 July 1823; Day, *Hydrographic Service*, 35. Day mistakenly joined that event together with the minute of 18 November 1825 (see Appendix 3) as evidence of Croker's determination to 'limit the autonomy of the department'. The 1825 minute was drawn up to give guidance how the Hydrographic Office should be run whilst Parry was away, which was fundamentally of little difference to while Parry was in post.

⁸⁷ Parry, *Parry of the Arctic*, 127.

⁸⁸ Parry, *Parry of the Arctic*, 120. Parry's cousin thought Croker was 'singularly entertaining and disagreeable' (*Ibid*, 124).

⁸⁹ W.J. McCormack, 'Croker, Thomas Crofton (1798–1854)', *ODNB* [accessed 29 June 2008].

gross humbug'.⁹⁰ This may not be without some substance as Captain John Ross' voyage to Baffin's Bay in 1818 was lampooned in a cartoon which portrayed their efforts as more of a comical procession than a serious scientific voyage.⁹¹

There were a great many things in Croker's favour, even Dawson and Gould acknowledged his finer points.⁹² He supported Hurd when the latter's accounting was brought into question in 1812 because of the procedures which were followed, and not for any financial irregularity. Croker agreed to pass the accounts, apparently without any condemnation of Hurd.⁹³ This was an ideal opportunity for Croker to have acted against Hurd but he did not take it, nor did he refer to it at a later date to use against him. When Parry was absent from the office in 1826 fitting out for his next voyage, it was Croker who signed the minute appointing Becher to be his stand-in, although he pointed out that Becher was to have no additional salary for undertaking the additional duties.⁹⁴ As the Hydrographer answered directly to the Admiralty Board so the Board naturally took even greater control when there was no Hydrographer.

A theme which had some bearing on a key event in the administration of the office, which has always been laid at the door of Croker was Parry's resignation from the post of Hydrographer. Parry claimed his position was that of 'A Director of a Chart Depot for the Admiralty, rather than a guide and originator of Maritime Surveys',⁹⁵ showing his dislike for what he saw in his eyes as a role of diminished responsibility. However, there is another side to Parry's departure that suggests it was not only Croker's activities which forced him out of the office, but that of money. The Hydrographer's salary was not particularly high for a naval officer, compared to the potential of earnings from prize money (mainly prior to 1815) and carrying freight, although Hurd had managed to raise his salary by the Board's decision to grant him

⁹⁰ National Maritime Museum, MSS78/038.a, T.C. Croker to unnamed recipient.

⁹¹ J.P. Delgado, *Across the top of the World. The quest for the Northwest Passage* (New York, 1999), 58.

⁹² Dawson states how Croker '... doubtless had his duty to do, or what he regarded as his duty, in a financial way, viz., to keep down the expenses of the Admiralty as well as of the navy generally' (Dawson, *Memoirs*, 101). Similarly in the 1920s Gould wrote how 'Croker was an energetic and ambitious man and we can feel increasingly his hot breath on the back of Hurd's neck' (UKHO, MLP4 p.8). Lt-Cdr. R.T. Gould prepared a typescript 'History of British Hydrographic Office', which although unpublished was used heavily by Day in his *Hydrographic Service*, from which this quote was taken. Gould only managed two chapters before realising the task was too great and he gave it up. Despite encouragement from the Hydrographer, Gould never returned to the project (J. Betts, *Time restored. The Harrison timekeepers and R.T. Gould the man who knew (almost) everything* (Oxford, 2006), 70).

⁹³ TNA, ADM1/3458, Hurd to Croker, 21 April 1812; *ibid*, Kite to Croker, 22 April 1812.

⁹⁴ UKHO, MB1 f.91, Croker to Dyer, 30 November 1826.

⁹⁵ Ritchie, *Admiralty chart*, 187.

his half pay. Ann Parry (in her biography of Captain Parry) quotes two of his letters in which he stated that the office was ‘little worth the salary to any but an absolute beggar like myself’, and ‘I am losing both health and money (about £200 per annum) . . . this will not do’.⁹⁶ Therefore the offer he was made to become a Commissioner of the Australian Agricultural Company at £2,000 a year for four years and an annuity at the end of it of £300 for life,⁹⁷ was far too tempting compared to the current situation as Hydrographer whereby he received a paltry salary of £500 per annum.⁹⁸

There were other issues which were more intricate than they first appear, from which Croker has previously been cast as the villain of the piece. The plan by Parry to prepare more volumes of sailing directions meant more resources, but more importantly the easy access to charts, sailing directions, reports and other data meant the accumulation of such material had to be organised and indexed. Croker’s reply on the issue of retaining Becher, a naval officer, in undertaking an indexing task (*i.e.* of the Navy’s navigational remark books) was naturally something which should have been questioned.⁹⁹ Why then in this instance did the Admiralty need to employ a competent naval officer to undertake such a task, when the Board were trying to expand its fleet and would have needed officers to man the extra vessels? This was a ‘double whammy’ as not only did it deprive the Fleet of an officer but it cost the Admiralty more than a civilian’s wages to undertake the task in question. Whether the Admiralty could have found a civilian with sufficient navigational and geographical knowledge is another matter, but Becher was retained to the advantage of the office.¹⁰⁰

Second Secretary to the Admiralty, John Barrow

The only member of the Admiralty Board to see continuous service between 1808 and 1829 was John Barrow (later knighted). Barrow served several terms on the Council of the Royal Society and as its vice-president, but was better known as one of the founders of the Royal Geographical Society in 1830, which organisation he later served as president. He owed his allegiance to Lord Melville who appointed him to the Board in 1804 and was ‘convinced that Britain’s security and future wealth

⁹⁶ Parry, *Parry of the Arctic*, 134-5.

⁹⁷ Parry, *Parry of the Arctic*, 136-7.

⁹⁸ He also received a knighthood on 29 April 1829 at St James’s Palace (*London Gazette*, 1 May 1829).

⁹⁹ Ritchie, *Admiralty chart*, 178.

¹⁰⁰ UKHO, MLP107, Becher’s memoirs, 1869; quoted in Ritchie, *Admiralty chart*, 176-7.

depended on control of the world's sea lanes both for trade and for defence'.¹⁰¹ To obtain this 'control' for defence meant high quality geographical knowledge and data being made available to its defenders, therefore navigational information was key to his strategic thinking. It was this type of thinking which raised the importance of the work undertaken in the Hydrographic Office in the eyes of the Board, especially those that were allegedly less than supportive. He is known to have supported numerous voyages involving naval personnel to collect geographical data,¹⁰² he wrote extensively about geographical matters¹⁰³ and even a biography of Anson, he also collected geographical intelligence,¹⁰⁴ which made him an ideal foil for Croker's occasional detrimental penny-pinching conservatism.

Barrow continued to use his connections throughout the period to promote geography and to a lesser extent hydrography, such as through his connection with Joseph Planta, Under-secretary at the Foreign Office.¹⁰⁵ This was the tip of a very large iceberg of connections that Barrow built up, resulting in a significant amount of information ending up in the Hydrographic Office. Ironically his indifference towards one provider of information, the exiled Spanish Hydrographer Don Felipe Bauzá, did not deter the Spaniard from providing the Admiralty with a wealth of hydrographic information. This was despite Bauzá writing of Barrow as being '... not frank and not at all forthcoming', being '... eager for glory and full of envy ...', but more

¹⁰¹ Lloyd, *Mr Barrow*, 69-97; J.M.R. Cameron, 'Barrow, Sir John, first baronet (1764-1848)', *ODNB* [accessed 24 Nov 2007]. For a general account of his interests mainly outside of hydrography see Captain G.S. Ritchie 'Sir John Barrow, Bart., F.R.S.' in *The Geographical Journal* 130 (September 1964), 350-4.

¹⁰² Ritchie, *Admiralty chart*, 179. For a fuller account of exploration under Barrow see F. Fleming, *Barrow's boys* (London, 1998). The pendulum experiments were undertaken to establish the figure of the earth and had seen 'a renewed attack upon this classical problem' after 1815 (Miller, 'The Royal Society ...', 177).

¹⁰³ J.M.R. Cameron, 'Barrow, Sir John, first baronet (1764-1848)', *ODNB* [accessed 24 Nov 2007].

¹⁰⁴ In 1819 William Allsopp wrote to Barrow in his capacity as Secretary to the Admiralty, after Barrow suggested how information on Allsopp's South American commercial voyages would be of use to the Admiralty. Allsopp included information in his letter of many commercial opportunities, the accuracy of navigational charts (by Malispina published by William Faden), descriptions of the aboriginal peoples, agriculture, livestock, timber, building materials and consideration of establishing an English settlement. The matter was also referred to the Board of Trade but it was of ephemeral use to hydrography as Hurd did not follow the matter any further (UKHO, LP1857 A159, Allsopp to Barrow, 10 July 1819). There is no out-letter relating to this matter in Hurd's letter book (UKHO, LB1). For Faden's biography see L. Worms, 'Faden, William (1749-1836)', *ODNB* [accessed 28 Aug 2009].

¹⁰⁵ W.W. Wroth, 'Planta, Joseph (1787-1847)', rev. H.C.G. Matthew, *ODNB* [accessed 21 Dec 2007]. Planta wrote very informally to Barrow, addressing him as 'My dear Barrow' when he asked for six copies of Owen's chart of the River Gambia in 1826 (UKHO, LP1857 P297, Planta to Barrow, 22 November 1826). Hurd had also sent information to Planta in 1822 concerning Russian charts (UKHO, LB1 f.516, Hurd to Bayley, 30 November 1822).

worryingly when it came to the Hydrographic Office ‘Mr Barrow is a man who neither understands nor cares for it’.¹⁰⁶

Despite Barrow’s alleged indifference towards hydrography he fully supported Parry in the latter’s career, not only in his voyages of exploration but also as Hydrographer. It was Barrow who recommended Parry to Lord Melville for the expedition to search for the north-west passage in 1817. Had Barrow not taken an ‘instant delight’ in Parry when they met,¹⁰⁷ the future of the Hydrographic Office may have been very different, as it was Barrow’s patronage and support of Parry that continually took him away from the Hydrographic Office. Not only was he taken away but his three appointments were only temporary ones, leaving the office without a permanent leader and on occasions without any noticeable direction. Further evidence of Barrow’s closeness to Parry occurred prior to Parry’s voyage of 1824, when the former told him

Do not think of quitting this situation, for, although it is true that you are to receive no salary for it, as soon as your ship is commissioned, still it is your sheet-anchor; keep hold of the Admiralty while you can – you do not know to what it may hereafter lead.¹⁰⁸

Such loyalty from the Board would have helped Parry’s own career, but not necessarily benefited the direction of the Hydrographic Office.

By the time Parry had offered his resignation from the post of Hydrographer, it was Melville who had the controlling hand in the appointment of his successor. Barrow thought the position was only a temporary one and it was Melville who wanted it to be a permanent position filled by ‘the most qualified officer that could be found’.¹⁰⁹ The Board received several applications which were narrowed down to two candidates, one of whom was Captain Peter Heywood who according to one source was (once again) offered the post but he allegedly refused, stating that Beaufort was the ‘fittest person to fill it’.¹¹⁰ According to Barrow the two applicants Heywood and

¹⁰⁶ Lamb, ‘The London years of Felipe Bauzá ...’, 324. See also A.C.F. David, ‘Anglo-Spanish cooperation in hydrography, navigation and nautical astronomy, 1788-1834’ in L. Martín-Merás (ed.), *Navigarre necesse est studios de historia marítima en honor de Lola Higuera* (Gijón, 2008), 153-62.

¹⁰⁷ A.G.E. Jones, ‘Sir John Ross and Sir John Barrow’, *Notes and Queries* 19(8) (August 1972), 298.

¹⁰⁸ UKHO, Ritchie Papers, letter from Parry to his brother dated 5 January 1824, abstracted by Ann Parry in a letter to Ritchie, 12 August 1963.

¹⁰⁹ Barrow, *An Auto-biographical memoir*, 394.

¹¹⁰ Friendly, *Beaufort of the Admiralty*, 244; A.C.F. David, *The surveyors of the Bounty. A preliminary study of the hydrographic surveys of William Bligh, Thomas Hayward and Peter Heywood and the charts published from them* (Taunton, 1976, corrected 1982), 30. As Heywood was unwell and died two years later it appears Beaufort was the best choice.

Beaufort were both ‘considered to be unexceptionable’ and Melville’s conscience forced him to give the decision regarding the appointment to Croker and Barrow.¹¹¹ Either way, their combined decision put the office in the hands of Beaufort and in Barrow’s own words their new Hydrographer ‘had no equal in that line’.¹¹²

William, Duke of Clarence, Lord High Admiral

By 1827 Croker had been in office for nearly two decades, his influence was particularly powerful and widely felt, and he only had to answer to a civilian First Lord who was renowned for his absences from the Admiralty. However, in that year a major turning point in the governance of the Hydrographic Office occurred when the Duke of Clarence became Lord High Admiral at the invitation of the incoming Prime Minister, George Canning.¹¹³ The Duke had two things that Melville sadly lacked, a passion for the Navy and a great deal of practical experience of its workings, despite being withdrawn from active service by 1827.¹¹⁴ Clarence appointed an advisory council, rather than the traditionally named ‘Admiralty Board’, although both were ‘boards’ in the naval sense, consisting of men of experience in naval matters.¹¹⁵ Backed by this group of men, who brought a variety of experience to the task in hand, Clarence introduced some extremely well thought through schemes for the Hydrographic Office, although others for the navy were questionable and his

¹¹¹ Barrow, *An auto-biographical memoir*, 394.

¹¹² Barrow, *An auto-biographical memoir*, 395.

¹¹³ R. Morriss, *Naval power and British culture, 1760-1850: public trust and Government ideology* (Exeter, 2004), 59.

¹¹⁴ Clarence entered the Navy when only 13 and became a competent officer (M. Brock, ‘William IV (1765–1837)’, *ODNB*, Oxford University Press, 2004 [<http://www.oxforddnb.com/view/article/29451>, accessed 27 Nov 2007]).

¹¹⁵ The Advisory Board included Sir Robert Cavendish Spencer (1791-1830) who served from August 1827 to September 1828 as private secretary and groom of the bedchamber to the duke of Clarence, then lord high admiral (J.K. Laughton, ‘Spencer, Sir Robert Cavendish (1791–1830)’, rev. A. Lambert, *ODNB* [accessed 24 Nov 2007]). As a private secretary he would have been affected by Melville’s decision the ‘private secretaries should expect no more than their pay as reward’ (quoted in C.I. Hamilton ‘Expanding naval powers: Admiralty private secretaries and private offices, 1800-1945’ in *War in History* 10 (2003), 126). John Evelyn Denison (1800-1873) was appointed on 2 May 1827 (G.F.R. Barker, ‘Denison, (John) Evelyn, Viscount Ossington (1800–1873)’, rev. H.C.G. Matthew, *ODNB* [accessed 24 Nov 2007]). Sir George Clerk (1787–1867) was gazetted on 4 February 1828, but upon the duke’s resignation was reappointed a lord of the Admiralty (G.F.R. Barker, ‘Clerk, Sir George, of Penicuick, sixth baronet (1787–1867)’, rev. H.C.G. Matthew, *ODNB* [accessed 24 Nov 2007]). Sir Edward Campbell Rich Owen (1771-1849) was appointed in March 1828 (J.K. Laughton, ‘Owen, Sir Edward Campbell Rich (1771–1849)’, rev. A. Lambert, *ODNB* [accessed 24 Nov 2007]). Sir William Hope Johnstone (1766-1831) owed his political position to Melville and brought with him some practical experience at sea (J.K. Laughton, ‘Hope, Sir William Johnstone (1766–1831)’, rev. A. Lambert, *ODNB* [accessed 24 Nov 2007]).

appointment detrimental to Admiralty administration.¹¹⁶ Like his brother Frederick, Duke of York (1763-1827), both were maligned for their military exploits, but both introduced reforms whilst head of their respective services.¹¹⁷

That Clarence was fond of hydrography and charting is clear as he had appointed his own hydrographer,¹¹⁸ served under a noted hydrographic surveyor, took an interest in Flinders' charting of Australia, as well as receiving a Polar chart from Hurd in 1822.¹¹⁹ His father George III had an extensive collection of charts which George IV gave to the Admiralty in 1828 for the specific use of the Lord High Admiral.¹²⁰ His approach to governance was far from impersonal¹²¹ and he was also known to have been patron of at least one surveyor (W.F.W. Owen) who named Clarence Town on Fernando Po after him in 1827.¹²²

To be able to make informed and effective decisions, the Lord High Admiral needed good sources of information. Apart from the obvious sources outside his advisory council, such as the Hydrographer, Clarence obtained some of his information first-hand for himself. Becher recorded on 9 June 1827 how 'HR Highness The Duke of Clarence in company with Mr Douglas visited every part of the Hydr. Office', which resulted in Douglas (commissioner of the Admiralty, member of parliament and later Lord Douglas), drawing up an order relating to the Office. It was as a result of this visit that numerous changes were introduced, including employing extra draughtsmen, improvements to the fabric of the office, reforms in the chart agencies and the introduction of an additional naval assistant. On 25 August Clarence visited the office again with Mr Douglas when they inspected the alterations and found them very much to his approval.¹²³ Parry's return to the Admiralty at the end of September 1827 offered him the opportunity to meet the Duke, writing '... nothing could exceed the warmth and cordiality with which I was received by the Duke and

¹¹⁶ Parry, *Parry of the Arctic*, 119; Morriss, *Cockburn*, 164; Lloyd, *Mr Barrow*, 94.

¹¹⁷ For the military reforms of the Duke of York see J. Peaty, 'Architect of victory: the reforms of the Duke of York' in *Journal of the Society for Army Historical Research* 84 (2006), 339-48.

¹¹⁸ John Hamilton Moore was appointed in July 1789 (*Whitehall Evening Post*, 7 July 1789).

¹¹⁹ S. Fisher, 'Knight, Sir John (*bap.* 1747, *d.* 1831)', *ODNB* [accessed 24 May 2008]; M. Estensen, *The life of Matthew Flinders* (Crows Nest, NSW, 2003), 455. The chart was of the Polar regions showing the late discoveries made by Captain Parry on the northern coast of America, and also marking those of Captain Franklin to the mouth of the Coppermine River and along the eastern shores of those unknown coasts towards Hudson's Bay' (UKHO, LB1 f.519, unaddressed letter, 18 December 1822).

¹²⁰ AL, MSS 96, fly leaf of the catalogue of charts of the George III Collection.

¹²¹ When an officer was killed on the quarter-deck shortly after the beginning of an action he wrote with his own hand a letter of condolence to the officer's widow (J.K. Laughton, 'Bathurst, Walter (1764?-1827)', rev. A. Lambert, *ODNB* [accessed 24 Nov 2007]).

¹²² Lamb, 'The London years of Felipe Bauzá ...', 253, 255.

¹²³ UKHO, OD814, Becher's journal, 1827.

all the Admiralty . . .', when the Hydrographer spent over an hour with him.¹²⁴ In October Parry met the Duke once again when he visited the *Hecla* and also when the ship paid off,¹²⁵ giving Parry plenty of opportunities to air his concerns over the future of the Hydrographic Office.



Illustration 1.3. The Duke of Clarence, Lord High Admiral (from Briggs, *Naval administrations*). Note the wine glass and decanter by his side, which are symbols of his renowned hospitality.

Other officers wrote to Clarence and opportunities for men to meet him arose during the many trips he made whilst in office. Therefore it is not unimaginable that on the evening of Wednesday 19 March 1828, when he held a dinner for naval officers, he picked up lots of useful ideas. This dinner was attended by Smyth,¹²⁶ who by this time had made a name for himself for his expert knowledge of surveying in the Mediterranean. It could have been this encounter which led the Advisory Council to raise questions some weeks later concerning the number of officers serving in ships

¹²⁴ Parry, *Parry of the Arctic*, 119.

¹²⁵ Parry, *Parry of the Arctic*, 122.

¹²⁶ Clarence was renown for his hospitality and paid for dinners such as this out of his own pocket (Lloyd, *Mr Barrow*, 95; *The Times*, Thursday, 20 March 1828, page 2 column E).

employed on the surveying service, as well as the scientific instruments with which they were supplied.¹²⁷

Clarence was a great supporter of change within the Admiralty and after less than two months he ordered (and it happened) the employment of six extra draughtsmen for the Hydrographic Office.¹²⁸ This raised the number from four to ten and was due to the backlog of work in the office, that included material for publication some of which had been in the Admiralty for 25 years or more.¹²⁹ As a direct result of this the number of new charts published rose from (at least) 21 in 1817 to (at least) 108 in 1827, being the highest year of output between 1808 and 1829. In the following year (at least) 93 new charts were also published¹³⁰ and this had the knock-on effect for increasing chart revenues which jumped from £233 in 1827 to £383 two years later.¹³¹ Other decisions he made were both significant and well informed, which can only be viewed as progressive measures: the appointment of an additional agent for the sale of Admiralty charts in September 1827¹³² (only to terminate the arrangement eleven months later);¹³³ in January 1828 he ordered Ordnance Survey data for use whilst Bullock was surveying the River Thames¹³⁴ and encouraged closer collaboration with the Danish Hydrographic Office;¹³⁵ in February he ordered complimentary charts to be sent to the British Museum to make up their set of Hydrographic Office charts¹³⁶ and employed two additional officers (and a third in June) to compile sailing directions;¹³⁷ in March he ordered an officer to submit data in order for charts to be completed.¹³⁸ He also ordered numerous routine matters to be undertaken that were no different to those confirmed by previous Board members, but nevertheless all his hydrography-related measures were progressive ones. Clarence

¹²⁷ UKHO, LB2 f.127, Parry to the Navy Board, 19 April 1828; UKHO, LB2 fos 132-4, Parry to White, Hewett and Jones, 22 April 1828.

¹²⁸ Day, *Hydrographic Service*, 36.

¹²⁹ Hurd's survey of Bermuda is a prime example of this as it was completed in 1802 (UKHO, A124)

¹³⁰ These figures are based on the inventory of Admiralty Charts held at the UKHO. The term 'at least' is used because no complete record of charts produced has survived and many charts were withdrawn before the numbering system was introduced in 1839. Those withdrawn charts do not appear in the numbered bundles of record copies of charts and exactly how many of these charts survive is not known.

¹³¹ UKHO, MLP98.

¹³² UKHO, LB2 f.84, Becher to King and Son, 26 September 1827.

¹³³ UKHO, LB2 f.183, Parry to King and Son, 22 August 1828.

¹³⁴ UKHO, LB2 f.94, Parry to Colby, 28 January 1828.

¹³⁵ UKHO, LB2 fos 95-7, Parry to the Danish Hydrographer, 26 January 1828.

¹³⁶ UKHO, LB2 f.110, Parry to Ellis, 16 February 1828.

¹³⁷ UKHO, LB2 f.111, Parry to Roe and Dessiou, 27 February 1828, *ibid.*, f.149, Parry to Symonds, 12 June 1828.

¹³⁸ UKHO, LB2 f.113, Parry to Fitzmaurice, 4 March 1828.

also used the Hydrographer to obtain information that he used to make informed decisions which had greater implications outside of the Admiralty.¹³⁹ This involvement with items out of the mainstream of hydrography and navigation, continued to expand the Hydrographer's workload, which successive Hydrographers used to their advantage.

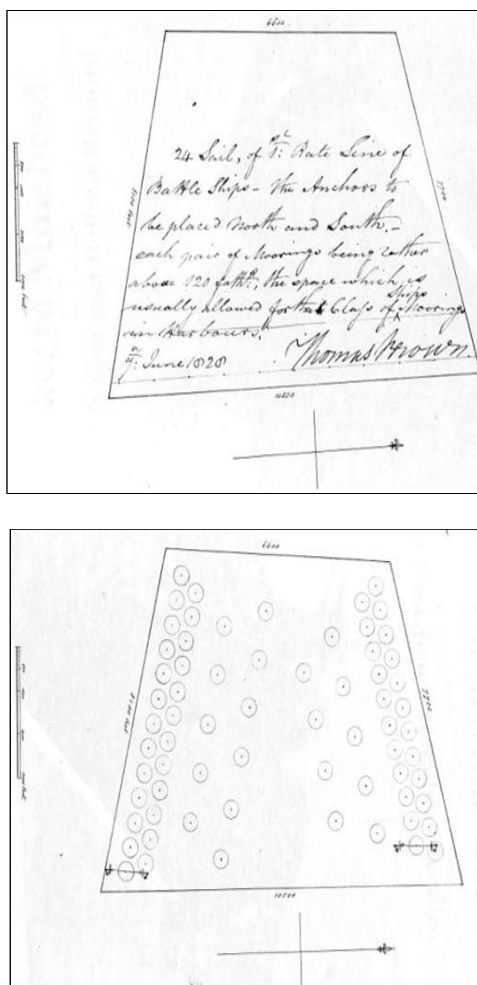


Illustration 1.4. The proposed layout of moorings at Chatham supplied by Thomas Brown, Woolwich Yard, 7 June 1828 following a request by the Lord High Admiral through Parry (ref: UKHO, LP1857 B888)

¹³⁹ He asked Parry in June 1828 to establish the amount of space required for 'laying down a line-of-battle ships moorings and for her swinging clear of other ships moored near her' at Deptford, Woolwich, Chatham and Sheerness (UKHO, LB2 f.144, Parry to Douglas, Brown, Payne and Brown, 6 June 1828; see also UKHO, MLP 19/1/3 for the reply from Cunningham). In the same month Parry had to write to Sir Thomas Martin, Controller of the Navy, for a plan kept in the Navy Office for constructing a breakwater from Penlee Point (Cawsand Bay) (UKHO, LB2 f.148, Parry to Martin, 11 June 1828). Another civil engineering scheme, in which Parry found himself acting as the Lord High Admiral's secretary, involved a proposed breakwater at Torbay, which Joseph Whidbey estimated would cost £1,630,000. The Lord High Admiral asked Parry to write to Whidbey 'for His Royal Highnesses information, a fresh estimate of this work, supposing the manual labour to be performed entirely by convicts' (UKHO, LB2 f.148, Parry to Whidbey, 11 June 1828).

The advisory council also got Parry involved with matters relating to manning, asking him in April 1828 for ‘a complete and accurate list of the names of all officers at present serving in ships employed on the surveying service’.¹⁴⁰ They also took an interest in scientific instruments being supplied to survey vessels, when they not only considered the costs but also whether the ships were sufficiently equipped.¹⁴¹ In the same month they ordered a complete copy of the recent surveys of the coasts of Africa and Madagascar by Captain Owen (published at the Hydrographic Office) to be sent to France;¹⁴² although this was not the first occurrence of Anglo-French relations, this was an important step forward in terms of international co-operation. The spirit of internationalism continued in July, but on this occasion it was with Sweden. Charles Tottie had presented two volumes of charts by Admiral Klint to the Lord High Admiral and The Council ordered Parry to send a letter of thanks along with some complimentary charts, which had by this time become the accepted way of undertaking such business.¹⁴³ The Council also encouraged new ideas and were particularly keen on the idea of the experimental use of water-proof chart paper in July 1828.¹⁴⁴ When it came to matters connected with hydrographic administration they were not always so easily won over, for example when the issue of extra pay being incorrectly claimed by a surveyor was brought before them they left the officer in no uncertain terms exactly how they felt.¹⁴⁵

The onward and progressive measures for hydrography could not last forever, and the last involvement the Advisory Council had with Parry was the termination of the chart agency at Bristol in August 1828.¹⁴⁶ The departure of Clarence from office¹⁴⁷ was according to his biographer ‘a sad episode for the navy because some at least of William’s reforms were much needed’. Citing the commissioning of its first steam vessel, and his concerns at the state of naval gunnery¹⁴⁸ as his major successes, it

¹⁴⁰ UKHO, LB2 f.127, Parry to the Navy Board, 19 April 1828.

¹⁴¹ UKHO, LB2 fos 132-4, Parry to White, Hewett and Jones, 22 April 1828.

¹⁴² UKHO, LB2 f.129, Parry to Rossel, 19 April 1828.

¹⁴³ UKHO, LB2 f.162, Parry to Tottie, 4 July 1828.

¹⁴⁴ UKHO, LB2 f.163, Parry to Stackhouse, 9 July 1828. Although a good idea, in practice it proved to be ineffective but it was not resolved until the January of the following year despite several attempts at solving the problem of it suitability (UKHO, MB1 f.221, Board minute January 1829).

¹⁴⁵ UKHO, LB2 f.169, Parry to Frazer, 29 July 1828.

¹⁴⁶ UKHO, LB2 f.183, Parry to King and Son, 22 August 1828.

¹⁴⁷ For an account of his activities relating to Cockburn, and Clarence’s subsequent departure from the Admiralty, see Morriss, *Cockburn*, 164-74, P. Ziegler, *William IV* (London, 1971) and Fry, *The Dundas despotism*, 376-7. For Croker’s personal view see Jennings, *The correspondence and diaries*, 1:427-9.

¹⁴⁸ M. Brock, ‘William IV (1765–1837)’, *ODNB* [accessed 29 Nov 2007]; A witness of these events, from an administrator’s perspective, thought Clarence had ‘accomplished a very great deal’ during his

should be added that his achievement in the advancement of hydrography as a whole was equally important. The latter were on a par with great advancements under Hurd, from which the office was on a firm footing for further expansion. Although to Greville, Clarence ‘distinguished himself by making ridiculous speeches, by a morbid official activity’,¹⁴⁹ the effect on British and, to some extent, world hydrography has been underestimated. In the short term Parry wrote how Clarence’s influence within the Admiralty was one of ‘. . . immense improvement which had taken place in it since his administration of affairs’, and by doing so had transformed it into something ‘fit for a gentleman and officer . . .’.¹⁵⁰

Conversely after Clarence’s departure Parry found the Admiralty

in a remarkably quiescent state, as if nothing had happened, just as people live under a volcano just after an eruption. In fact, the old régime seems to have succeeded so quietly and smoothly, that the change is now no longer a matter of conversation or remark.¹⁵¹

This is backed up by Briggs whose contemporary thought was that

Lord Melville’s retrograde proclivities were only too well known, and therefore nothing in the shape of reforms or improvement could reasonably be expected during his tenure of office; expectation was not disappointed.¹⁵²

Those two accounts (and Appendices 3 and 5) reflect the way in which Admiralty business was on the whole undertaken, whereby the vast majority of ‘ideas’ had to be suggested to the Board, rather than original ideas being generated by the Board; with Melville’s lack of technical knowledge of the Navy and his political commitments, it is easy to see why he was thought of in this light by contemporaries.¹⁵³ But little did either Parry or Briggs know of the impending monumental changes (for the better) which were on the horizon, in the shape of Sir James Graham, Sir Thomas Masterman Hardy and for hydrography, Captain Francis Beaufort.

term as Lord High Admiral (Lady Briggs (ed.), *Naval administrations 1827 to 1892, the experience of 65 years, by the late Sir John Henry Briggs, Reader to the Lords and Chief Clerk of the Admiralty* (London, 1897), 6).

¹⁴⁹ Parry, *Parry of the Arctic*, 127.

¹⁵⁰ Parry, *Parry of the Arctic*, 127.

¹⁵¹ Parry, *Parry of the Arctic*, 130.

¹⁵² Briggs, *Naval administrations 1827 to 1892*, 8.

¹⁵³ P. Hore, ‘Lord Melville, the Admiralty and the coming of steam navigation’ in *The Mariner’s Mirror* 86:2 (May 2000), 157-72, states how Melville was not as described by Briggs. My interpretation of the quotation reflects not Melville’s disinterest, or any indication of not promoting ideas, rather ideas coming from him were a rarity.

After his departure and with the Hydrographer having spent two and a half out the six years in post out of the office, it appears the overbearing Croker and the frustrations of working in the Admiralty, forced Parry to resign.¹⁵⁴ There may have been other pressures, as a contemporary wrote how Parry had been ‘playing another game rather than mere Hydrography’,¹⁵⁵ but he only accepted the post of Hydrographer on the condition he could ‘give it up, in favour of active service’,¹⁵⁶ suggesting there was at least one faction who thought the post should have been filled on a more permanent basis. Add to this the financial concerns Parry had over his own income and his temporary position, his departure was no bad thing for hydrography, especially as Beaufort was waiting eagerly to take charge.

Other Admiralty Board members

Sitting alongside ‘the big three’ of Melville, Croker and Barrow between 1808 and 1829 were a procession of six naval lords, and numerous other council members. From a hydrographic perspective many of these men had practical experience of navigation, using charts at sea and even of surveying, and thus were a godsend on the Board. Two of these men who were of more importance, especially during Parry’s difficult relationship with Croker, were Sir George Cockburn (1772-1853)¹⁵⁷ and Sir Edward Campbell Rich Owen.¹⁵⁸ Cockburn was by far the greatest influence and had been appointed to the Board in 1818, followed in May 1827 to a position on the council of the Lord High Admiral. Cockburn brought a wealth of experience with him to the Admiralty and eventually in September 1828 he was appointed as first naval lord. But Cockburn cut off the hand that fed him when as a leading council member, and also a privy counsellor, he ‘brought about the resignation of the duke of Clarence as lord high admiral for exceeding the terms of his patent’.¹⁵⁹ The fact that neither Cockburn or Croker saw ‘eye to eye’ with Clarence’s reforms¹⁶⁰ led to this almost

¹⁵⁴ Friendly, *Beaufort of the Admiralty*, 247.

¹⁵⁵ Quoted in Friendly, *Beaufort of the Admiralty*, 244.

¹⁵⁶ William L. Clements Library, Croker box 6 Parry to Croker, 7 December 1823.

¹⁵⁷ J.K. Laughton, ‘Cockburn, Sir George, eighth baronet (1772–1853)’, rev. R. Morriss, *ODNB* [accessed 20 Dec 2007].

¹⁵⁸ J.K. Laughton, ‘Owen, Sir Edward Campbell Rich (1771–1849)’, rev. A. Lambert, *ODNB* [accessed 24 Nov 2007].

¹⁵⁹ J.K. Laughton, ‘Cockburn, Sir George, eighth baronet (1772–1853)’, rev. R. Morriss, *ODNB* [accessed 20 Dec 2007].

¹⁶⁰ Lloyd, *Mr Barrow*, 94.

inevitable event. What was possibly good for the Navy was not necessarily so for the Hydrographic Office.

Cockburn's and Owen's connections with hydrography made them far more sympathetic and supportive of the office. Cockburn had studied chart making from 1788 on the *Ariel* under the master, Archibald Blair, surveying the Great Andaman group.¹⁶¹ After vast experience at sea he was appointed second naval commissioner at the Board of Admiralty in 1818, which along with his political connections to Peel and Liverpool, made him a well connected ally to hydrography.¹⁶² Sir Edward Owen was the brother of Captain W.F.W. Owen a hydrographic surveyor, who naturally was sympathetic to the office which influenced his brother's career path. It is highly likely that those naval men usurped Croker's indifference to hydrography, giving the council a naval rather than civil bias for the first time in recent years at least.



Illustration 1.5. Sir George Cockburn (from Briggs, *Naval Administrations*). Note on the table a chart, showing how important navigational information was to a naval officer.

¹⁶¹ Morriss, *Cockburn*, 9. During that experience one of his colleagues was shot through the arm with an arrow.

¹⁶² Morriss, *Cockburn*, 142-4.

Cockburn took responsibility for a wide range of duties and although mainly concerned with governance over the Navy and Victualling Boards, he was involved with many hydrographic issues: in 1819 the joint drafting of a key Board minute for the direction of the Hydrographic Office (see Appendix 3);¹⁶³ chronometer supply, when he lent his personal chronometer watch to the Navy;¹⁶⁴ preparing sailing instructions for surveyors in 1820¹⁶⁵ and 1822;¹⁶⁶ drawing up the instructions for Parry's voyage in search of the north-west passage in 1824 (after discussing with Barrow whether Parry could serve as Hydrographer and fit out his ship at the same time);¹⁶⁷ instructing the Hydrographer to extract data from remark books;¹⁶⁸ approving the use of a survey by a non-specialist naval officer in 1827;¹⁶⁹ survey planning;¹⁷⁰ promoting the trial of an artificial horizon¹⁷¹ and enquiring of journey times between Porto Bello and Jamaica in 1828.¹⁷² It is worth noting that towards the latter part of 1828 and during 1829 how Parry referred hydrographic issues more than ever before to Cockburn, mainly on routine matters such as the supply of surveys,¹⁷³ the employment of a midshipman to complete drawing of some plans,¹⁷⁴ the fitting of corner springs to compasses,¹⁷⁵ chart supply,¹⁷⁶ permission to have charts engraved¹⁷⁷ and again on the artificial horizon.¹⁷⁸ This was possibly due to Cockburn's new position as first naval lord and Parry's ability not to miss out on an opportunity that would advance his career by keeping his name in the conscious of a senior board member's mind. After all he had done this in 1819 when he renamed the mythical 'Croker Mountains' in Barrow Strait, and other discoveries after Lord Melville and

¹⁶³ TNA, ADM1/3461, Admiralty Board minute, 16 November 1819. See Appendix 3 for a transcript of this important document.

¹⁶⁴ UKHO, LB1 f.223-4, Hurd to Popham, 28 April 1819.

¹⁶⁵ UKHO, LB1 f.284, Hurd to White, 17 January 1820; *ibid.*, f.337, Hurd to Fitzmaurice, 20 October 1820; *ibid.*, f.342, Hurd to Fitzmaurice, 20 November 1820.

¹⁶⁶ UKHO, LB1 f.512, memorandum, 16 November 1822.

¹⁶⁷ Morriss, *Cockburn*, 159; UKHO, Ritchie Papers, letter from Parry to his brother dated 5 January 1824, abstracted by Ann Parry in a letter to Ritchie, 12 August 1963.

¹⁶⁸ UKHO, MP 47.

¹⁶⁹ UKHO, LP1857, Bowles to Parry, 12 March 1829.

¹⁷⁰ UKHO, MB1 f.108, Parry to White, 12 February 1828; *ibid.*, f.150, note by Parry, February 1826. Survey planning is covered in the chapter on data acquisition.

¹⁷¹ UKHO, LB2 f.230, Parry to Phillips, 22 December 1828.

¹⁷² UKHO, MB1 f.177, Parry to Cockburn, 31 March 1828.

¹⁷³ UKHO, MB1 f.195, Parry to Cockburn, 26 June 1828.

¹⁷⁴ UKHO, MB1 f.214, Parry to Barrow, 16 December 1828.

¹⁷⁵ UKHO, MB1 f.217, minutes, December 1828.

¹⁷⁶ UKHO, MB1 f.222, Parry to Cockburn, 22 January 1829.

¹⁷⁷ UKHO, MLP3/5.

¹⁷⁸ UKHO, MB1 f.233, Parry to Cockburn, 15 May 1829.

Sir Joseph Banks, because according to Jones it was Parry who knew 'where his best interests lay'.¹⁷⁹

Occasionally his personal view of hydrographic matters can be found and the reasoning behind them. Such as in 1820 after Hurd had displayed White's English Channel survey work before the Board, he found Cockburn particularly satisfied with it and 'extremely desirous of having the Channel chart and soundings brought forward as soon as possible' for publication.¹⁸⁰ Cockburn also had a hand in the scheming of charts in 1822, stipulating Owen's survey of the American Lakes should be connected together on one sheet,¹⁸¹ showing how his navigational knowledge benefited the chart user. He also held some patronage, insuring the placement of 'a young gentleman' who had never been to sea before, Mr William Lord, on board one of the survey vessels in 1822.¹⁸² In 1827, rather than let an issue be forgotten he directed Mr. Walker, chief draughtsman in the Hydrographic Office, to 'remind him this spring to send a ship to renew the search for Atkins's Rock'.¹⁸³ Only once could Cockburn be accused of his own self-promotion over that of hydrography when in 1827 the Lord High Admiral's Council was concerning itself with the distribution of lighthouses (after receiving a report by a surveying master Anthony DeMayne). Cockburn ordered that the information should be sent with his compliments and not those of the Lord High Admiral, to William Huskisson, at the Board of Trade, suggesting Cockburn was trying to claim some benefit from this opportunity.¹⁸⁴ However, on another occasion when information was sent to Lord Mountnorris he did not take up the opportunity to send his compliments, and only one example of self-promotion is not enough to tarnish his reputation.¹⁸⁵ In 1828 when Parry asked Owen if the charts of the American Lakes should be supplied to the chart agents for sale, it was Cockburn who added a line to the minute for them not to be supplied to the chart sellers,¹⁸⁶ because he did not wish them to be used outside the Navy.

Between Owen and Cockburn they dealt with most of the issues passed from the Hydrographer to the Board, and vice versa in 1828 and 1829, even getting

¹⁷⁹ A.G.E. Jones, 'Sir John Ross and Sir John Barrow', *Notes and Queries* 19(8) (August 1972), 299.

¹⁸⁰ UKHO, LB1 f.335, Hurd to White, 16 October 1820.

¹⁸¹ UKHO, LB1 f.512, memorandum, 16 November 1822.

¹⁸² UKHO, LB1 f.520, Walker to White, 22 December 1822.

¹⁸³ UKHO, MB1 f.171, Parry to the Admiralty Board, 18 March 1828.

¹⁸⁴ UKHO, MB1 f.184, minute 15 October 1827. For details of Huskisson see A.C. Howe, 'Huskisson, William (1770–1830)', *ODNB* [accessed 21 Dec 2007].

¹⁸⁵ UKHO, LP1857 M326, Norris to Parry, 9 May 1826.

¹⁸⁶ UKHO, MB1 f.204, Parry to Owen, 6 August 1828.

involved with each other in the acquisition of compasses in December 1828.¹⁸⁷ Owen even got Parry involved with the estimates for carving of royal monogram of King George in 1828.¹⁸⁸ Although not part of his hydrographic work Parry, unlike Dalrymple, was not likely to refuse the Board their wishes. However well they governed the Hydrographic Office, in the latter years there was nothing of an outstanding nature, more business as usual, but noteworthy for their supportive stance rather than some of the apparent nit-picking ways of Croker.

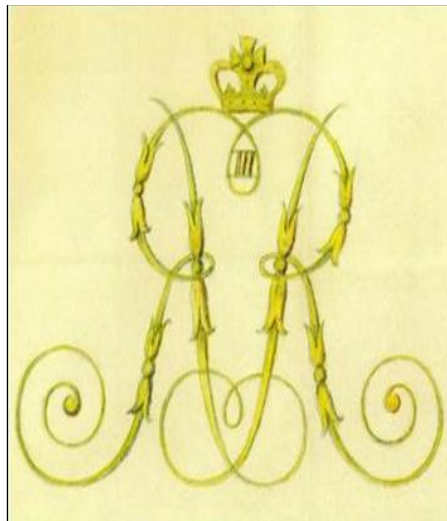


Illustration 1.6. Design of the Royal initials which Parry was involved with at Sir Edward Owen's suggestion in 1828 (ref: UKHO, LP1857 L197)

Accounting

The Admiralty Board were very careful when it came to matters of expenditure, but this was only natural as can be seen in their constant referral of matters back to the Hydrographer asking him for estimates and costs.¹⁸⁹ This is to be commended rather than condemned, as they could not commit public money before knowing the full cost, and there should be no confusion here over Croker's penny-pinching and the way all Board business was handled when it came to financial matters. The Hydrographer was not being singled out, only playing by the same rules as all the other departments who had to account to their Lordships.

¹⁸⁷ UKHO, MB1 f.217, Owen to Cockburn, 20 December 1828.

¹⁸⁸ UKHO, LP1857 L197, letter from Mr Lang, Woolwich Yard, 30 July 1828.

¹⁸⁹ TNA, ADM1/3458, Hurd to Croker, 1 July 1812, minute by Croker. This is only one example of many referrals for financial approval.

It appears Croker was also chiefly responsible for dealing with the routine matter of the Hydrographer's annual accounts, contingencies and imprests.¹⁹⁰ The Admiralty Board required the Hydrographer to send his bills and vouchers to the Navy Board on an annual basis, in addition to which their Lordships required a 'general account' of expenditure from him. In 1811 the procedure required the Hydrographer to send his annual bills and vouchers to Thomas Kite, Chief Clerk, who once they had been certified would be sent to the Navy Board for payment.¹⁹¹ In 1812 a problem with this procedure called for the Chief Clerk to account to the Admiralty Board for Hurd's accounts. It transpired that his payments were made up of those which were made under general directions to him from the Admiralty Board and others for which no specific orders were given to him; this shows a certain amount of autonomy where the Hydrographer did not need to go to the Admiralty Board for approval to spend every penny. The Navy Board appear to have been happy to accept Hurd's accounts as long as Croker would sign for them on the production of proper vouchers, when they would compare the vouchers with the charges. In this instance Kite quite correctly stated that both himself and the Navy Board were 'incompetent to judge of the necessity or propriety of the charges', thereby putting the onus on Croker to sanction the costs.¹⁹²

It appears that Hurd was a long way behind with his accounting, as his 'package containing my office accounts' for the year 1815 was not sent to Croker until 7 February 1817, and that was only after he had to be reminded in a minute four days earlier. Once it had been received the Admiralty Board reminded Hurd that his allocation for 1817 was not to exceed £1,500, as published in the Navy Estimates, and the accounts were then sent to the Navy Board.¹⁹³ On the following day Hurd followed this up with his account for December 1816 and January 1817, using the opportunity to claim an imprest of £600 to cover his payment of draughtsmen's salaries, various office contingencies and the cost of defraying Lieutenant King's outfit. By this date the additional imprests were given without question, but in this instance for no apparent reason they gave £500 instead of the £600 which was

¹⁹⁰ Brightfield quotes a case where the naval estimates presented in 1822 to the House of Commons and were attacked by Joseph Hume M.P., which Croker defended with great credit to himself and the Admiralty (Brightfield, *John Wilson Croker*, 49-51).

¹⁹¹ TNA, ADM1/3458, Hurd to Croker, 21 April 1812.

¹⁹² TNA, ADM1/3458, Kite to Croker, 22 April 1812.

¹⁹³ TNA, ADM1/3460, Hurd to Croker, 7 February 1817.

requested.¹⁹⁴ The Admiralty Board were repeatedly requested for further imprests, which was the normal way of undertaking business when it came to claiming the costs of running the Hydrographic Office. The type of materials which the imprests covered were essential items, such as time keepers, salaries, printers' bills, charts and sailing directions.¹⁹⁵ None of those examples reflect a penny-pinching Croker, which he is portrayed as, only one who was careful to remind the Hydrographer of his budgetary commitments for the coming year and the procedures he had to follow.

The returns made by the Hydrographer formed the basis of the Board's ability to accurately predict the potential expenditure of the Hydrographic Office. Those predictions can be seen in the Board's estimates of contingencies published by parliament in the Navy estimates from 1811; see Appendix 6 for the contingent figures for 1811 to 1829. The estimates show several factors relating to the governance of the office. One of the most striking is the estimate of the contingent expenses for the years 1813 to 1815. In 1813 the contingent was £2,500 (following on from two years when the figure had not fluctuated by more than £500), which suddenly increased by 100% to £5,000 for 1814, which then dropped to £2,000 in the following year. This was due to the return of peace to the country in 1815 and the subsequent cuts in the Navy budget, which saw the allocation of £16,374,000 in 1815 cut to £6,473,000 in 1817.¹⁹⁶ To justify such a cut it was stated in Parliament by Mr Tierney that 'the diminution here was simply to be ascribed to the results of peace, which rendered it impossible that there could be business enough in that office to demand a sum nearly equal to what it might require in time of war'.¹⁹⁷ Also, in the years 1818 to 1823 there were three occasions in which the estimate was greater than the actual expenditure by the Hydrographer, during two of those years it was underestimated by the Board by £1,000; this over-estimation was between one third and one fifth too much. In the three years when the estimates were lower than the actual expenditure, on all three occasions the actual expenditure was at least a third more than had been estimated. Clearly something was going wrong with the way in

¹⁹⁴ TNA, ADM1/3460, Hurd to Croker, 8 February 1817.

¹⁹⁵ TNA, ADM1/3460, Hurd to Croker, 10 May 1817, *ibid*, Hurd to Barrow, 20 August 1817; *ibid*, Hurd to Barrow, 2 September 1817.

¹⁹⁶ Parliamentary Paper 1816 (135), 213; Parliamentary Paper 1819 (147), 305.

¹⁹⁷ House of Commons, *The parliamentary debates from the year 1803 to the present time: forming a continuation of the work entitled "The parliamentary history of England from the earliest period to the year 1803" published under the superintendence of T.C. Hansard vol. xxxiii comprising the period from the seventh day of March, to the twenty-fifth day of April, 1816* (London, 1816), 568.

which the Board were making their estimates, or perhaps Cockburn's reluctance to make an estimate based on the previous year's expenditure was a factor.

The estimates appear to have been more wishful thinking than a reflection of the amount of business which the Hydrographic Office was undertaking, business which after all had been sanctioned by the Board. For example, in 1818 the estimate was £2,500 and the expenditure £2,000, which fell into line with the thinking rather than exceeding it. The following year (1819) the estimate was set at the same figure but it was exceeded by over £1,000 (to just under £4,000), so the following year the estimate was raised to £3,000. When this estimate was once again exceeded by £1,000 in 1820¹⁹⁸ (to just under £4,000) the following year's estimate was raised to £5,000, the highest it had been since 1814. After two years of actual costs of around £4,000 it is not surprising to find this was followed by a third year (1821) which came in at around the same figure, meaning the Board's estimate was about £1,000 too high, going from one extreme to the other. The increase in 1821 was justified in Parliament by Sir George Warrender, in May 1821 when he stated it 'would not be surprising to any member who recollected that the maritime surveys were more conveniently taken in a time of peace than in a time of war',¹⁹⁹ reflecting the Admiralty Board's unwritten policy to expand data collection under Hurd.

Rather than set the estimate for 1822 at £4,000 after the actual costs for the previous three years had been around that figure, the Board dropped the estimate down to £3,000. Unsurprisingly the actual costs for 1822 were once again near £4,000, but not learning from this blatantly obvious pattern the Board set the estimate for 1823 at £3,000, being £1,000 less than what it should have been. Unfortunately due to Hurd's death in post the output of the office, which lacked a Hydrographer thanks to the Board's failure to appoint one, diminished and the actual expenditure was less than £2,000 for 1823.²⁰⁰ Part of the problem of the estimates was the time it took between the Hydrographer completing his accounts and the date in which the estimates had to be laid before Parliament. Parry wrote a report on his expenditure in which he started by stating how on 30 December 1828 'the money estimates of the

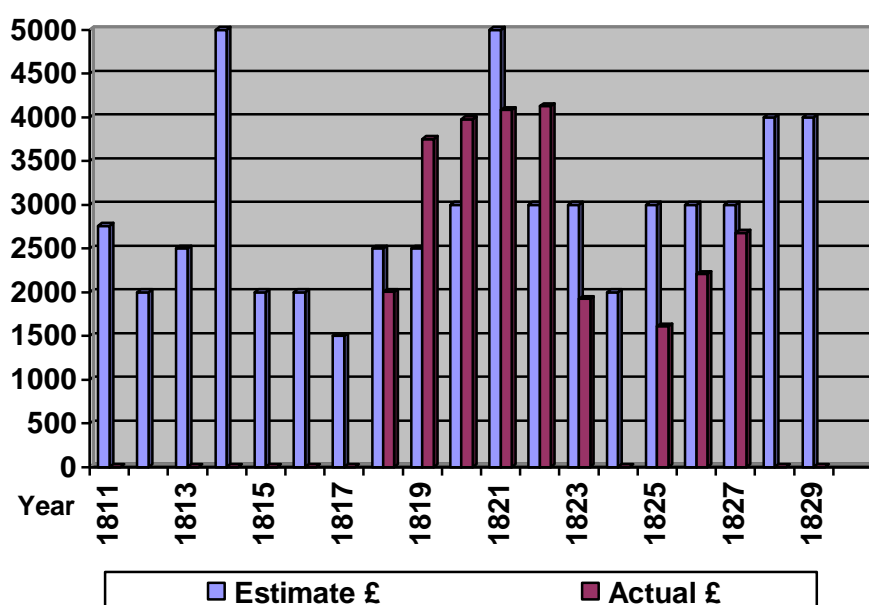
¹⁹⁸ House of Commons, *A return in detail of £3,000; charged in the Navy estimates for 1820, for contingencies relating to the service whereon the Hydrographer is employed* (London, 1821).

¹⁹⁹ House of Commons, *The parliamentary debates: forming a continuation of the work entitled "The parliamentary history of England from the earliest period to the year 1803 . . ."* (London, 1822), 521-2.

²⁰⁰ TNA, ADM17/28; House of Commons, *The ordinary estimate of His Majesty's Navy for the year . . .* . 20 vols (London, 1810-29).

Admiralty are shortly about to be taken',²⁰¹ which were then published by Parliament on 18 February 1829.²⁰² This suggests that if his annual reports were late they would not have been available to the Board for consultation in time for the estimate to be prepared. Even allowing for this the Board clearly did not identify the trend which showed Hurd steadily getting through £4,000 a year for four years in a row, suggesting the Board did not look back very far in their records when it came to setting the estimates for the Hydrographic Office at least.

Figure 1.1 Estimate and actual expenditure within the Hydrographic Office, 1811-1829



Source: Contingent accounts, naval estimates and Hydrographic Office accounts.

During Parry's term as Hydrographer the estimates for 1825 to 1827 remained set at £3,000 and apart from 1825 when the actual amount spent was nearly half that amount, the following two years were relatively accurate. The estimates for 1828 and 1829 were significantly raised by £1,000 to £4,000, which may certainly have reflected the Lord High Admiral's influence in 1829. In 1828 he had made provision for six extra draughtsman which would have forced the estimate to have risen, which along with the extra materials and consequently more copper for charts, including the

²⁰¹ UKHO, MLP5A, Report of the expenses of the Hydrographical Office, 30 December 1828.

²⁰² House of Commons, *Navy estimates: viz ordinary of the Navy; and building and repair of ships; for the year 1829* (London, 1829).

number of copies printed, would have accounted for at least the additional £1,000.²⁰³ It also appears that the expenditure figures for 1827 were part of a parliamentary report, covering the keeping of official accounts for the public service (published in 1829), where once again the Hydrographer's activities were brought under scrutiny.²⁰⁴ Parry wrote of getting 'another thousand pounds added to the Estimates for my Office'²⁰⁵ for 1828, but he gave no indication of what the effect of this gesture by the Board actually meant in real terms. He would have known, like his predecessors, that the Board would pay pretty much every contingency brought before them, providing it was a legitimate expense which had been sanctioned by them in the first place. Part of the reason why the contingent and actual expenses did not tally was due to the purchase of very expensive items, such as chronometers which ran into the hundreds, rather than the low costs for office supplies.

Against this picture of fluctuating estimates, but reasonably consistent expenditure, is the figure of Croker looming in the background. His interest in financial matters was undoubtedly linked to the Admiralty's need to not only balance the books, but to try and predict, or estimate, what moneys it was going to expend. If it underestimated by one third for all of its departments, then in 1815 when the net expenditure was £16,366,445²⁰⁶ it would have over spent by over five million leading to serious repercussions in Parliament. In reality the problem was not that serious because it was the contingencies that were unpredictable and it is this which caused the Board some difficulties in their estimates and possibly in Croker's governance of the Hydrographic Office. Estimating the salaries was relatively straightforward compared to contingencies, but estimating the contingencies for one small office employing a handful of men clearly caused the Board some difficulty. It appears Cockburn was the member of the Board responsible for naval estimates and he spoke 15 times in the House of Commons on this subject. Even at this level the amounts put to the House by Cockburn were, according to Morriss, never a major political issue

²⁰³ UKHO, MLP5, accounts for the period 1825-7; House of Commons, *The ordinary estimate of His Majesty's Navy for the year . . .* 20 vols (London, 1810-29).

²⁰⁴ House of Commons, *Report of the Commissioners appointed to inquire into and to state the mode of keeping official accounts in Principal Departments connected with receipts and expenditure for the public service, &c.* (London, 1829), 163.

²⁰⁵ Parry, *Parry of the Arctic*, 134.

²⁰⁶ Rodger, *Command of the ocean*, 643.

and it was the Navy Board who suffered more from the reduction in estimates than the Hydrographic Office.²⁰⁷

Conclusion

The advantages of having a virtually continuous core of ‘directors’ of the Hydrographic Office between 1808 and 1829 on one hand offered consistency, but on the other resulted in stagnation and a lack of innovation. Under their regime development and innovation was slow, often compromised by existing parameters, or by later decisions which reduced its capabilities. The Board oversaw some testing times which they dealt with in reasonably successful terms: the transition from Dalrymple’s departure (and the end of one man receiving two salaries),²⁰⁸ through the extensive post-war reductions and then the challenging times of the Parry years. Far from letting the office decline, or even cease to exist, either of which might have occurred as the Board could have left the chart production business to private enterprise, the Office eventually expanded. On the whole the Board eventually embraced expansion, with suggestions from the Lord High Admiral, and also its Hydrographer, it laid the foundations for vast increases in chart production mainly through its introduction of additional draughtsmen. This showed just how much could be achieved if the right amounts of resources were allocated, but they were not always.

Had the Admiralty Board thought earlier of expanding resources in the Hydrographic Office, before being asked to do so, the Fleet would have been able to use a much higher number of Admiralty produced charts containing good quality accurate data. This was a serious shortcoming and one which had its origins during Dalrymple’s time, thus the finger of blame cannot be entirely pointed at Croker for this, but it is certainly with the Board who for many years did not provide enough resources. Only during those years when the Duke of Clarence was at the helm did the governance of the office reach anything like its full potential. Although short-lived, the period of governance under the Lord High Admiral and his advisory council saw a reversal of Croker’s penny-pinching ways. There was more expansion, experiments

²⁰⁷ Morris, *Cockburn*, 150-1, 154.

²⁰⁸ Although Dalrymple had been receiving two incomes, unlike the ‘greedy mean’ who rewarded ‘themselves at taxpayers’ expense’ he did produce many valuable charts of use to the Royal Navy (P. Harling, *The waning of ‘old corruption’*. *The politics of economical reform in Britain, 1779-1846* (Oxford, 1996), 70).

and increased production, something which above all had been sadly lacking, as well as a greater hope that improvements could be made. All of this led to greater opportunities for hydrography and ultimately the Navy, despite the hiatus of the return of Melville and Croker to power.

Croker in his public relationship with Hurd and Parry, was not particularly different, showing no open favouritism for either man, although privately it may have been very different where Parry was concerned. But it is surprising that Croker's plan to 'reduce the . . . establishment of the Hydrographic Department'²⁰⁹ did not come to light until after Hurd's death, during the interregnum between Hydrographers when Croker was in charge.²¹⁰ His bottom line when dealing with the business matters of the governance of the Hydrographic Office was consistent, fair, at times cautious but never zealous in seeking opportunities for cutting the service for any personal gain. How much his alleged determination to curb the growing Hydrographic Office was curtailed by his fellow board members when debating important matters relating to finance, manning and expansion will never be known. What is known is that he was outnumbered by naval officers who knew all too well the value of accurate charts and Sir John Barrow, whose thirst for geographical information was unabated. But putting this into perspective, Barrow, Croker and Cockburn all were known to have worked well together and the Board contained a good balance of administrators, naval officers, politicians, governors and civilians who acted quickly in returning their verdicts and on the whole fairly when dealing with issues which confronted them in the Board Room concerning hydrography.²¹¹

²⁰⁹ UKHO, MLP 2/1, Dyer to Walker, 7 July 1823.

²¹⁰ Lamb, 'Felipe Bauzá', 325.

²¹¹ Morriss, *Cockburn*, 159.

Chapter 2

Managing Civilians and Surveyors

The role of the Hydrographer as the ‘head’ of a small but not insignificant office, was one which saw him undertake many different duties and responsibilities. When it came to the direction of hydrographic matters the Admiralty Board held far more power than they have previously been given credit. The Board might well have appointed a Royal Naval officer to be head of the Hydrographic Office, but when it came to important decisions (especially pay) it was the Board who had the final say. What, therefore, was left for Hurd, Parry and their ‘stand-ins’ to manage is defined in this chapter, including the involvement with surveyors and civilians working in and outside of the office. Figures 2.1 and 2.2 show the hierarchies of responsibility that included lieutenants, or ‘Naval Assistants’, working in the office for the Hydrographer as his assistant, as well as Mr John Walker, engraver, right-hand man to Dalrymple, reliable and efficient, who was the backbone of production throughout the period. This chapter also looks more closely at the experience needed by men to serve on survey vessels and once that had been established how they were managed, including the numbers of those involved. In addition to this an analysis of how the Hydrographers’ knowledge influenced their style of management can also be seen.

Figure 2.1 Hierarchy of Hydrographic Office Staff, 1808-23

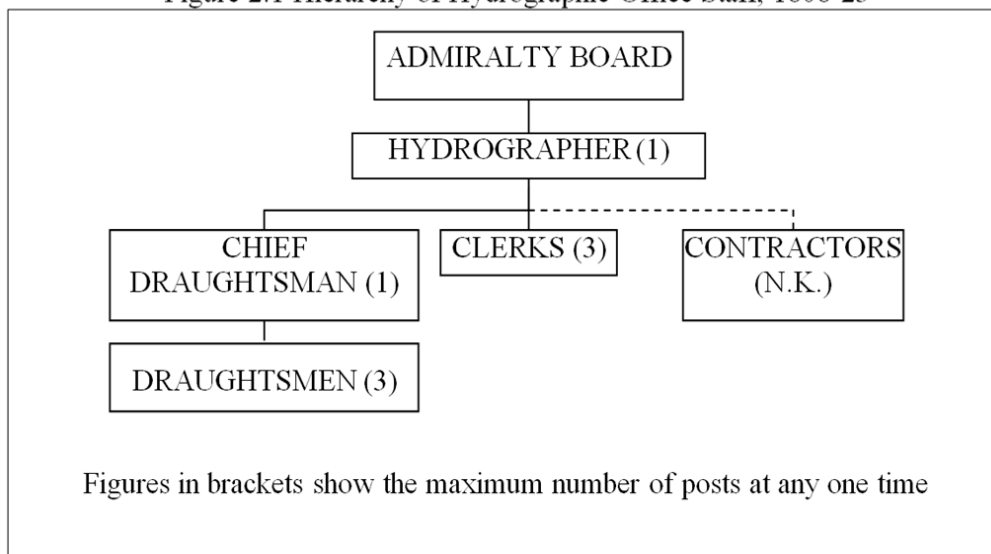
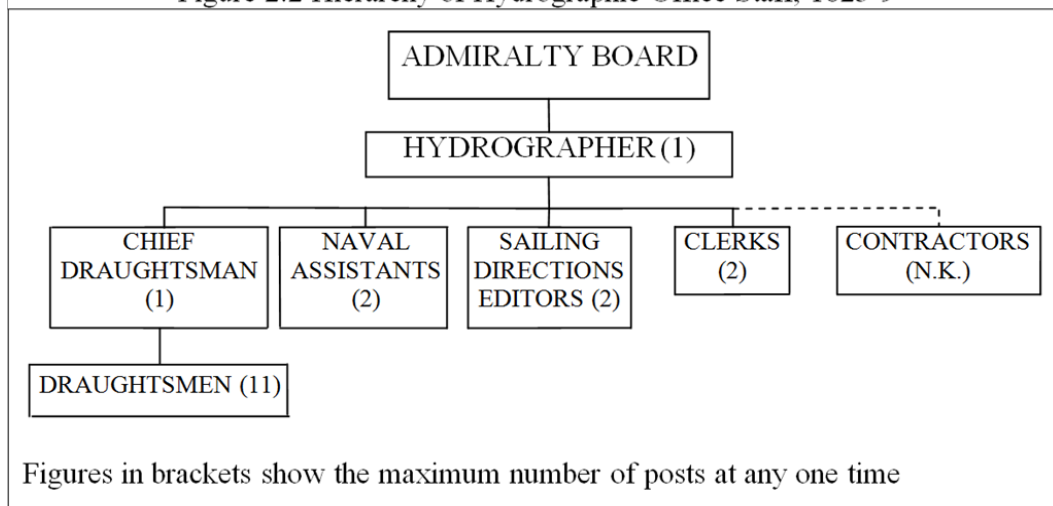


Figure 2.2 Hierarchy of Hydrographic Office Staff, 1823-9



Head of the Hydrographic Office

In Hurd's own words we have a pithy synopsis of what he thought his position represented. In 1811 Hurd, when appealing to the Admiralty Board for more pay, described his position as 'head of a scientific, laborious, confidential and responsible department'.²¹² scientific, because of the nature of collecting the information required to compile accurate charts, along with the association to natural history, oceanography and astronomy; laborious, because of the long hours and dedication required to ensure the chart boxes were filled correctly so all of His Majesty's ships received the correct charts and sailing directions; confidential, because the supply of charts published by the Hydrographic Office was mostly only available for Government use and not to the public; and lastly, a responsible position because of the reliance men in every naval vessel placed in the charts supplied to them by the Admiralty. Parry claimed towards the end of his term as Hydrographer his position should have been one of 'A Director of a Chart Depot for the Admiralty, rather than a guide and originator of Maritime Surveys',²¹³ showing his dislike for what he saw in his eyes as a role of diminished responsibility. Although the responsibility might have been diminished and Parry thought of himself as capable of a great deal more, the post was nevertheless as laborious and tiring for Parry²¹⁴ as it had been for Hurd. But although Parry was undoubtedly a director of a chart depot, he also prepared (and finished in October

²¹² TNA, ADM1/3458, Hurd to Yorke, 14 April 1811.

²¹³ Ritchie, *Admiralty chart*, 187.

²¹⁴ Parry, *Parry of the Arctic*, 134-5.

1826) a key document for planning the acquisition of maritime surveys.²¹⁵ It was this document which, along with areas of political interest, helped to determine what surveys would be undertaken during the following decades.

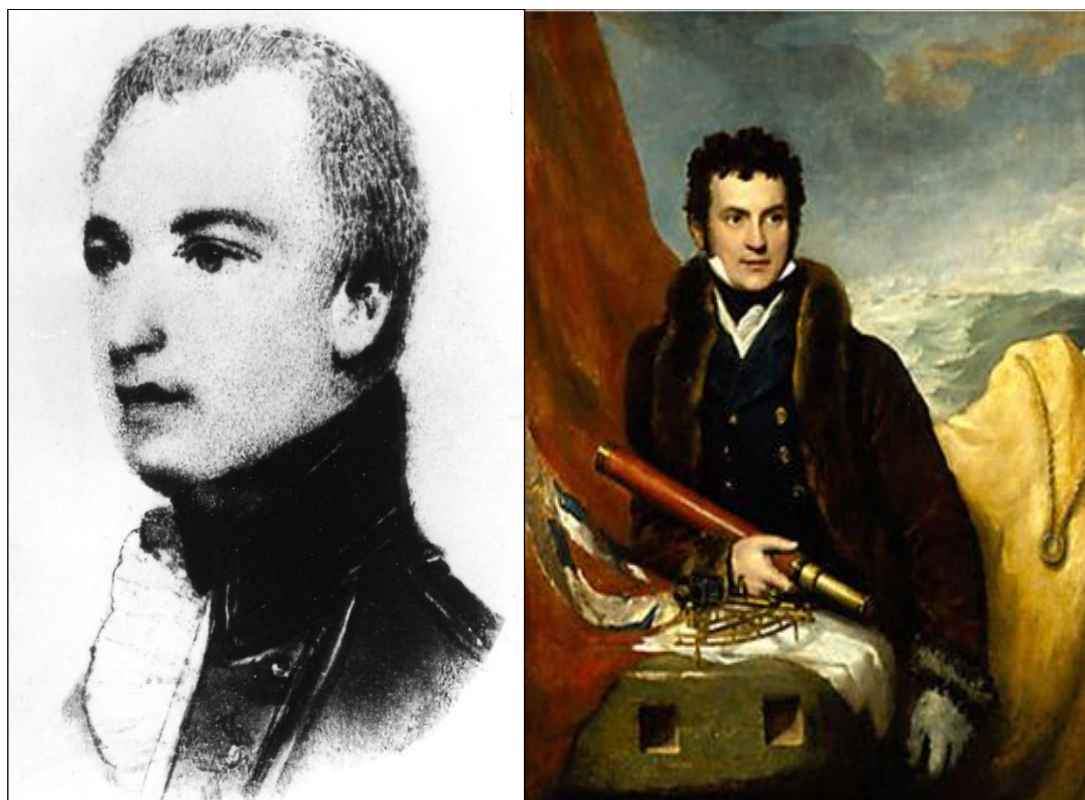


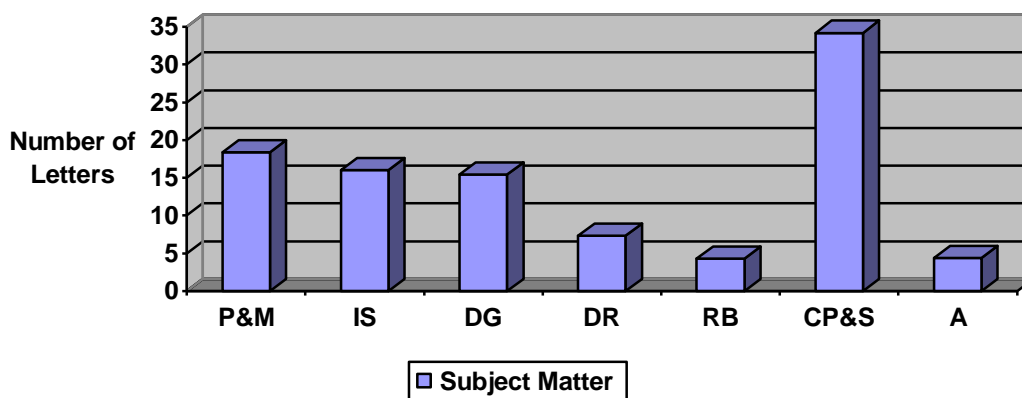
Illustration 2.1 (Left) Captain Thomas Hurd, by an unknown artist (David Broughall).
Illustration 2.2 (Right) Captain William Edward Parry by Samuel Drummond, in or before 1820 (© National Portrait Gallery, London)

How much time the Hydrographer spent on his dealings over management issues (particularly pay), data acquisition, new innovations, international relations, chart production, supply and chart sales can be measured by his outgoing correspondence. From 1815 to 1829 the ‘out’ letter books (containing 1020 letters) include many examples written in their own hand, suggesting that administrative help, *i.e.* that of the clerk, was hard to come by, and on average just over 6 letters were written per month. If the letters are a true indication of the types of duties being undertaken then the largest amount (34.2%) concerned chart production and supply, which meant the Hydrographer spent a day and a half every week on this subject. Planning and manning, the supply of instruments and data gathering occupied him

²¹⁵ UKHO, MLP 183/3, ‘A General Account of the present state of our Hydrographical Information on all the Coasts throughout the World . . .’.

almost equally, accounting for half of his time every week, with data receipt and administration accounting for less than one day per five day week; although he should have worked six days a week the number of absences would have reduced this to five. There are some problems with this analysis as during Parry's Hydrographership the number of letters concerning the supply of instruments dropped dramatically from 219 (from 1815 to 1822 when Hurd was in charge) to only 22 from 1823 to 1829. Similarly there are fewer letters from 1823 to 1827 when only 110 are recorded, when the overall average was 68 letters per year, compared to the 326 recorded from 1 January 1828 to 19 May 1829. The letters do not reflect the amount of time the Hydrographer would have spent assessing information, proof-reading, discussions with the Admiralty Board, as well as with Becher and Walker over matters of production and supply. Nevertheless the underlying trend of Hurd spending his working week between production, supply and data issues was most likely the normal way of things for both Hydrographers.

Figure 2.3 An analysis of the subject of Hydrographer's out-letters, 1815-1829



Key to abbreviations: P&M = Planning and Manning, IS = Instrument Supply, DG = Data Gathering, DR = Data Receipt, RB = Remark Books, CP&S = Chart Production and Supply, A = Administration
 Source: UKHO, LB1 and 2.

Deputising for the Hydrographer

Whilst the Hydrographer was absent it was often the case that a temporary deputy would stand in for him, but this was not an innovation during Hurd's period in post. Captain Bligh had stood in for Dalrymple whilst he was absent due to sickness; Bligh's time was spent 'arranging the Hydrographical Office' and other administrative duties in April and May 1804.²¹⁶ Dalrymple's career was dogged with illness, but for

²¹⁶ NMM, CRK/2/66 1804; TNA, ADM1/3523, letters from Bligh to the Admiralty Board.

Hurd, despite his weakness (allegedly caused by too many years in Bermuda),²¹⁷ he appears to have been a stalwart of the Hydrographical Office until his latter years. He mentioned in a letter of May 1822 that he was an invalid²¹⁸ but continued to work until at least the end of January 1823. It was only in the months of February, March and April of 1823 prior to his death in April that he appears to have been absent for any great length of time.²¹⁹ During those occasions prior to 1823 when he was absent it was mainly John Walker who undertook the administration of the office, with Richard Baily (clerk) and William Nares (draughtsman) occasionally helping. In January 1819 Nares was dealing with the supply of charts,²²⁰ instruments,²²¹ and the former again in April²²² and in June he also supplied the *Nautical Almanac*.²²³ During two months of absence in 1820²²⁴ (when Hurd had permission from the Admiralty Board to be absent)²²⁵ Walker was issuing certificates stating officers employment for pay purposes and dealing with the supply of chronometers,²²⁶ with Baily (not Nares) helping with the supply of charts and copies of the *Nautical Almanac*.²²⁷ Hurd was absent again in April 1821, followed by a period of two months prior to the end of October.²²⁸ In May 1821 Baily was once again dealing with supply in Hurd's absence 'on account of indisposition'²²⁹ and once more in August 1822.²³⁰ On all those occasions the responsibility for supply was not particularly onerous, nor was it something with which the Hydrographer would necessarily have been involved, but the duties undertaken by Walker were part of the day-to-day business in which Hurd was involved. In total Nares signed nineteen letters for Hurd, Baily four and Walker six, but it was Walker who held the most responsibility during Hurd's several

²¹⁷ ADM1/3460, Hurd to Croker, 16 November 1818. This allegation relating to his time in Bermuda is possibly incorrect as one Naval officer who visited the island found the climate to be very agreeable and good for people's health.

²¹⁸ UKHO, LB1 f.493, Hurd to Wade, 30 May 1822.

²¹⁹ UKHO, LB1, letter book, 1815-1823, passim. Hurd signed a letter dated 28 January 1823 (TNA, ADM17/28, Capt. Hurd's accounts, 1818-23) and another on 11 April 1823 (TNA, ADM3/201).

²²⁰ UKHO, LB1 f.193, Nares to Sankey, 13 January 1819.

²²¹ UKHO, LB1 f.194, Nares to Willoughby, 23 January 1819

²²² UKHO, LB1 f.222, Nares to Strong, 22 April 1819.

²²³ UKHO, LB1 f.231, Nares to Blamey, 21 June 1819.

²²⁴ UKHO, LB1 f.337, Hurd to Fitzmaurice, 20 October 1820.

²²⁵ Hurd was in Brighton on 3 September 1820 when he wrote to the Navy Board and was back in the office by the 2nd October (TNA, ADM17/28).

²²⁶ UKHO, LB1 fos 329-32.

²²⁷ UKHO, LB1 f.125, Baily to Falcon, 1 October 1817.

²²⁸ UKHO, LB1 f.438, Hurd to Gordon, 26 October 1821.

²²⁹ UKHO, LB1 f.489, Nares to unnamed recipient, 1 May 1822.

²³⁰ UKHO, LB1 f.504, Nares to Hay, 20 August 1822; *ibid*, f.505, Nares to Woollnough, 30 September 1822.

absences especially over matters relating to production.²³¹ Hurd's absences from 1819 need to be off-set, like those of Dalrymple's, with some consideration for their age and the state of their health. Hurd was in his early seventies in 1819 and Dalrymple was in his late sixties at the time Bligh was deputising for him, clearly both past their physical prime when compared to Parry who was still in his thirties.

Parry's absences were a different matter altogether to those of Hurd and Dalrymple. Parry was lured away from the Hydrographic Office to the Arctic by the chance of fame, glory and money on more than one occasion, which was no major hardship for him. In July 1826 he wrote 'I am in the highest possible spirits, being quite rejoiced in the prospect of some new and honourable employment, better suited both to my tastes and early habits than the sedentary occupation of my office'.²³² But Parry was not one to shirk responsibility and made sure that he had support from the Admiralty Board whilst away. This appeared in his concerns over the management of the Hydrographic Office which came to light at the beginning of January 1824. He was concerned that he could not manage both the Office and his preparations for the voyage, but was encouraged by Barrow to oversee the business in the Hydrographic Office rather than resign.²³³

As the Hydrographer held the rank of captain it would have been fair for a deputy, especially of a lower rank, who had to stand in for him during a long period of absence, to temporarily hold that higher rank, or receive some compensation for his extra responsibility and duties. Lieutenant Becher who according to a contemporary in 1824 was 'acting *pro tempore* as Hydrographer to the Admiralty'²³⁴ was not allowed such a reward. Another contemporary wrote in the same year 'the chief is Captain Parry, and during his absence it is the secretary of the Admiralty who is not a naval career man' who was at the helm,²³⁵ hence there must have been some confusion as to who was in charge. Either way a good percentage of Parry's duties must have been undertaken by Becher from January 1824, although the letters Parry wrote in the months following (until April 24th) suggest that he kept his correspondence up-to-date whilst fitting out his ship. Whilst Parry was away it appears that Walker may have once again had a hand assisting in the office administration, and was certainly in

²³¹ UKHO, LB1, passim.

²³² Rev. E. Parry, *Memoirs of Rear-Admiral Sir W. Edward Parry, Kt. F.R.S. etc late Lieutenant-Governor of Greenwich Hospital* (London, 1858), 189.

²³³ UKHO, Ritchie Papers, Parry to his brother, 5 January 1824.

²³⁴ Marshall, *Royal Naval biography*, II:II (1824), 585.

²³⁵ Lamb, 'The London years of Felipe Bauzá', 325.

charge of production, with Barrow and Croker signing certificates for Walker to issue for pay purposes.²³⁶ Walker was thought by Dawson, writing in the 1880s, to have ‘acted in the capacity of Assistant Hydrographer’ to both Hurd and Parry, when he appears to have undertaken the ‘scientific and technical portion of the duties of Hydrographer’ in their absence.²³⁷ This is confirmed by Bauzá, who wrote in 1828 after Parry’s final absence (when discussing engraving) that Thomas Walker ‘. . . the premier geographer who is also an engraver looks after everything from nine to four’.²³⁸ However, he may have been in charge of the ‘engine room’ of the ship in Hurd’s absence, but it was definitely Becher who was in command and steadied the ship whilst Parry was away in 1827.²³⁹

Whilst Parry was preparing for his mission to Spitzbergen he was allowed to split his duties between the Hydrographic Office and Deptford to prepare for his voyage. Thus from July 1826 until the following March Parry was effectively wearing two hats, Hydrographer and the commander of a voyage of exploration.²⁴⁰ When the time came for Parry to leave for an extended period, Becher was ordered by the Board to keep a journal of events in the Hydrographic Office, and between 20 March and 1 November 1827 a record survives of his activities. Although there are many days when there are no entries, there is one complete week recorded, when at the end of March he spent all or part of everyday working through Lieutenant Badgeley’s translations, only interspersed with the supply of chart boxes on two out of those six days. In total he made entries on 65 days out of a total of 186 days that could have been worked, but entered only ten items into the official ‘out’ letter book²⁴¹ during that time, suggesting he wrote a letter once in every three calendar weeks. When the letter book contents are compared with the entries in his journal, it appears he could have written some 53 letters during this time to coincide with the supply of chart boxes, dealings with the printers, sending charts for binding and at other times when he made written contact on office business.²⁴² This appears to be more realistic as he should have written a letter or note at least once a day rather than once every three weeks.

²³⁶ There are only a few letters to support this, but see UKHO, LB2 fos 36-51.

²³⁷ Dawson, *Memoirs*, 103.

²³⁸ Lamb, ‘The London years of Felipe Bauzá’, 325.

²³⁹ UKHO, OD814, Becher’s journal, 1827.

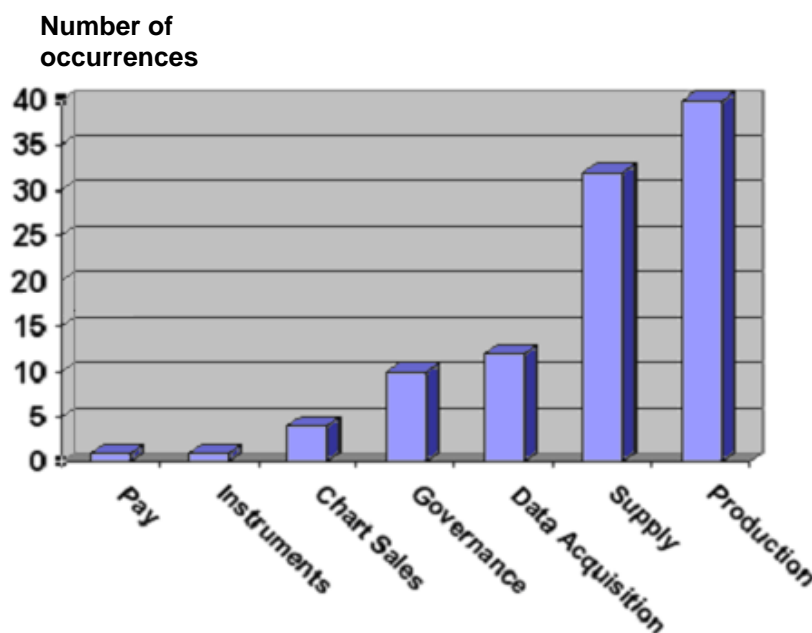
²⁴⁰ Parry, *Memoirs*, 189.

²⁴¹ UKHO, LB2 fos 79-86.

²⁴² UKHO, OD814, Becher’s journal, 1827.

Becher's journal shows that the majority of his time was spent on production and supply issues and there were not many days when he was not involved with one or the other. What was more out of the ordinary was Becher's dealings with the directives from the Lord High Admiral which did not directly relate to production and supply. The sweeping reforms brought in by the Lord High Admiral saw Becher having to arrange staff to undertake revised job responsibilities, accommodate eight extra men to work as draughtsmen on Owen's charts of Africa, selling off an unwanted copper press, moving into a new office for his own use, discharging the services of four chart agents, moving the carpenters out of the printer's room, removing useless charts from Mr Walker's room, superintending artificers as well as dealing with the visits from Mr Douglas and the Lord High Admiral. These were things that neither Parry nor Hurd had to contend with. The journal finishes on the 1 November 1827 when Becher recorded 'Capt Parry resumed his official duties as Hydrographer',²⁴³ following a holiday on the Continent, during which time the success of Parry's exploits became all too clear to him with the attention he received in France.²⁴⁴

Figure 2.4 Occurrence of subjects in Becher's journal, 30 March – 1 November 1827



Source: UKHO, OD814, Becher's journal, 1827

²⁴³ UKHO, OD814, Becher's journal, 1827.

²⁴⁴ Parry, *Memoirs*, 209-10.

Out of the 1989 calendar days from Parry's date of his first appointment to the day of his resignation, at least 735 were spent away from the Hydrographic Office, with another 91 days unaccounted for (see Table 2.1 below). It appears Becher undertook a large percentage of the Hydrographer's duties and he did not receive any additional pay, nor is there anything to suggest he received any immediate benefit from standing in for Parry as he was not promoted to commander until 1841.

Table 2.1 Period of absences and attendances of Captain Parry

Location	Start date	End date	Absent (days)	Present (days)	Unaccounted (days) ²⁴⁵
Hydrographic Office	8 Dec 1823 ²⁴⁶	> 8 Apr 1824 ²⁴⁷	-	123	30
Arctic voyage	8 May 1824	17 Oct 1825 ²⁴⁸	527	-	36
Hydrographic Office	22 Nov 1825	7 Feb 1827 ²⁴⁹	-	442	25
Polar voyage	4 Mar 1827	29 Sep 1827	208	-	0
Hydrographic Office	29 Sep 1827 ²⁵⁰	18 May 1829	-	598	-
Total			735	1163	91

Development of the 'Hydrographic' specialism

In 1808 when the Chart Committee's recommendations had been taken up by the Admiralty Board and the decision to supply naval vessels with all their charts put into practice, it must have been blatantly obvious even to the Board that there were huge gaps in world charting. To be able to fill those gaps a need for more specialist officers to undertake that task came to the fore. Attempts were immediately made by Hurd to obtain data from his fellow officers,²⁵¹ but the number of specialist surveyors in service capable of obtaining high quality surveys and nautical descriptions was small. Dalrymple had pointed out to the Admiralty Board in 1807 how there were in effect at least 22 naval personnel who had their hydrographic work published,²⁵² but the

²⁴⁵ This is the number of days from the 'End date on this line, to the 'Start date' on the line below.

²⁴⁶ The vessels were paid off on the 14th November, he visited Lord Melville on the 19th but he was not appointed until the 8 December (TNA, ADM3/203).

²⁴⁷ Date of his last official letter (UKHO, LB2 f.39, Parry to Grey, 8 April 1824).

²⁴⁸ This is the date he appeared at his court-martial and it is known he was at Chatham on the 28th (*The Times*, 26 October 1825, 29 October 1825).

²⁴⁹ Date of his last official letter (UKHO, LB2 f.78, Parry to Hendry, 7 February 1827).

²⁵⁰ Although appointed on 1 November he was actually in the Admiralty on the 29th of September (Parry, *Parry of the Arctic*, 119).

²⁵¹ Huntingdon Library, FB1365, Hurd to Beaufort, 26 July 1808.

²⁵² TNA, ADM1/3523 Dalrymple to Pole, 10 October 1807.

question as to why they were not considered ‘competent’ is not easily answered; see Appendix 7 for the list.

Filling the gaps and finding enough competent men did not happen overnight and it was not until after the Peace of 1815 that the opportunity to use men and ships that were suddenly surplus to requirements became a reality. The pre-Peace situation saw some 335 ships of the line and cruisers in the British Navy²⁵³ that potentially could have been manned by 335 masters, or many more lieutenants, with enough basic surveying experience to serve in a specialist branch of the Navy, if one had been formed. However, these figures are a theoretical maximum number as not all vessels possessed a master or a lieutenant who had surveying, or indeed, significant navigational experience to warrant a place aboard a survey vessel.²⁵⁴ The number of wrecked naval vessels caused by navigational error shows how a lack of experience was all too often the cause of losses throughout this period.²⁵⁵ But in 1810 there was a glimmer of hope as a small number of men were employed on purely surveying duties, led by George Thomas, master of the *Investigator*, surveying in Home Waters and Captain Beaufort, *Fredericksteen* in the Mediterranean. There were other officers who had proved themselves as competent surveyors for which no surveying appointments were available, men such as Captain Flinders (who described himself in 1812 as Bligh’s ‘. . . disciple in surveying and nautical astronomy’) and Lieutenant W.F.W. Owen who spent the latter part of the year superintending transports from Madras to Mauritius.²⁵⁶ The reason for this dearth of activity and officer development in surveying was undoubtedly due to the priorities of the Admiralty and that of the Hydrographer in supporting the war effort. Thus when the Peace came about Hurd took the opportunity to promote the specialism that he had performed in so well.

One great disadvantage of this pre-Peace situation was that although there was an abundance of commissioned officers and masters with the appropriate skills at a basic level, the number of men who had benefited from serving under specialist surveyors, and thus learnt the art of surveying from an experienced practitioner, were

²⁵³ Rodger, *Command of the ocean*, 608.

²⁵⁴ For example in the 1760s one captain complained to the Admiralty that whilst at Havanna they could not return any charts because of ‘. . . not having any one on board that could draw’ (UKHO, MP4, remark book of H.M.S. *Belle Isle*, 1762).

²⁵⁵ D.J. Hepper, *British warship losses in the age of sail, 1650-1859* (Rotherfield, Sussex, 1994), passim.

²⁵⁶ M. Darby, ‘Bligh’s disciple: Matthew Flinders’s journals of H.M.S. *Providence* (1791-3)’, *The Mariner’s Mirror* 86:4 (2000), 401-11; Dawson, *Memoirs*, 57.

therefore few. Of those who had benefited from such experience, such as Bligh, age was against them. Of those who had served on the Chart Committee with Hurd, Captain Home Popham was deployed on military matters in support of Wellington²⁵⁷ and Captain Edward Columbine was governor of Freetown.²⁵⁸ Others such as Lieutenant Peter Heywood (who had also served under Bligh)²⁵⁹ and Captain William Broughton could have been better deployed than they were, in order to take advantage of their experience,²⁶⁰ thus leaving a very grim situation for the continuity of surveying knowledge within the Navy. Others who had the right experience by 1810 (who had achieved the rank of lieutenant since 1800) included Lieutenants Buchan, Cutfield, Ross, Bartholomew, White and Grant.²⁶¹ None of those men had any significant involvement in surveying prior to 1810, but later went on to make a notable contribution to hydrography: clearly another example of how little interest there was in surveying voyages prior to the Peace but how expansion of hydrography meant career development was not totally unknown.

The idea of specialist men for survey duties was nothing new, nor was the concept of groups of men working together on a common cause. This was, however, a new idea for the Admiralty Board of the early nineteenth century to consider when Hurd wrote to them in 1807 asking for ‘an establishment being formed of officers, scientific young men . . . capable of making nautical surveys’.²⁶² It came to their attention again when Captain W.F.W. Owen wrote to Lord Melville in May 1814, with proposals for keeping in employment (after the Peace) resources used in surveying for the benefit of ‘Commerce, Arts and Sciences’. The main purpose of his letter to the First Lord was not to form a surveying service but to try and secure employment for himself with the growing possibility of peace and the obvious reductions in the Navy. His secondary proposal was to form within each squadron a dedicated group of four vessels manned with surveyors, savants, astronomers and scientists to survey the vast areas of uncharted waters of the Far East, outside of those covered by James

²⁵⁷ H. Popham, ‘Popham, Sir Home Riggs (1762–1820)’, *ODNB* [accessed 30 Jan 2008].

²⁵⁸ C. Terrell, ‘Columbine, Edward Henry (1763–1811)’, *ODNB* [accessed 30 Jan 2008].

²⁵⁹ David, *The surveyors of the Bounty*, 29.

²⁶⁰ J.K. Laughton, ‘Broughton, William Robert (1762–1821)’, rev. R. Morriss, *ODNB* [accessed 8 Feb 2008].

²⁶¹ See Figure 2.3 below under ‘Promotion’ for their career dates.

²⁶² TNA, ADM1/1933, Hurd to Pole, 23 July 1807 and quoted in S. Fisher ‘Captain Thomas Hurd’s survey of Brest during the Blockade in the Napoleonic Wars’, *The Mariner’s Mirror* 79:3 (1993), 303-4.

Horsburgh, Hydrographer to the H.E.I.C.²⁶³ This was a proposal to solve a particular geographical problem and give him four years of employment.²⁶⁴ Owen is also credited, with Peter Heywood, of ‘contributing his assistance and advice . . . to Captain Hurd, . . . in the formation of the Naval Surveying Service’,²⁶⁵ but the written evidence for this is not forthcoming.

The notion that the Hydrographer was head of a ‘Surveying Service’ from 1810 (proposed by Dawson),²⁶⁶ or in 1817 (by Day),²⁶⁷ has misled all who have followed them. Day’s suggestion was due to the Admiralty Board minute setting rates of pay for surveyors in 1817, following on from the separate indication in the *Navy List* of vessels involved in surveying duties.²⁶⁸ However, that is all the Admiralty Board were doing (setting rates of pay), as they gave no more control to the Hydrographer and certainly none over manning, promotions or appointments²⁶⁹ at that time being essential elements in forming a specialism. All of those responsibilities remained firmly in the hands of the Admiralty Board, with whom those surveyors who knew how to play the game accordingly corresponded directly, or via their commander-in-chief. If a date is therefore needed for the formation of the ‘Surveying Service’ then it is more likely to have been the day when the Hydrographer took direct responsibility for all functions of that service. The only time authority was given by the Admiralty Board to the Hydrographer giving him anything close to such a responsibility was under the Lord High Admiral’s governance. But even then the minute did not cover the full range of authority which Parry clearly longed for, although permission was given for the Hydrographer to correspond directly with surveyors.²⁷⁰

²⁶³ A.S. Cook, ‘Horsburgh, James (1762–1836)’, *ODNB* [accessed 28 Sept 2008].

²⁶⁴ NLS, GD51/2/517, Owen to Melville, 4 May 1814.

²⁶⁵ Dawson, *Memoirs*, 57.

²⁶⁶ Dawson, *Memoirs*, 46.

²⁶⁷ Day, *Hydrographic Service*, 29.

²⁶⁸ Day, *Hydrographic Service*, 350. I am grateful to Cdr Bob Wilson for alerting me to this reference.

²⁶⁹ Richards wrote in 1868 how around 1810 ‘the Admiralty first conferred on the Hydrographer the privilege of selecting a Surveyor for the home coasts, a practice which has never since been departed from’ (Richards, *Memoir*, 5).

²⁷⁰ UKHO, MLP 5/3iv, Admiralty Board minute August 1828. This is reflected in the higher numbers of surviving letters in the Hydrographic Office archive from 1827 onwards (UKHO, LP1857 and the Surveyors’ Letters series). Robinson states Hurd ‘was responsible for establishing an independent surveying service . . . over which the Hydrographer ultimately came to exercise considerable control’ (Robinson, *Marine Cartography*, 127). This is misleading because he did not define exactly what ‘independent’, or ‘considerable control’, meant, or did he give the date when those two events happened, subsequently leading more recent writers to the wrong conclusion. During the period of this study it is Parry who got nearer to that stage in 1828 than Hurd managed to.

The idea of a ‘surveying service’ was not mooted by contemporaries from this period of study until 1814, although Hurd had been pushing for the employment of specialist officers for some years before this. He regularly referred to ‘the service’ surveyors were employed upon from the time he was appointed as Hydrographer,²⁷¹ but not specifically to the ‘Surveying Service’, only writing of the ‘survey service’ in 1816;²⁷² the term ‘service’ was generally used for serving in the Navy, or serving the Crown. But the reality that the common purpose hydrographic surveyors possessed meant they naturally saw themselves as part of a ‘surveying service’. Often those men who served together on voyages of exploration and surveying remained friends for life, such as Parry and F.W. Beechey who sailed together to Melville Island.²⁷³ Even those who had not served together on the same vessel, but had an affinity through their common interest in surveying, such as Hurd, Beaufort, White, Smyth and Captain Basil Hall also built up valued friendships which were lifelong due to the common interest in their specialism.²⁷⁴ Building up a camaraderie which seems likely to have formed an affiliation between surveyors led to the notion of a ‘surveying service’ in practice, even though it had not been sanctioned in name by the Admiralty Board.

The nearest action taken by the Admiralty Board to the naming of this specialism occurred in 1816²⁷⁵ to identify specialist ships commissioned for surveying. This may well have been in response to the French setting up Ingénieurs Hydrographes under the Dépôt Générale des Cartes et Plans de la Marine, to undertake the technical aspects of hydrography. The Ingénieurs had a strict entry level qualification,²⁷⁶ which was something that Hurd desired from entrants into the British Navy’s hydrographic specialism but was difficult to enforce. It would not be the first

²⁷¹ Huntingdon Library, FB1365, Hurd to Beaufort, 26 July 1808.

²⁷² UKHO, LB1 f.45, Hurd to Lockwood, 13 February 1816.

²⁷³ F.W. Beechey, ‘Address to the Royal Geographical Society of London’, *The Journal of the Royal Geographical Society of London* 26 (1856), clxxxii.

²⁷⁴ Huntingdon Library, FB1365, Hurd to Beaufort, 26 July 1808; UKHO, LP1857 Hu22 S.P. Hurd to Beaufort, 27 May 1837. The sale of Hurd’s library included two volumes of Beaufort’s works (Sotheby, *A catalogue of the select library . . . of the late Capt. Hurd* (London, 1825)). Hurd was referred to by White as ‘my valued and liberal friend’ in an untitled early state (c.1822) of what was later to be issued as the *Sailing directions for the English Channel* (AL, UaI, p.1). Hall and Smyth both corresponded with Beaufort on the most friendliest of terms (UKHO, SL20a and American Philosophical Society). For Hall’s biography see J.K. Laughton, ‘Hall, Basil (1788–1844)’, rev. R. Morriss, *ODNB* [accessed 28 Aug 2009].

²⁷⁵ Day, *Hydrographic Service*, 350.

²⁷⁶ UKHO, Ritchie papers box P, item 26, Notes on the history of the French Hydrographic Service.

time that the British had copied ideas from their neighbours across the Channel and neither would it be the last.

Experience of officers

To be able to undertake the accurate recording of survey and scientific data it was essential men were either educated in mathematics at a formal school, or had enough proven years of experience at sea under an experienced practitioner, but preferably both. Without doubt Hurd was of this opinion in 1816 and in a letter to Croker two years later he outlined those necessary prerequisites for an appointment as a surveying officer, which he hoped would ‘lay a firm foundation for a regular scientific corps of sea officers’ when the time came.²⁷⁷ Hurd had been actively searching for, as well as encouraging ‘all young men of talent and educated abilities, particularly such as have received a mathematical education at Christ’s College [Hospital] to enter the naval service of this country’. He wanted those talented men to serve on board survey vessels as he felt such a placement would develop their skills as both ‘seamen and artists’.²⁷⁸ That requirement for being both seaman and artist was a necessary one as views of coastal landfalls, headlands and navigational features, were essential pieces of information regularly recorded; this was one area of expertise which set naval surveyors apart from their Ordnance counterparts.²⁷⁹

What was more important for surveyors was their mathematical ability, attracting men such as John Septimus Roe,²⁸⁰ and John Bushnan²⁸¹ who had both been educated at Christ’s Hospital. Others who found their way into survey vessels could count amongst their number A.T.E. Vidal who had attended the Royal Naval College in Portsmouth.²⁸² There were those who tried to educate themselves later in life in a bid to get a posting to a survey vessel, such as Lieutenant Fabian²⁸³ and Captain Hendry. Hendry’s efforts to improve his surveying knowledge were commendable, as he appealed to his old shipmate Parry in a private letter stating how he had read Euclid’s first 14 books, studied two surveying manuals as well as algebra.

²⁷⁷ UKHO, LB1 fos 120-1, Hurd to Croker, 27 July 1818.

²⁷⁸ UKHO, LB1 fos 120-1, Hurd to Croker, 27 July 1818.

²⁷⁹ A.S. Cook ‘The training of East India Company surveyors in the early nineteenth century’, paper given at the 10th International History of Cartography Conference (Dublin, 1983), 4.

²⁸⁰ Dawson, 109

²⁸¹ *Gentleman’s Magazine* 1824, 567.

²⁸² Dawson, *Memoirs*, 94; G.S. Ritchie, ‘Alexander Thomas Emeric Vidal’ in *The Dictionary of National Biography – missing persons* (London, 1993), 692.

²⁸³ UKHO, LP1857 F238, Fabian to Parry, 1 September 1826.

Despite having supplied the Admiralty with charts, the negative reply from his old shipmate was very abrupt. Hendry also offered his services to Barrow to explore the passage by the route of Behrings Straits, but there was no place for him on the Arctic voyage.²⁸⁴

One element of ‘experience’ which was particularly relevant in such a small contingent of men that were involved with surveying, was practical experience, which was obtained by ‘on the job’ training. A certain amount of theory and land-based education became a prerequisite under Hurd, but once selected in order to obtain further postings, and even consideration for promotion, men had to prove their worth. There were no training manuals specifically aimed at educating young officers to turn them into an experienced practitioner, only volumes explaining how surveys were executed, which were only of use if the user had the prerequisite skills to use them and an environment to practice them;²⁸⁵ those prerequisite skills were taught by the schoolmasters found on board larger ships, from whom young gentlemen would be taught mainly mathematical and navigational subjects and then transferred to a survey vessel (see Illustration 2.3).²⁸⁶ Some surveying experience was available on the larger ships, but it was nothing compared to that available on a surveying vessel.

To make matters worse there does not appear to have been any detailed instructions issued by the Hydrographer, or the Admiralty, to officers to instruct their charges in any particular method of surveying, unlike the methods adopted by the Ordnance Survey in the early nineteenth century.²⁸⁷ Undoubtedly Hurd was keen for them to be instructed, but how, and to what particular standard, is not apparent. Because of the dearth of surveying voyages prior to 1810²⁸⁸ the opportunities for midshipmen and lieutenants to serve with an experienced surveying officer to obtain this practical training were few and far between. After 1810 the opportunities

²⁸⁴ UKHO, LP1857 H368, Hendry to Parry, 5 February 1827. The reply from Parry is in LB2 f.78, dated 7 February 1827. Whether a posting to a survey vessel was unavailable, or whether he specifically wanted to go to the Arctic, is unclear.

²⁸⁵ Volumes included M. Mackenzie senior, *Treatise of martim surveying, in two parts, with a prefatory essay on draughts and surveys by Murdoch Mackenzie, senior; late Maritim Surveyor in His Majesty's Service* (London, 1774); A. Dalrymple, *Essay on nautical surveying* (London, 1786); and Capt. R. Copeland, *An introduction to the practice of nautical surveying, and the construction of sea-charts: illustrated by thirty-four plates. Translated from the French of C.F. Beautemps-Beaupré Hydrographer of the French Marine, member of the Legion of Honour, &c* (London, 1823).

²⁸⁶ TNA, ADM7/226. In 1820 the newly formed Astronomical Society promoted the idea of training ‘nautical men’ in the use of astronomical instruments (Miller, ‘The Royal Society . . .’, 210-11).

²⁸⁷ A.S. Cook ‘The training of East India Company surveyors in the early nineteenth century’, paper given at the 10th International History of Cartography Conference (Dublin, 1983), *passim*.

²⁸⁸ T.H. Tizard, *Chronological list of the officers conducting British maritime discoveries and surveys; together with the names of the vessels employed from the earliest times until 1900* (London, 1900).

increased and those officers who possessed the skills to be able to teach their subordinates in the art of surveying effectively were running floating training schools. As time progressed more and more opportunities became available.

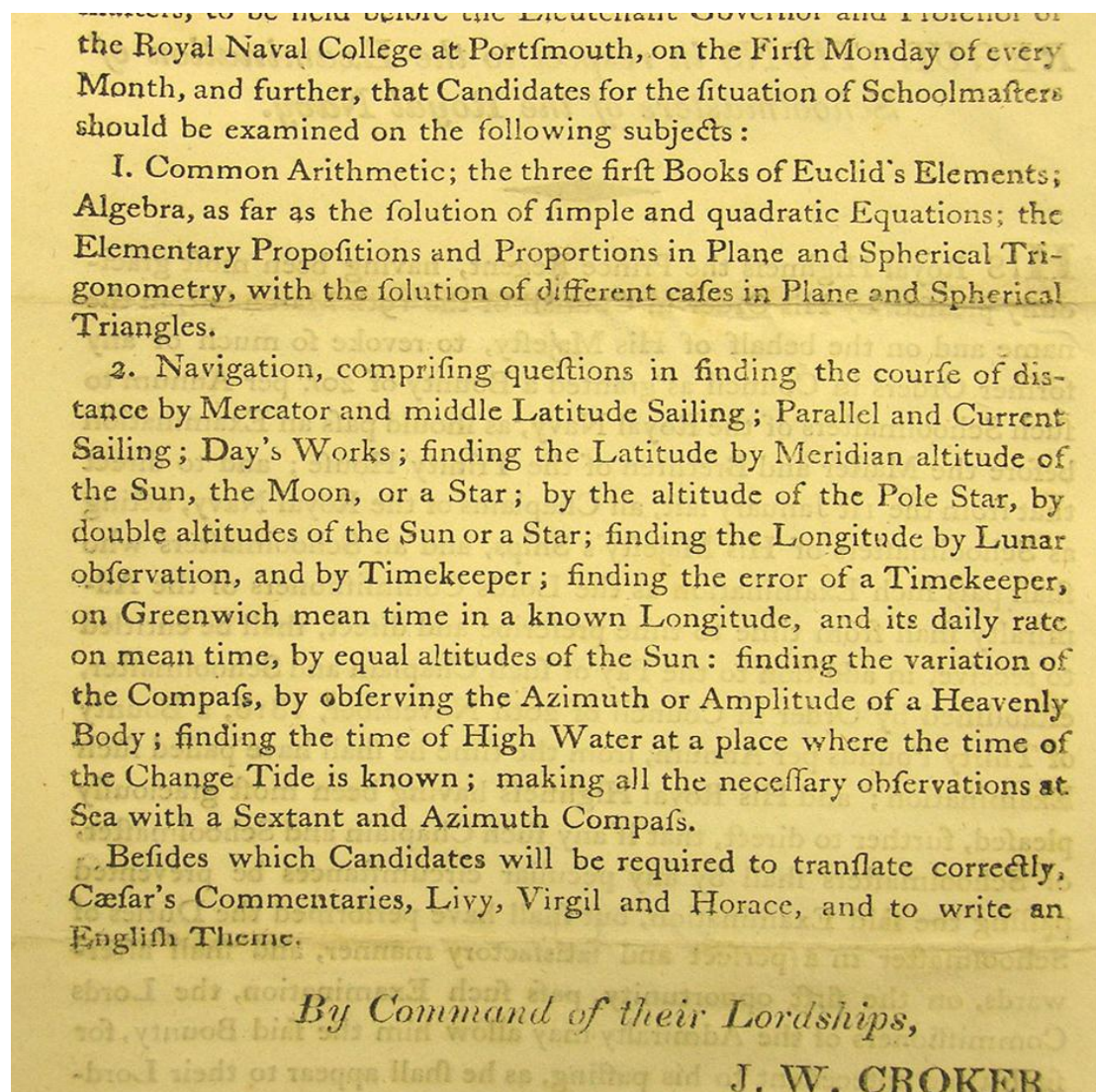


Illustration 2.3 An extract from an Admiralty order of 1819 showing the subjects to be taught by schoolmasters (TNA, ADM7/226)

Although there was no formal surveying training programme run by the Hydrographer, unlike the Spanish Hydrographic Office that ‘trained personnel at all levels’,²⁸⁹ the Hydrographer did use his position to make sure training was given but in a more *ad hoc* manner. This was more in line with today’s ‘on the job’ training where men were taken under the wing of an experienced practitioner. So successful was this strategy for developing men that David notes how Smyth nurtured eleven officers for the surveying service, who had served with him in the *Adventure* and *Aid*

²⁸⁹ Lamb, ‘The London years of Felipe Bauzá’, 324.

in the Mediterranean,²⁹⁰ all of whom went on to command vessels and nurture further officers; this was a practice that was also used by the Spanish Navy.²⁹¹ Such was the camaraderie that developed, often as a result of the hardships of surveying, in a beneficial environment on board a survey vessel, that the officers of His Majesty's ships *Leven* and *Barracouta* presented their commanding officer with a silver punchbowl on conclusion of their African survey.²⁹² In 1824, after Hurd's influence on postings and training was no more, the exiled Spanish Hydrographer made the following observation relevant to this *ad hoc* practical training 'that in this way many people are trained and as a half dozen corvettes are steadily in service, this amounts to a well educated work force'.²⁹³ From this position the Navy never looked back and as the number of vessels commissioned for surveying duties increased so did the number of trained men.

Manning

Surveying was an opportunity (in Hurd's words) for 'genius exerting itself out of the common line of service', but such opportunities were far from numerous. Neither was the Hydrographer's influence on manning a whole vessel's complement, although he did write to both the Admiralty and Navy Boards with the names of suitably experienced men who could fill a range of posts. Hurd and Parry kept career details of men with surveying experience, those records have not survived in the official archives. However, Hurd regularly complained of the lack of petty officers needed in survey vessels, such as in 1818, after previous attempts to resolve the matter, when he wrote to Croker.²⁹⁴ He had to write to Croker again in February 1819, only six months after his last letter, pointing out how the deficiencies had not been addressed and the survey work subsequently compromised.²⁹⁵ This showed the frustrations of the Hydrographer and experienced surveyors who were being compromised by the lack of appropriate resources allocated by the Admiralty Board. It is likely that as the Hydrographer had little influence over extra manning he would have held little

²⁹⁰ Lt-Cdr. A.C.F. David R.N., 'British hydrography in the Mediterranean in the early nineteenth century', read at Greenwich (1974), 12.

²⁹¹ Lamb, 'The London years of Felipe Bauzá', 322-3.

²⁹² Ritchie, *Admiralty chart*, 150-1.

²⁹³ Lamb, 'The London years of Felipe Bauzá', 325.

²⁹⁴ UKHO, LB1 fos 160-1, Hurd to Croker, 27 July 1818.

²⁹⁵ UKHO, LB1 fos 207-8, Hurd to Croker, 19 February 1819. Hurd also gave another example (in the same letter) of the problem because he was not made aware of the establishment of HMS *Kangaroo*.

influence over initial postings. This was true, especially for senior officers in command of voyages and survey cruises,²⁹⁶ with few exceptions. As the Arctic voyages were so high profile, Hurd's role was one of a supportive nature rather than directorial. For example, when the Arctic voyage of 1821 was in preparation one applicant to the Hydrographer was told that

Capt. Hurd . . . has neither the appointment or the approval of the officers who are to be employed in the Arctic expedition, but that all applications for such a purpose must be made either to the Board or to the several commanders.²⁹⁷

Parry did keep a collective record (from 1825) of the progress of surveys and the resources tied up in those vessels, noting when men of the higher ranks died or were transferred to other duties. Thus the chances of any great interest being taken in the lower ranks was pretty small, although those men performed essential tasks in supporting the officers collecting the data.²⁹⁸ Men who wrote to the Admiralty Board seeking employment on a survey vessel were unlikely to get any, especially after 1815 when there was a glut of manpower, unless they already had experience onboard such a vessel. But the Hydrographer was not left totally out of the loop as the Admiralty Board occasionally wrote to consult him on the suitability of men for appointments, even those from the lower ranks. On one occasion Parry was asked by the Admiralty Board to report on charts submitted to it, which had been made by Mr John Bremner, acting master, and Mr John Hay, midshipman, and whether those officers deserved a recommendation to the Navy Board. Parry was able to recommend Bremner because his remarks and charts were made with 'great care and industry, and, as relating to this part of Mr Bremner's duty, I consider him highly deserving of a recommendation to the Navy Board'.²⁹⁹

One particularly good example of the network of connections that was used to try and secure employment can be seen in 1829. As a result of Parry's successful high profile voyages of discovery, he had been given the freedom of the city of Winchester on 26 December 1823.³⁰⁰ In March 1829 it was time for the mayor, aldermen and inhabitants of Winchester to call in a return favour. They wrote to Parry seeking employment for 'a young officer of the name of Edward Rogier, a lieutenant on half

²⁹⁶ See UKHO, LB1 and LB2 for numerous examples of this.

²⁹⁷ UKHO, LB1 f.364, Nares to Jenkins, 24 January 1821.

²⁹⁸ UKHO, SL101/1.

²⁹⁹ UKHO, MB1 f.99, 6 February 1827.

³⁰⁰ *The Times*, 29 December 1823, pg. 2, issue 12068 col G; Dawson, *Memoirs*, 99.

pay of the Navy, who resides in this neighbourhood, and has served in the expedition which was sent to survey the coasts of Africa'. Although Rogier had been with Captain W.F.W. Owen on the African survey and had qualified as an assistant surveyor, he was not needed for future surveying duties. All Parry could do was refer him to the Admiralty Board, giving a brief outline of his experience.³⁰¹ Unfortunately for Rogier, although he had a good deal of experience there was no further employment for him in surveying, although he remained on half pay for many years afterwards,³⁰² despite two further requests for employment and the involvement of Cockburn.³⁰³

Officers

How men actually came to the notice of the Hydrographer, or the Admiralty Board, as having the correct competency to warrant their inclusion in a surveying voyage was quite straightforward. In the early years when Hurd was Hydrographer the opportunity to specialise on a voyage was exceptionally low, with only one or two such enterprises a year up until the Peace of 1815, compared to only eight during the 13 years Dalrymple was Hydrographer.³⁰⁴ Therefore any budding surveyor had to do something either very spectacular to attract the Board's attention, have a very well placed patron, executed a survey which was laid before the Board, or been exceptionally lucky and have a request (to the Board) for a move or appointment to a survey vessel accepted. Such was the benefit of placing a 'prettily coloured' survey before the Board that one surveyor termed such colouring '*à la Croker*', suggesting that was just how the first secretary wanted it.³⁰⁵

Although patronage is normally associated with the upper classes of society, the Hydrographer also kept the hopes of employment alive for many individuals, perhaps more so for those who had established themselves as a surveying specialist. A book was kept recording men's abilities³⁰⁶ and also included names of those seeking

³⁰¹ UKHO, LP1857 M255, Mayor of Winchester to Parry, 10 March 1829. See also pages 104-5 of Burrows' *Captain Owen of the African survey* (Rotterdam, 1979).

³⁰² UKHO, SL110/4, register of surveyors' service.

³⁰³ UKHO, LP1857 R326, Rogier to Beaufort 23 May 1829; *ibid*, R328, Rogier to Beaufort 17 July 1830; *ibid*, R333, Rogier to Beaufort 20 October 1837.

³⁰⁴ Tizard, *Chronological list*, 10-11.

³⁰⁵ American Philosophical Society, BSm98, Graves to Smyth, 12 October 1830.

³⁰⁶ Hurd wrote to one applicant's uncle 'I was much pleased with your nephew's New Zealand Thames and have it recorded in our Office books as a proof of the young man's abilities and also entered his

employment to the Admiralty Board.³⁰⁷ By 1828 this responsibility may have been devolved to Parry, as he stated to Lieutenant Miles that he had noted his ‘name in the list of officers desiring to have employment in the surveying service, with the names of the officers to whom you refer, as being acquainted with your qualifications’, lamenting that he did not know of any increase in the numbers of officers to be employed.³⁰⁸ This is despite Miles having taken command of the *Kangaroo* and brought her back to England because the master was court martialled; Miles did go on to become a commander and eventually was employed in the Hydrographic Office as a Naval Assistant.³⁰⁹

The majority of men who had any surveying capability and wanted to progress their career, would lay before the Admiralty Board the fruits of their labours. The cleverer ones would even dedicate their work to one of their Lordships, such as Lieutenant Maw who expressed his gratitude for Cockburn’s patronage in the introduction of his account of crossing the Andes in 1827.³¹⁰ One officer used the opportunity when sending the track chart of his vessel to Croker to highlight the abilities of one Admiralty midshipman who had ‘served in this ship with great credit and ability’, with the officer being promoted to lieutenant as a reward for his work preparing the chart.³¹¹ The Hydrographer also laid charts before the Board, which was something their Lordships directed him to do in 1819, having to ‘. . . lay before the Board every new work completed in his department as soon as it shall be in a state for their Lordships inspection’.³¹² Thus from 1819 any man who had their name engraved on such an office chart was brought to the attention of the Board and increased his chances of employment.

An appointment to a surveying voyage was viewed by one contemporary as ‘an opening to the path of distinction’,³¹³ which before 1815 was a very limited path

name as a candidate for employment under this department’ (UKHO, LB1 f.462, Hurd to Downie, 15 February 1822).

³⁰⁷ Hurd recalled to one lieutenant who wanted to leave the Navy in 1822 to work for the Port of Liverpool that ‘In consequence of the communications made by you several years back to this office your name was given into the Board for the purpose of being employed in this department and why their Lordships did not so determine at the time I am ignorant’ (UKHO, LB1 f.493, Hurd to Wade, 30 May 1822).

³⁰⁸ UKHO, LB2 f.125, Parry to Miles, 15 April 1828.

³⁰⁹ Dawson, *Memoirs*, 51. Miles’s original letter to Parry can be found in UKHO, LP1857 M443.

³¹⁰ Lieut. H.L. Maws, *Pacific to the Atlantic, crossing the Andes in the Northern Provinces of Peru, and descending the River Marañon, or Amazon* (London, 1829).

³¹¹ Royal Naval Museum, Portsmouth, 1977.301/62, Dundas to Croker, 6 July 1818.

³¹² TNA, ADM1/3461, Board minute 16 November 1819.

³¹³ *Gentleman’s Magazine* 1824, 568.

indeed. When Clarence served as Lord High Admiral he instigated a request for officers to recommend men with surveying experience for employment. This proactive approach of going out and identifying men with the appropriate skills was typical of the progressive ideology during Clarence's administration. Thus Commander Boteler wrote recommending five men for employment in the surveying service; the letter was passed to Lieutenant Becher and remained in the Hydrographic Office after the details had been collated at the Lord High Admiral's request.³¹⁴ Other men such as Lieutenant John Bushnan came to the notice of Hurd, according to his obituary, through 'providential circumstances',³¹⁵ but however they came to the notice of the Board as specialising in surveying it did not guarantee an officer employment. John Franklin, for example, was seeking employment when Parry was considering leaving the office in 1829³¹⁶ and even the experienced Martin White was unemployed for a short time in 1812.³¹⁷ The competition for places was always great and the opportunities for employment in the specialism slim, especially when the numbers of officers in employment in the Navy as a whole dramatically decreased.³¹⁸ Even with the number of voyages of discovery and charting on the increase from 1815, any officer who found himself on a surveying vessel could have considered himself very fortunate.

Masters

The rank of master was one that surveyors from this period of study must have looked back into history to the great Captain Cook for inspiration. Here was a man like many who had started life in the Merchant Service, but (exceptionally) had ended his days as a household name in England thanks to the opportunities offered to him through employment in the Royal Navy. The position and status of the rank of master was one that aboard a surveying vessel was equally, if not more important, than those who served on larger vessels. The reason for this concerns the nature of the work that was being undertaken in the two types of vessels and the numbers of masters of smaller vessels who were not only in command but also tasked with the responsibility of surveying duties. Thus a surveying master who received additional pay of 15s after

³¹⁴ UKHO, LP1857 B376, Boteler to the Lord High Admiral, 1 November 1827.

³¹⁵ *Gentleman's Magazine* 1824, 567.

³¹⁶ Parry, *Parry of the Arctic*, 135.

³¹⁷ TNA, ADM1/3458, Hurd to Croker, 1 July 1812.

³¹⁸ N.A.M. Rodger, 'Commissioned officers' careers in the Royal Navy, 1690-1815', *Journal for Maritime Research* (June 2001) [www.jmr.nmm.ac.uk].

1817,³¹⁹ compared to an ordinary master, was certainly of a higher cultural status. Such was his status that the Admiralty held great respect for these men and in 1810 they made up a third of commanding officers of what was to become the ‘Surveying Fleet’.

In 1817 the Navy Board was instructed by the Hydrographer to keep a separate list of survey vessels and no master or second master could be appointed to any of those vessels until the Hydrographer had been consulted.³²⁰ The important position in which Hurd found himself, involved him as an advisor, rather than someone who could appoint, but it was nevertheless a progressive measure. This precedent was also a big step towards the formulation of a professional body of men with surveying knowledge to serve under the Hydrographer, who in return could influence their chances of promotion. This system of appointments relied on information from surveying captains and from men applying to Hurd on an *ad hoc* basis, from whom details of their experience would have been presented. Hurd would recommend appointments to the Controller of the Navy as well as review papers and certificates referred to him by the Board, with those unsuitable candidates being rejected. This sometimes meant that he was left with no suitable person to appoint and therefore left it up to the captain of the vessel to make his own choice. In this final case the Hydrographer still had to examine any of the nominees’ papers and even the considerations of the geography of the area to be surveyed ruled at least one candidate out of contention.³²¹

The Hydrographers’ recommendations were sound ones and his reputation relied upon him choosing wisely, especially for the ship’s master as there was nowhere to hide when it came to his navigational responsibilities. Hurd found that his own suggestions carried much more weight if they were supported by a higher-ranking officer. His suggestion to appoint Mr Joseph Foss Dessiou as the second master of the *Aid* in 1817 was supported by Admiral Thornborough. The appointee was highly suitable for survey work, as he had learnt surveying from his father who was also a master in the Navy, being ‘a good observer and calculator both by Lunars and time-keepers as well as a tolerable Draftsman and Mathematician’. Although

³¹⁹ UKHO, SL101/1.

³²⁰ UKHO, LB1 f.29. Further regulations concerning the appointment of masters can be found in the Admiralty Standing Orders and in particular that of 5 December 1820, which stated that the rank of master could be confirmed by commanders-in-chief of foreign stations arising from vacancies due to death or dismissal from the service (ADM7/226).

³²¹ UKHO, LB1 fos 75-8, 90.

Dessiou (junior) was not eligible to pass the Trinity House examination, the Hydrographer used his own influence to get the appointment confirmed with the Navy Office.³²² The other factor affecting his appointment was that the vessel was about to leave Portsmouth and there was no other suitable person available to fill the post.

Appointments of masters were not always straight forward, even after the Peace of 1815 when there was a surplus of men and employment in the Navy was difficult to come by. Therefore after 1815 Hurd found himself in a strong position to be able to pick and choose the best. He wrote to the Controller of the Navy in January 1817 complaining how (in one instance) there were ‘no particular talents or qualifications appear amongst the papers and certificates referred to me by the Navy Board which mark the characters of any of the candidates for employment in the vessels fitting out for the survey service at the different ports I herewith return them . . .’³²³ To make matters worse he had selected two men who then declined the offer and thus found himself in a position where he had to leave the appointment totally in the hands of the Navy Board.³²⁴ Not really wanting the Navy Board to make the appointment, he finished his letter pointing out how he had taken matters into his own hands by asking Commander White of the *Shamrock* ‘to look out for any persons at Plymouth who may be likely to answer his purpose’.³²⁵

Men would also write direct to Hurd for employment if they had passed their certificates and then he would write to the Navy Board promoting their suitability. Such were Mr Charles Balfour and Mr John Leader ‘who also possessed satisfactory testimonies of servitude’ who Hurd submitted to fill the vacancies for second masters in vessels fitting out for survey employment.³²⁶ However, on further examination Hurd found them to be of ‘the least talent or qualification which can entitle them to a recommendation from this office’ and then left the matter in the hands of the Navy Board, not missing the opportunity of trying to resolve a further manning issue for

³²² Hurd wrote ‘. . . I have to propose that he should receive either from the Navy Board or the Commanding Admiral at Portsmouth an acting appointment as second Master of the above ship – presuming that during his services in that capacity he will be acquiring a sufficient standing in the Kings service to qualify him both for an examination, & a Navy Board Warrant at a future period’ (Ibid, LB 1 fos 92-93, Hurd to Martin, 28 February 1817).

³²³ UKHO, LB1 f.76, Hurd to Martin, 16 January 1817.

³²⁴ UKHO, LB1 f.76, Hurd to Martin, 16 January 1817.

³²⁵ UKHO, LB1 fos 76-7, Hurd to Martin, 16 January 1817.

³²⁶ UKHO, LB1 f.77, Hurd to Martin, 20 January 1817.

another vessel.³²⁷ Although at times Hurd had numerous men to choose from, he would not select any unsuitable applicant.

With such a small number of survey vessels in commission after the Peace the number of opportunities for a master to specialise was very limited. Despite the majority of survey vessels having a master and a second master,³²⁸ in 1818 there were only nine such vessels in commission, realising approximately 15 posts for masters and some second masters. Thus the Hydrographer could not accommodate all requests, such as that made to him by Sir Archibald Dickson Bart in 1817 for employment for Mr Fotheringham. Hurd replied to the baronet that

the appointments to all the vessels have been filled up a considerable time back, and whether in these days of economy any more survey vessels may be brought forward I cannot say . . .³²⁹

He promised to contact Dickson if a vacancy arose but nothing was immediately forthcoming. Fotheringham was not put off by this and in the following year sent Hurd details of dangers off the coasts of Lincolnshire and Norfolk when once again seeking employment to no avail.³³⁰ It was not just masters who found opportunities in survey vessels hard to come by, as Lieutenant G.J. Fabian could find no way in after writing to Hurd in 1821.³³¹ Not to be put off Fabian, who had been a lieutenant since 1815, wrote again in September 1826 to the Hydrographer after having gained some surveying experience under Captain Septimus Arabin, who had entered Fabian's name 'in a book at your office, as a sort of certificate of the same'. Arabin had also spoken with John Barrow and naturally he was now very hopeful of 'gaining employ in this desirable branch of the service', even offering to study scientific subjects relating to surveying to improve his chances and finishing off with a plea to Parry's religious interests to guide him towards employing the lieutenant. But all was once again futile and the letter annotated by Parry: 'Cannot give any hope of employment in this department'.³³²

Despite an excess of men the days of the master in command of a survey vessel were numbered, due in part to the Admiralty having drawn up new orders in

³²⁷ UKHO, LB1 f.77, Hurd to Martin, 23 January 1817.

³²⁸ In the late 1820s only three out of nine vessels did not have a second master (UKHO, SL101/1).

³²⁹ UKHO, LB1 f.106, Hurd to Dickson, 7 June 1817. Fotheringham had initially applied to Hurd on the 30 May 1817 for an appointment (UKHO, LB1 f.106, Hurd to Fotheringham, 30 May 1817).

³³⁰ UKHO, LB1 f.106, Hurd to Fotheringham, 17 April 1818.

³³¹ UKHO, LB1 f.362, Hurd to Fabian, 19 January 1821.

³³² UKHO, LP1857 F238, Fabian to Parry, 1 September 1826.

1824 for improving the ‘class of persons intended to rise to the situation of masters in the Royal Navy’. The Admiralty required boys to have been ‘persons of education and attainments in . . . navigation, . . . brought up at Christ’s Hospital, or the Upper School of Greenwich’, who could be appointed immediately as volunteers of the second class by captains or commanders.³³³ Whether enough men of sufficient quality came into the Navy through this initiative, or whether only those who joined the officer class had a sufficient amount of scientific education, is unclear. Nevertheless there were surveying masters such as George Holbrook (d.1832), Anthony Lockwood (d.1855), George Thomas (d.1846), Lewis Fitzmaurice (d.1849) and Anthony DeMayne (dismissed 1829, d.1832),³³⁴ who had served the Admiralty very well. With a growing number of ‘specialists’ coming from the officer class, the masters were gradually phased out of surveying not because of a lack of competent men, but through a desire to see scientifically orientated lieutenants, commanders and captains in charge of surveying operations. Such a position was made even worse (for masters) after Parry became Hydrographer, as he was by far more scientifically orientated than Hurd.

Such a theory can be seen in the numbers of masters involved in survey operations. In an undated proposal by Hurd of which areas of the globe needed surveying of *circa* 1815, he recommended surveys could be completed by five masters, two captains and one lieutenant.³³⁵ However, by 1829 when Parry resigned there was only one master left in charge of a survey vessel (George Thomas, *Investigator*), with the other survey vessels commanded by one captain, eight commanders and four lieutenants.³³⁶ Some of those officers learnt the art of surveying through practical work under the masters, such as Lieutenants Barnett and Richard Owen who had both served under DeMayne³³⁷ who Hurd placed a great deal of trust to develop those future surveyors.

The demise of the surveying master was due to a ‘closed shop’ whereby an educated and affluent officer class usurped the whole genre of naval life, ensuring employment for young gentlemen at the expense of the ship’s master. Quantitative

³³³ TNA, ADM7/889.

³³⁴ De Mayne was court martialled on 29 January 1829 and dismissed from the Navy (TNA, ADM13/103).

³³⁵ UKHO, MLP70, undated and untitled survey of charting needs.

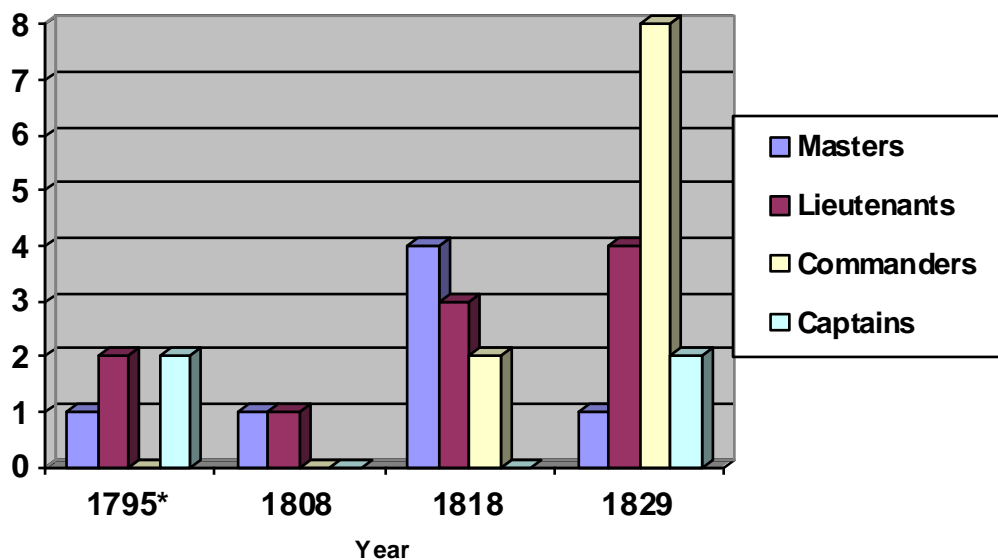
³³⁶ Dawson, *Memoirs*, 102.

³³⁷ Dawson, *Memoirs*, 126; Ritchie, *Admiralty chart*, 118. De Mayne had built up a good reputation for accurate surveying on the west coast of Africa, the North American Station and the West Indies, but his career was blighted when he was dismissed following a court martial (Dawson, *Memoirs*, 50-1).

evidence to support this theory can be seen in the number of masters in command of vessels. Figure 2.5 below shows the numbers of survey vessels commanded by masters, lieutenants, commanders and captains from 1795 to 1829, showing the demise of the master and the dramatic increase in the number of commanders. It also shows the lack of surveying activity prior to 1815.

Figure 2.5 The ratio of commands of survey vessels, 1795-1829

No. of men



* This includes Graeme Spence, who although a civilian has been counted as a master for this representative purpose.

Source: Dawson, *Memoirs of Hydrography*; Tizard, *List of officers*

There is some further evidence to support this theory of the demise of the master in favour of lieutenants in command of survey vessels, even though second masters, masters' assistants, and volunteers of the second class were encouraged by the Admiralty Board 'in making Surveys of Coasts, Harbours, or Rivers . . . keeping the rate of Chronometers, and . . . taking . . . Nautical Observations' in 1826.³³⁸ Vice Admiral Fleeming wrote a private letter to Parry in May 1828 proposing that surveys should be undertaken under the command of lieutenants.³³⁹ But such employment under Fleeming's scheme came at a price as rather than drawing up the information

³³⁸ Admiralty Circular No.4, Admiralty Office, 12 August 1826.

³³⁹ Fleeming proposed that vessels ' . . . with a reduced complement of men . . . to be commanded by lieutenants; but that no extra allowance be given whatever; the term of remaining in commission should be limited to the usual period of three years; when the work they have done, and the accuracy of it, should determine their further employment' (UKHO, LP1857 F196, Fleeming to Parry, 15 May 1828).

themselves the lieutenants were prohibited from preparing charts for private publication, having to send their work to the Hydrographic Office once every three months. Fleeming, like Croker, clearly had issues with officers undertaking duties which could have been undertaken by lesser paid men and lamented ‘. . . we shall soon be without a master, capable of taking a ship in or out of port; their whole time being taken up in scribbling’.³⁴⁰ His views were clear and his proposal a sound one, as it redefined the roles of the master and lieutenant on a survey vessel that had become muddled over time by masters having to take command. He also showed how the lieutenants should be rewarded and also prevented from profiting from selling their own charts to the private chart trade. These ideas would certainly be put in place, but whether Fleeming can be credited with them, or whether they had already been put in place is unclear.

Lower ranks

Assigning men from the lower ranks to serve on voyages of exploration and surveying was something the Hydrographer rarely appears to have written about. The majority of requests were sent directly to the Admiralty Board and not dealt with by the Hydrographer.³⁴¹ But how beneficial for an ordinary man’s career it was to have joined a surveying vessel is exceptionally difficult to judge. As men without the advantage of patronage the highest rank they would most likely have achieved was that of master. Out of the ten vessels (not including tenders and hired vessels) on survey duties in the late 1820s, there were only three commanded by masters,³⁴² with the opportunity of a command post dwindling rapidly from that time for men of that rank.

The opportunity for able seamen to find employment on survey vessels was towards the end of Parry’s term as Hydrographer subject to dramatic cuts due to the introduction of steam power. The *Echo* (a steam vessel of 295 tons) under Lieutenant Frederick Bullock, was brought into commission in 1827 and compared to the slightly larger *Chanticleer* (314 tons) needed less than a quarter of the complement of men. The reason for this was two-fold. First, because the Lord High Admiral had instructed the Navy Board in December 1827 to allow steam vessels only one lieutenant, one

³⁴⁰ UKHO, LP1857 F196, Fleeming to Parry, 15 May 1828. Includes an enclosure from William Sandom, H.M.S. *Espeigle* at sea, 28 March 1828 to Vice Admiral C. Fleeming.

³⁴¹ See the Admiralty digests in ADM12 under section 57.

³⁴² UKHO, SL101/1.

mate, two engineers and twelve men (including stokers).³⁴³ Secondly, due to those duties the *Echo* was commissioned to undertake in the River Thames, alleviating the need for any Marines, whereas the *Chanticleer* was on an ocean-going voyage for which a steamer of the *Echo's* size would have been unsuitable. For surveying voyages the location of the operation determined the complement of the crew, thus the *Protector* (185 tons) had only 37 men because she was deployed in Home Waters, whereas the *Shamrock* (180 tons) was off the French coast and in the English Channel, thus requiring a complement of 63 men to work effectively in those conditions.

A table (Appendix 8) prepared by Parry for the Lord High Admiral,³⁴⁴ shows the numbers of men (arranged by post) employed on survey vessels during Parry's term as Hydrographer. The 546 men out of a total of 31,000 men borne on ships' books for the whole Navy in 1828,³⁴⁵ meant manning survey vessels accounted for less than 2% of the whole Navy. In reality this therefore meant if the Admiralty Board picked men for surveying duties at random men would have had less than a 2 in 100 chance of being selected. However, two occurrences show the extremes of employing lower ranks for voyages. For Parry's 1827 Polar voyage, that proposed taking men to an extreme latitude, enduring harsh conditions and which despite Melville's instructions not to put anyone's life at risk would have involved a great deal of danger, the ship's complement was full within three days.³⁴⁶ In stark contrast to this George Thomas, master of the *Investigator*, whilst surveying in the relatively safe environment of Home Waters complained to the Admiralty of the lack of men. He not only could not find enough men for his vessel (having a complement of 35 in 1828, the second lowest number of men in any survey vessel at that time), but several that he did manage to sign-on deserted, leaving him very shorthanded.³⁴⁷ This was not an isolated example of men deserting survey vessels in Home Waters as the master of the

³⁴³ B. Greenhill and A. Giffard, *Steam, politics and patronage: the transformation of the Royal Navy, 1815-54* (London, 1994), 38.

³⁴⁴ For the letter from Parry requesting this information see UKHO, LB2 f.127, Parry to the Principal Officers and Commissioners of H.M. Navy, 19 April 1828.

³⁴⁵ Lambert, *The last sailing battlefleet*, 16.

³⁴⁶ Parry's son wrote '... as popular as its predecessors, and so many were found desirous of sailing under Parry's command, that, with the greatest care to select none but first-rate hands, the ship was completely manned in three days after the hoisting of her pendant, as many men being refused as would have served to man her a second time' (Parry, *Memoirs*, 191).

³⁴⁷ UKHO, SL101/1; TNA, ADM12.

Shamroc deserted in 1817.³⁴⁸ Clearly Captain Parry's charismatic leadership skills were a far better incentive for men of the lower ranks to serve under him than to serve under officers of less well known qualities on less glamorous engagements.³⁴⁹ Added to this was the draw such high profile voyages had as even the lower ranks held some degree of celebrity status on their own.

Figure 2.6 shows the ratios of men needed per ton of surveying vessel in commission from 1825 to 1835, *e.g.* for the *Adventure* one man was needed for just under every four tons of vessel. It appears that as time progressed more men per ton were needed (or were added) in the 1830s than in the late 1820s, but it is unclear whether Parry or Beaufort worked out the complements of survey vessels in this way. There was no dramatic fluctuation across the period as the complements were calculated by the type and number of posts needed to be filled rather than pure numbers; survey vessels carried more able seamen because of the large amount of work that was carried out in small boats which needed to be manned. It appears survey vessels needed 59 different ranks and occupations, which meant as the vessels were on the whole rather small, being bomb vessels, cutters, gun brigs, schooners and wooden paddle vessels,³⁵⁰ only the largest of them offered postings for more than one type of specialist. Thus the *Hecla* (375 tons) under Parry accommodated six midshipmen whereas the next highest number of mates and midshipmen were three in number aboard the *Chanticleer* (237 tons),³⁵¹ both of which compare on an equal footing with figures in the 1830s for larger vessels.³⁵² It is difficult to identify any noticeable changes in the type of manning between the two periods, except for the demise of second class volunteers in the 1830s.³⁵³ Nevertheless this does show how the number of opportunities for midshipmen trying to specialise in surveying was very small indeed, compared to the number of posts on other larger vessels.

³⁴⁸ UKHO, LB1 f.120, Hurd to Croker, 16 August 1817.

³⁴⁹ Ex in Dr M. Duffy.

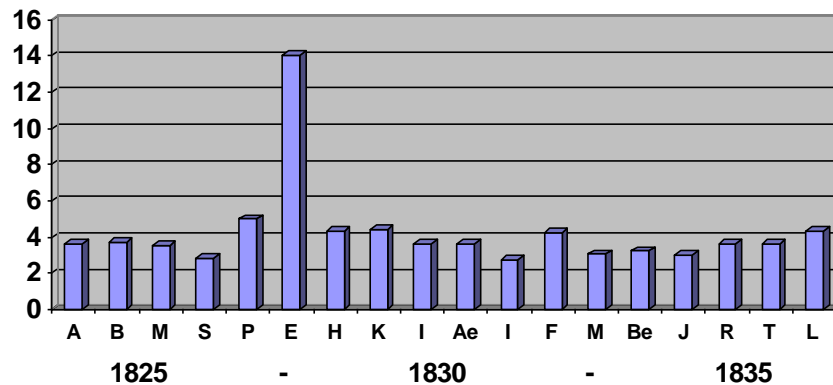
³⁵⁰ See R.O. Morris, 'Surveying Ships of the Royal Navy from Cook to the Computer Age', *The Mariner's Mirror* 72:4 (1986), 388-91.

³⁵¹ UKHO, SL101/1.

³⁵² UKHO, MLP5.II.8.

³⁵³ UKHO, SL101/1, MLP5.II.8.

Figure 2.6 Ratio of ton of surveying ship to men needed on survey vessels, 1825-35
Tons to men



Dates ships were in commission

Key to Ship names: A=Adventure, Ae=Aetna, B=Beagle, Be=Beacon, C=Chanticleer, E=Echo, F=Fairy, H=Hecla, K=Kangaroo, I=Investigator, J=Jackdaw, L=Lark, M=Mastiff, P=Protector, R=Raven, S=Shamrock, T=Thunderer

Source: UKHO, SL101/1, MLP5.II.8

In Figure 2.6, if the anomaly of H.M.S. *Echo* is removed, then the average number of men needed per ton was approximately one man for every four tons of ship. These figures compare well with earlier complements of men on survey vessels, such as the 409 ton sloop *Providence* that Broughton took to the north Pacific (1795-8), which had a complement of 115 men³⁵⁴ equating to 3.55 tons per man, similar to at least half a dozen vessels from Figure 2.6 (above). The significance of geography and the other objectives of the mission, in addition to surveying, can be seen in the manning of the vessels under Parry for the three Arctic voyages from 1819-27. On the first two voyages the tonnage to manning ratios were well above the average seen in Figure 2.6, with the *Fury* (377 tons and 60 men), equating to 6.28 tons per man, the *Hecla* (372 tons and 58 men) 6.41 and the *Griper* (185 tons and 36 men) measuring 5.13.³⁵⁵ This was mainly due to the need to take a heavier vessel with a larger amount of stores than was needed for other voyages, as well as the difficulties of crossing the ice. This was also true to some extent for the *Hecla* voyage of 1827 (which had a complement of 86 men to go to the North Pole), but the ratio was only 4.16 which

³⁵⁴ W.R. Broughton, *A voyage of discovery to the north Pacific Ocean: in which the coast of Asia, . . .* (London, 1804), xvi.

³⁵⁵ Captain W.E. Parry, *Journal of a voyage for the discovery of a North-West Passage . . . 1819-20* (London, 1821), ii; *ibid*, *Journal of a second voyage for the discovery of a North-West Passage from the Atlantic to the Pacific; performed in the years 1821-22-23, in His Majesty's ships Fury and Hecla, under the orders of Captain William Edward Parry, R.N. F.R.S., and commander of the expedition* (London, 1825), ii.

was similar to four other vessels in Figure 2.6.³⁵⁶ This ratio is a little surprising as the laborious duties needed to tackle crossing the ice would have needed more manpower, which points to Parry's failure to make any further progress on that voyage being not totally due to the conditions but partly due to not having taken enough men.

As has been shown, although applications from the lower ranks to the Hydrographer for a position on a survey vessel were not numerous, Hurd was known to have supported applications by pilots for employment. In 1822 Mr Brown, who was 'the old pilot for the Firth of Forth and the northern coast of these Kingdoms' was recommended by Sir Charles Paget (whilst groom of the bedchamber) for employment. Hurd thought that because Brown had 'experience and knowledge of the above coasts [it] may render him worthy of being placed on board one of the squadron to be employed under your command in the Eastern Seas'.³⁵⁷ Such a personal recommendation was of great benefit to men such as Brown because in addition to his qualifications as a pilot, a letter from the Admiralty's Hydrographer was more evidence of his abilities, thus making him more employable. Applications to Parry were much higher because of the demand to go on voyages of discovery (and hopefully glory) to the Arctic, but despite both men using their influence there were many men who were left disappointed and out of favour.

Civilian management

Within the Hydrographic Office were a small number of civilian staff (draughtsmen and clerks), who came under the responsibility of the Hydrographer. The Admiralty relied upon civilian labour in almost every facet of its activities, but in the Hydrographic Office they were performing essential duties alongside naval personnel. The majority of those civilians were draughtsmen and thus were the direct responsibility of Mr John Walker, who was in all but name the 'Head of Production'; according to Dawson he was responsible for the 'scientific and technical portion of the duties of Hydrographer' in their absence, especially during the time when Croker had a freer reign over the office.³⁵⁸ Thus Walker was the most important civilian in the office, but those beneath him were not and viewed as disposable assets by Croker. When the numbers of staff had to be reduced it was those men who were dispensed

³⁵⁶ UKHO, SL101/1.

³⁵⁷ UKHO, LB1 f.502, Hurd to Paget, 30 July 1822.

³⁵⁸ Dawson, *Memoirs*, 103.

with, such as Brown and Anderson who were dismissed in August 1823,³⁵⁹ but not Walker who would have been too great an asset to risk losing. Similarly two of Walker's sons worked in the office under their father's close scrutiny, with two of his other sons eventually working in the H.E.I.C.'s Hydrographic Office.³⁶⁰ Although there were only a maximum of four draughtsman on the permanent staff, and this number did not reach double figures until the 1890s,³⁶¹ there were numerous occasions when naval lieutenants and midshipmen were drafted in to the office to undertake additional drawing duties. These were usually only on a short term basis and rarely involved more than one extra man at a time. An exception to this was the Lord High Admiral's radical move to bring in Captains Mudge and Boteler, Lieutenants Roberts, Bullock, Hanns, Denham, Barnett and Fraser in preparing Captain Owen's surveys for engraving.³⁶² This showed the flexibility there was in manning, whereby naval officers could be redeployed rather than employing civilians, but also how manning in the post 1815 world was a lot easier than during times of war.

The Hydrographer was also responsible for managing dealings with civilian contractors mainly for the supply of commodities to the office such as charts, maps, transparent paper, scientific instruments and books, as well as supplies for vessels. He also had to pay for services such as the hire of labourers, printing of official publications outside the Admiralty, repairs to instruments and for charts to be mounted.³⁶³ The majority of these arrangements were a simple matter of straight purchase, but the management of office publications printed off-site by Ballantine and Byfield, and the repairs to expensive scientific instruments, required more negotiation, approval from the Admiralty Board and time to manage them, including visits to contractors' premises. There were of course many other dealings with civilians who either wanted to benefit hydrography by philanthropic gifts, or saw the Admiralty Hydrographic Office as an opportunity to make money. Of the latter the negotiations with individuals who wanted financial reward were often protracted, such as the proposal by Mr Stackhouse to try and persuade the Admiralty to purchase

³⁵⁹ UKHO, MLP 2/1, Dyer to Walker, 7 July 1823.

³⁶⁰ Dawson, *Memoirs*, 104.

³⁶¹ Day, *Hydrographic Service*, 348.

³⁶² UKHO, OD814 Becher's journal.

³⁶³ TNA, ADM17/28, Capt. Hurd's accounts, 1818-23.

his waterproof paper.³⁶⁴ Numbers of civilians and naval personnel were relatively equal, but the nature of the type of work undertaken meant civilian numbers would soon overtake them. As Croker was not keen for naval personnel to be employed in the office, a precedent was set which saw numbers of civilian personnel dominate the make up of the Hydrographic Office, but this was not until the twentieth century.³⁶⁵

Pay

The setting of equal rates of pay and the claiming of pay for the rank, or position, held by a surveyor is a theme which appeared with great regularity throughout the Hydrographical Office correspondence. Pay was therefore an important issue for the Hydrographer to deal with and drew him into communications with the Navy Board. Also, the amount of requests to the Admiralty Board was such that this subject matter was made into a separate section in the Admiralty's digest system of correspondence in 1821.³⁶⁶ The mechanism for paying surveyors, at least, was irregular by modern standards with officers having to request their pay, therefore demands were many and correspondence numerous. The biggest issue for the Admiralty Board was what rate of pay should they set, even after efforts were made to standardise the rates in 1817 and 1819.³⁶⁷ Naturally with the number of men employed on surveying duties vastly increasing after 1815, so the number of requests to the Admiralty Board increased and the number of problems multiplied.

The rates for surveyors at sea were different to those allowed for drawing up their notes and rough sketches whilst ashore, or in the Hydrographic Office. The 'setting' of rates of pay in 1817³⁶⁸ has been mistakenly seen as the date for the establishment of the 'Surveying Service',³⁶⁹ but rates for surveyors' pay had been established prior to this, although not in such an emphatic way as claimed by later writers. A letter from the Admiralty Board to the Navy Board was the normal way of doing business not the exception, examples of which are numerous, such as the decision that Des Barres' maritime surveys (commenced in 1764) were worth 20

³⁶⁴ UKHO, MB1, this subject is dealt with throughout this minute book which contains correspondence on this subject and much technical information provided by Mr John Walker senior.

³⁶⁵ Day, *Hydrographic Service*, 248.

³⁶⁶ TNA, ADM12/204, Admiralty Digest, 1821.

³⁶⁷ UKHO, SL101/1, 'Abstract of Hydrographic correspondence between the Hydrographic Department and officers in charge of H.M. surveys 1825-1833'.

³⁶⁸ UKHO, SL101/1, 'Abstract of Hydrographic correspondence between the Hydrographic Department and officers in charge of H.M. surveys 1825-1833'.

³⁶⁹ Day, *Hydrographic Service*, 29.

shillings per day plus an allowance for contingencies, instruments and stationery.³⁷⁰ In 1789 whilst on survey duties at Bermuda Hurd was paid a slightly higher amount of a guinea a day as he was the most senior officer, whereas his assistant surveyor was paid 2s 6d plus his half pay.³⁷¹ Captain Bligh also received one guinea a day whilst surveying Dublin Bay in 1800, but it is not clear whether this included any additional allowances.³⁷² This rate of pay for commanders was changed in 1817 when the rate was set at 20s per day for surveying, plus ‘the pay of their rank in the vessel in which they may be employed’.³⁷³ Therefore the rate of 1817 was hardly a new recognition for the worth of surveyors, neither was it innovative, more one to provide parity for the fast growing but small group of hydrographic surveyors employed by the Navy.

Such parity, as it was, should have made matters a lot more straight forward for the Admiralty and the Navy Boards for their administration of surveying officers’ pay. However, the matter was not resolved and on the 19 February 1819 Hurd, in his usual tenacious manner, wrote to Croker pointing out the irregularities in the amount of pay and how he seldom saw such decisions made by their Lordships.³⁷⁴ Pay, like manning, was something that Hurd as Hydrographer thought he should have a greater say in and more control over its regulation. He felt that surveying assistants should have had ‘a proportional remuneration’ to encourage their abilities,³⁷⁵ which was a strong move towards a clearer ‘reward for excellence’ culture for survey specialists, which in this instance appears to have offered recognition for surveys being undertaken from non-survey vessels. Hurd was looking to spread his influence for the better of surveyors and by getting the Admiralty and Navy Boards to recognise his specialism wherever it was being undertaken was just as important culturally for the Navy as it was formally for the men themselves.

With rates of pay established for surveyors, closer to home the remuneration for civilians working in the Hydrographic Office was championed by both Hurd and

³⁷⁰ J.F.W. Des Barres, *A statement submitted by Lieutenant Colonel Desbarres, for consideration. Respecting his services, from the year 1755, ... The utility of his surveys and publications ... intituled, The Atlantic Neptune. - and his proceedings and conduct as Lieutenant Governor ... of Cape Breton* (London, 1795?), 3.

³⁷¹ TNA, ADM2/118, Admiralty Board to the Navy Board, 1 October 1788.

³⁷² TNA, ADM1/3523, Hurd to Pole, 14 September 1808.

³⁷³ UKHO, SL101/1, ‘Abstract . . .’.

³⁷⁴ UKHO, LB1 f.207, Hurd to Croker, 19 February 1819.

³⁷⁵ The important section of Hurd’s letter stated how ‘a proportional remuneration bestowed on them, as an encouragement to genius exerting itself out of the common line of service, and as a further inducement for such as are qualified to make a willing tender of their talents and abilities when an opportunity for their use shall present itself’ (UKHO, LB1 f.207, Hurd to Croker, 19 February 1819).

Parry. Hurd raised the matter in 1816 and when he wrote again five years later because nothing had been done, he thought ‘the very small and degrading remunerations allotted to the various persons employ’d in this office’ could have been increased with the profits from the sale of charts to the public. This suggestion must have been welcomed by Croker, as Hurd pointed out how the public purse would not be burdened by this idea and the civilians would receive a much needed increase in pay. The claim for more money by Hurd for his staff was surely justified, not only because of the longevity of the Walkers’ service but also because of their loyalty.³⁷⁶

The Board did not increase John Walker’s salary and with Hurd’s death in 1823 the matter was not raised again until December 1824. A memorandum was presented to the Board comparing his salary with that of a clerk, which should have given him £141 more! Fortunately for Walker positive action was taken as Lord Melville instructed Dyer to increase Walker’s pay to £300 a year, still less than a third-class clerk, but nevertheless an amount he was surely long overdue, especially when considering the responsibility he held in Hurd’s absence. The increase from £8 8s per month to £15 8s was justified.³⁷⁷ The other civilian salaries remained unchanged and in 1827 Parry prepared a report on the Hydrographic Office in which he was able to show that of the permanent civilian staff, the office clerk was only on £7 less than the draughtsmen. No further changes were made until May 1829, when one of Parry’s last actions as Hydrographer saw him send a memorandum respecting Mr Michael Walker’s salary, as a draughtsman. Parry drew a similar comparison against the salaries of the Admiralty clerks that had been made in 1824.³⁷⁸ The salaries were increased and in 1831 when the Hydrographic Office came under the Scientific Branch (with the Royal and Cape Observatories) the four draughtsmen received £793 collectively.³⁷⁹ Financial remuneration for draughtsmen for their continued loyalty was a concept that was non-existent in the Admiralty Board’s eyes until 1824, but even then there was no annual rise in salary and the cartographers could feel hard

³⁷⁶ By that time after 25 years Walker was only receiving £209 and ‘two others who have been employ’d from 20 to 23 years receive by weekly payments 165£ a year and the remainder from 165 down to 109 pounds agreeable to their different lengths of servitude [sic]’ (UKHO, LB1 f. 410, Hurd to Croker, 28 June 1821).

³⁷⁷ John Walker was described as ‘a steady, attentive, and well-informed man particularly in the practical part of his profession, and has, in fact, been Acting Hydrographer for most of the time since Capt. Hurd’s death, and indeed for some years before it’ (TNA, ADM1/3463, memorandum to the Admiralty Board, 17 December 1824).

³⁷⁸ UKHO, MB1 f. 172, memorandum by Parry, 21 May 1829; TNA, ADM1/3470.

³⁷⁹ Day, *Hydrographic Service*, 350.

done by. Such disparity between clerical and the small number of cartographic specialists clearly caused some resentment, something that was still visible in the Hydrographic Office towards the end of the twentieth century.³⁸⁰

Promotion

Once a man had been fortunate enough to obtain a post in a survey vessel the opportunities for promotion for officers involved in voyages of exploration were greatly enhanced. This was due to the attention drawn to such ventures from influential men in the Admiralty and also because of the Herculean efforts the men made whilst undertaking some of those voyages, such as Cook, Flinders, Owen and those men who served under them. Men such as Barrow at the Admiralty and Banks at the Royal Society were useful allies to have in one's corner when it came to Melville considering suitability for promotion.³⁸¹ Thus towards the end of voyages consideration was given to the advancement of those who had performed meritoriously; conversely, it was unusual to receive a promotion whilst on such a voyage.

It was not only those who had undertaken voyages to uncharted and distant lands who exclusively benefited from undertaking what would appear more mundane survey duties. Part of the benefit was in having the Hydrographer to support claims or appeals for promotion. David quotes how in 1812 after Smyth had submitted his charts to Hurd, it came to light that his earlier surveys were already in the Admiralty, as a result the midshipman was promoted at the beginning of the following year.³⁸² However, the Hydrographer had even less influence over promotions than he had over postings, but it did not stop his efforts to reward specialists, even if it meant changing Admiralty policy to do so. The case of Mr Frimley (who worked under Thomas on the *Investigator*) showed how after eight years of service when he had proved himself as a 'seaman, surveyor and draftsman', he found '... all his hopes of promotion or reward frustrated' as there were no opportunities for promotion on that vessel. Such a scenario had serious implications for those seeking promotion, especially 'the rising

³⁸⁰ Ex inf Mr H.J. Turner, April 2009.

³⁸¹ P. Hore, 'Lord Melville, the Admiralty and the coming of steam navigation' in *The Mariner's Mirror* 86:2 (May 2000), 160.

³⁸² Lt-Cdr. A.C.F. David R.N., 'British hydrography in the Mediterranean in the early nineteenth century', paper read at Greenwich (1974), 5.

generation of young men now serving under this department' and it was the same stagnation which had effected Hurd's own career advancement.³⁸³

This was not an isolated incident as many other surveyors relied on the Hydrographer to point out their merits, which he found duty bound to do, especially if they were scientifically orientated.³⁸⁴ Even when men had passed their examinations they had to wait their turn for promotion and in 1822 Hurd wrote to Melville how Henry Denham, although he had passed his examinations three years ago, was still waiting for 'some mark of Lord Melville's approbation of his services may be bestowed on him'.³⁸⁵ Fortunately for Denham, Captain Hurd's intervention brought him his much awaited promotion. Not all men were as fortunate as Smyth and Denham despite receiving support from the Hydrographer.

Whether or not men were better off when it came to promotions by specialising in the surveying business is exceptionally difficult to judge. Men such as Becher, who was known to have spent '... his spare time ... forming plans, many of which were adopted by the Admiralty',³⁸⁶ appear not to have benefited from his spare-time activity, apart from being able to specialise in surveying. Why his long term career prospects were not advanced by this activity was probably due to the length of time he spent in the Hydrographic Office rather than at sea. By taking 19 years to reach commander and 15 to reach captain was one of, if not the longest periods for a surveyor to be promoted from lieutenant to captain from a sample of those who were promoted to lieutenant from 1777 to 1824.³⁸⁷ A comparison between those who specialised in surveying and were promoted to commander and/or captain, and a corresponding number of those who did not specialise, shows a variety of patterns.³⁸⁸

For promotion from lieutenant to commander (Figure 2.7) men were marginally better off serving in a survey vessel, or having a substantial amount of surveying experience if promoted prior to 1815. However, after the Peace the figures are dramatically different, with men promoted to lieutenant from 1815 onwards as a

³⁸³ UKHO, LB1 fos 120-1, Hurd to Croker, 27 July 1818.

³⁸⁴ Hurd wrote of one candidate 'Situating as I am at the head of the Hydrographical department I consider it a duty incumbent on me to mark my sense of the very superior talents of this officer, to whose future scientific exertions we have to look forward for every thing useful to navigation, and beneficial to the Naval service of this country' (UKHO, LB1 fos 20-1, Hurd to Melville, 13 September 1815).

³⁸⁵ UKHO, LB1 f.508, Hurd to the Admiralty Board, 26 October 1822.

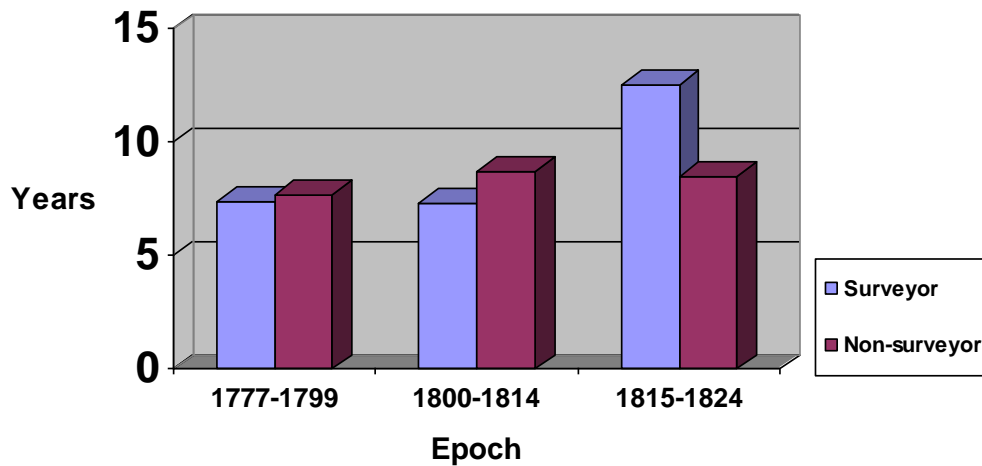
³⁸⁶ Marshall, *Royal Naval biography*, II:II (1824), 582.

³⁸⁷ See Figure 2.9 below.

³⁸⁸ See tables at Appendix 9 and 10.

surveyor having an average waiting time of 12.57 years before reaching commander. This is in comparison to a non-specialist who took on average only 8.5 years, but these figures are slightly weighted against the surveyor as John Septimus Roe served as a lieutenant for 40 years before becoming a commander.

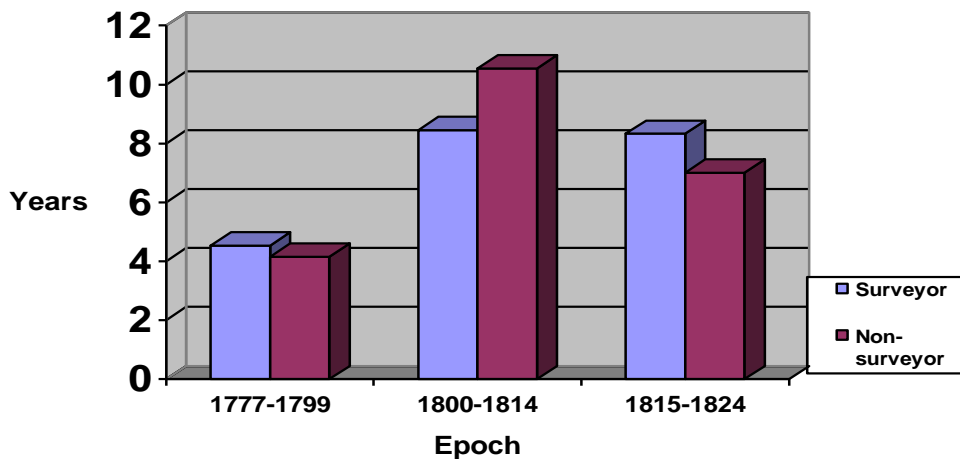
Figure 2.7 Average number of years between promotion from lieutenant to commander



Source: See Appendices 7 and 8 for the data for this graph

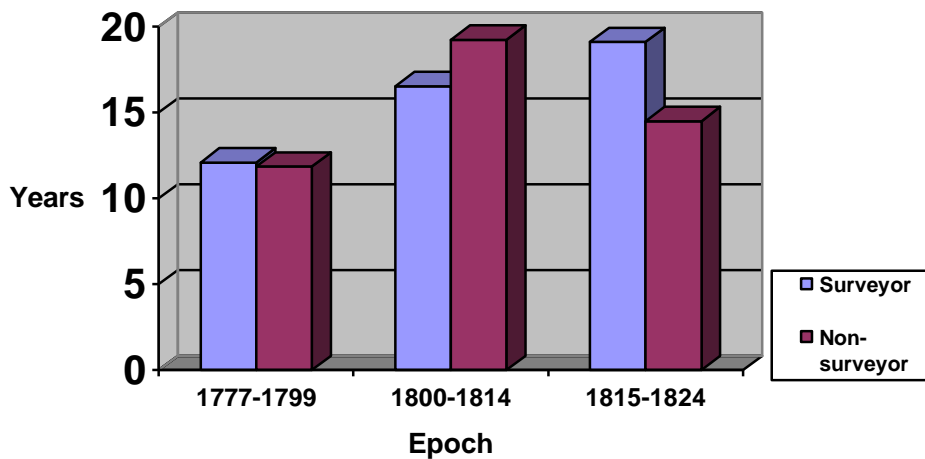
For promotions from commander to captain (Figure 2.8) the most striking observation is the relatively short amount of time lieutenants promoted from 1777 to 1799 had to wait to obtain their post rank. This was approximately half the time it took those lieutenants promoted from 1800 to 1826, being over four years compared to over eight, within which time no clear pattern emerges for a surveyor or non-surveyor having any advantage in either service. The overall pattern of promotions from lieutenant to commander to captain (Figure 2.9) shows a similar style to that of commander to captain. Thus any great advantage a surveyor had over his contemporaries was only for those who were promoted to lieutenant between 1800 and 1814, who found their subsequent promotions to commander and captain on average markedly shorter than non-surveyors.

Figure 2.8 Average number of years between promotion from commander to captain



Source: See Appendices 7 and 8 for the data for this graph

Figure 2.9 Average number of years from promotion from lieutenant to commander to captain



Source: See Appendices 7 and 8 for the data for this graph

Conclusion

Finding the right quality of men to serve as surveyors was far more difficult than it was to find suitable civilians to work in the Hydrographic Office. Because of the small number of civilians, compared to surveyors that Hurd and Parry managed, they were not overlooked by the Hydrographer but by the Admiralty Board, who eventually took action to bring their pay in line with clerical staff. Financial reward was equally important to surveyors, who found rates standardised during this period. However, promotions within the specialism were few mainly due to the small number

of survey vessels and the glut of men after 1815, despite the Hydrographer's best efforts to bring their abilities to the attention of the Admiralty Board.

The office of Hydrographer meant far more to Hurd than it did to Parry. The style of management the two men brought, and their approach when dealing with hydrographic matters, was also very different. Hurd wrote to Lord Melville in 1821 stating how his 'sense of the various duties incumbent on the official situation I have the honor to hold in this Department of the Admiralty' led him to propose officers for appointments and promotions.³⁸⁹ An honour it must have been, as Hurd worked in the Admiralty for a considerable time when he classed himself as an invalid, working on until literally a handful of weeks before his death. His letters reflect the commitment he had to the Navy and to the men who were serving in the specialism he held dear to his heart, not only by promoting their pay but using his influence where he could to ensure their continued employment. He had their interests at heart, informing one officer in 1821 'I shall also be glad to have some report of the young men who are serving on board the *Hasty* both as to their abilities and length of service in case any opportunity should offer of being serviceable to them'.³⁹⁰ Opportunities were few but Hurd's drive and enthusiasm to forward the careers of young men was never ending.

Hurd is best remembered for establishing a 'surveying service' but this was not an overnight process, or one that can be attributed to a particular date, or action sanctioned by the Admiralty Board. It was a concept that evolved during the early years when Hurd was new to the role of Hydrographer, which achieved a firmer footing when the Admiralty allocated additional resources that resembled a small corps of men who identified themselves as a surveying service with Hurd as their head of department. A further testament to his qualities was made by Beaufort in 1831 when he described Hurd's term as Hydrographer as '... worthy . . . long presided with equal credit to himself and benefit to the service'.³⁹¹ Beaufort's contemporary view aptly sums up the findings of this thesis, with the benefits being expansion in almost every facet.

Parry's term as Hydrographer was very different as he managed under different terms to Hurd in a very different era of political and global pressure, which saw him concentrate more on office reforms than developing the numbers and quality

³⁸⁹ UKHO, LB1 f.359, Hurd to Melville, 8 January 1821.

³⁹⁰ UKHO, LB1 fos 429, Hurd to Fitzmaurice, 27 August 1821.

³⁹¹ UKHO, LB2 f.162, Beaufort to S.P. Hurd, 18 May 1831.

of surveyors. He can be compared in some ways to today's career civil servant, undertaking short high profile appointments, but unfortunately lacking some of the experience and enthusiasm that his predecessor brought to the position. Parry did not hide the fact that he would rather have been away from the Admiralty on voyages of exploration as his absences brought excitement, a physical and mental challenge which was not so obvious in an office in London, but also did little of any merit to forward the surveyors' plight. However, Parry was a very efficient administrator and the reports he prepared laid the foundation for survey planning and data acquisition for many years to come. Thus Parry left Beaufort an inheritance which he did not squander, allowing him to build upon the hard-won gains of his predecessors in the fields of pay and manning to increase the number of specialists afloat and skilled staff in the Hydrographic Office.

Chapter 3

Data Acquisition

If the Admiralty Board ever had the desire to chart the whole world at the end of the eighteenth century, the way in which they went about it was exceptionally *ad hoc* and opportunistic.³⁹² It does not become obvious until the Admiralty Board instructed Dalrymple to organise the data they had accumulated that they had any reasonable idea of what charts they held and what detailed surveying activity had gone on in the past. Thus measures had to be put in place to rectify that lack of strategic information and subsequently the Chart Committee was formed. In addition to the groundbreaking work that committee achieved in identifying the significant deficiencies in World charting, there was a large corpus of data in the Admiralty that also needed to be exploited, some of which had been systematically planned and acquired and others that had been gifted. The variety of materials which had been gifted had some geographic significance, but when it came to charting there were items that had little value to the Admiralty, such as the topographic mapping of inland areas. However, even that marginal data added to the significance of the Hydrographic Office's geographical holdings that gave its archive a reputation as a knowledge repository. It was this knowledge repository (of predominantly charts and coastal views)³⁹³ that would provide vital geographical intelligence to the Admiralty Board and planners to enable naval forces to 'attack and destroy coastal fortresses that protected major dockyards or cities',³⁹⁴ thus restricting an enemy's capability to wage war at sea. This chapter focuses on the proactive measures taken to obtain data, how it was administered and how much of the Hydrographer's working week it took up to do so.

Data accumulation

Prior to the establishment of the Hydrographic Office in 1795 the Admiralty obtained data through a variety of methods. They supported the publication of surveys by purchasing a pre-arranged (or subscribing to a) number of multiple copies of charts,

³⁹² See A.C.F. David, 'Admiral Nelson, Alexander Dalrymple and the early years of the Hydrographic Office' talk given to the International Map Collectors' meeting at Taunton, April 2005, in which he cited numerous examples of opportunistic and unplanned surveys being executed.

³⁹³ For the strategic value of coastal views see M.K. Barritt, *Eyes of the Admiralty. J.T. Serres an artist in the Channel Fleet 1799-1800* (Greenwich, 2008).

³⁹⁴ D. Lyon and R. Winfield, *The Sail & Steam Navy list. All the ships of the Royal Navy 1815-1889* (London, 2004), 17.

such as those by Lewis Morris and Robert Bishop.³⁹⁵ Those multiple copies remained in the Admiralty but it is not clear how they were distributed to ships, if at all. This method of acquisition was ideal for the Admiralty as it meant they did not have to sponsor the survey and therefore put money up front with a risk of no, or little, return. When the charts were delivered the money would be handed over, with the main issue being that the information was in print and naval officers could purchase it if they needed to. Although this was an *ad hoc* method of obtaining data, the more publications the Admiralty supported then the more charts were brought into print; there was also a greater incentive for individuals to undertake their own surveys.

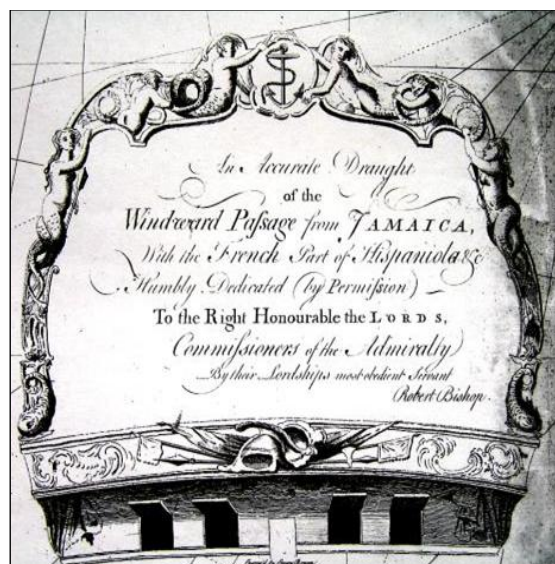


Illustration 3.1 Robert Bishop's dedication to the Lords Commissioners of the Admiralty in return for their contribution towards the costs of publishing his survey (A chart of the Windward Passage, 1761 reference UKHO, A109 Ag3)

This method of subsidising the publication of charts involving the private chart trade was still being supported by the Admiralty even after they had the capability within their own department to compile and print their own branded charts. In 1821 their Lordships instructed Hurd to inform one such application that they were prepared to either offer him a maximum of £30 for his work or subscribe to it if he took it to the private chart trade.³⁹⁶ This was a far from ideal method of obtaining data as the Admiralty was dependent on material, which was often surveyed to no particular standard, being brought to them. Thus to obtain surveys they had to be more

³⁹⁵ UKHO, C36 on shelf Dc and A109 on shelf Ag3.

³⁹⁶ UKHO, LP1857 Hu21, Hurd to the Admiralty Board, 9 August 1821.

proactive and prepare instructions,³⁹⁷ men, ships and instruments in a far greater way than ever before. Outside of those surveying voyages that were planned there were still *ad hoc* opportunities for obtaining small surveys, which were beneficial to the Navy. Becher was known to have spent ‘his spare time . . . forming plans’,³⁹⁸ suggesting this was not his main duty whilst afloat and surveys made by masters were a routine part of their working life. Another example were the chart and views of Toulon Roads by Commander Daniel Roberts (that were sent to Hurd in 1820) and executed whilst he was at Toulon with the British Squadron. After learning from Admiral Fremantle and the ‘Captains that they had not a correct chart of Toulon Roads’ he used his initiative and commenced a survey, using pieces of a manuscript chart by Captain Gauttier.³⁹⁹ As this was not planned and involved great risk, Roberts found himself ‘imprisoned in the Corps de Garde for three days’ during the survey. The Admiralty Board were ‘pleased with his zeal’ but asked him that ‘if again in a similar situation he could abstain from operations of this point unless he has regular permission’.⁴⁰⁰ Countless numbers of small surveys were made by men when opportunities materialised and were subsequently sent to the Admiralty,⁴⁰¹ but it will never be known how many remained in men’s hands that were never submitted.

Data types

The data predominantly recorded by hydrographic surveyors included soundings, quality of the seabed, trigonometrical positions, tidal heights and sailing directions. In addition to this there was a growth in the amount of scientific data, which surveyors accumulated, such as tidal stream data and temperature readings, some of which were recorded regularly but in the 1810s they were in a minority. One master in 1817 recorded in his nautical remarks and observations on board the *Port Royal* occurrences of marine animals, plants and zoophytes that he came across from England to Jamaica. The information was returned to the Admiralty with an elaborate title page, but it is not clear that the data from this voyage was ever put to any use,

³⁹⁷ Instructions can be found at The National Archives in class ADM2. During the period of this study some abstracts of instructions can be found in the ‘out’ letter books kept by the Hydrographer (UKHO, LB class) as well as in Parry’s record book of surveys being undertaken from 1825 (UKHO, SL101/1).

³⁹⁸ Marshall, *Royal Naval biography*, II:II (1824), 582.

³⁹⁹ Captain P.H. Gauttier was involved in positional data in the Mediterranean between 1816 and 1820 (Dawson, *Memoirs*, 72).

⁴⁰⁰ UKHO, LP1857 R279, Roberts to Croker, 9 February 1820.

⁴⁰¹ No study exists of surveys sent to the Admiralty, although it would be possible to build up a picture through a trawl of Admiralty correspondence.

whereas other data gathered on specific scientific voyages certainly was.⁴⁰² This was a rare but not totally unknown example of naval involvement in experimental scientific data recording.⁴⁰³

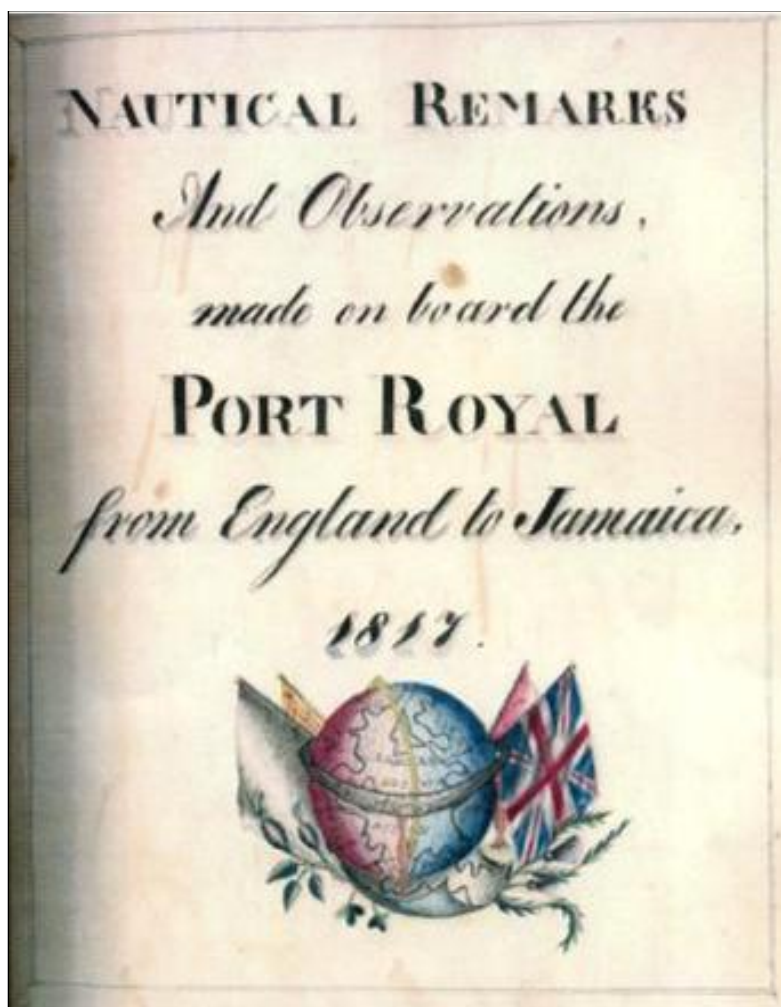


Illustration 3.2 Title page of the remark book of the *Port Royal* for 1817-18 containing data on marine animals, plants and zoophytes (UKHO, MP47)

The variety of data collected on a typical extended voyage of exploration can be seen in the inventory Parry made of the products of H.M.S. *Blossom's* work in 1827. Almost all of the officers kept private journals, as well as recording separate navigational remarks, there were also books of natural history, 44 charts, 126 single and two books of views of the coast, five ship's logs, papers on the specific gravities

⁴⁰² UKHO, MP47, Nautical remarks and observations made on board the *Port Royal* from England to Jamaica, 1817 signed by Robert Beecroft, 1817-18. In the introduction to the voyage of H.M.S. *Chanticleer* it specifically refers to the data being 'placed by the Admiralty in the hands of men of science' (W.H.B. Webster, *Narrative of a voyage to the Southern Atlantic Ocean, in the years 1828, 1829, and 1830, performed in H.M. Sloop Chanticleer* vol. I (London, 1834), iii).

⁴⁰³ See Chapter Four for a detailed account of the extent of the Hydrographer's involvement with the world of science.

of sea water, hygrometrical observations, barometrical observations, lunar observations, tide tables, current tables, geographical positions, culminations, dipping needle, magnetic force, horizontal needle, abstract of lunars, heights of mountains, magnetic variation, four meteorological journals and four volumes of observations.⁴⁰⁴ In addition to those data types was a growing collection of printed works which contained geographical positions, scientific observations, sailing directions and a host of information that supported the work being undertaken in the Hydrographic Office. To this number can be added 'angle books' that were kept in the copper plate rooms,⁴⁰⁵ which formed the basic framework of hydrographic surveys.

There were also other types of data that arrived in the Hydrographic Office such as volume 4 of Lieutenant Colonel William Lambton's trigonometrical survey of India, dated 1805 and borrowed from the H.E.I.C.'s library some time after 23 August 1820, but never returned.⁴⁰⁶ Civilians also sent in newspaper cuttings, such as that from S. de Peyster informing the Admiralty of his nephew's discoveries in the Pacific Ocean. The information was sent up to the Hydrographer and the letter and newspaper cutting remained in the office.⁴⁰⁷ Another source of information was those people associated with naval voyages who had no official remit to collect data but nevertheless did not miss out on such an opportunity. Men such as Dr Joseph Arnold who recorded many coastal views during his voyage to Australia in 1815, which would have been of use to the Hydrographer but remained amongst Arnold's papers.⁴⁰⁸ These are only a few examples of the diverse sources for geographic knowledge that the Hydrographic Office benefited from.

Foremost in the collection of more detailed, accurate and scientific data of a much broader nature than that acquired from the lead line were Captains White and Smyth. Their ability to accurately record information associated with survey work, the use of new technology and their connections with the scientific community was a great asset to the Hydrographer.⁴⁰⁹ Accuracy was (and still is) paramount in hydrographic work and Hurd reported to the Board in 1819 how he was ' . . . impeded . . . for want of correct latitudes and longitudes' in compiling charts of North

⁴⁰⁴ UKHO, MLP 3/3.

⁴⁰⁵ Pascoe, *The story of the Curator*, 13. An angle book contained raw data associated with triangulation and position fixing, being fundamental to the accuracy of a survey.

⁴⁰⁶ UKHO, MDB23.

⁴⁰⁷ UKHO, LP1857 D293, de Peyster to Hope, 10 April 1820.

⁴⁰⁸ Maggs Brothers Ltd, *Bibliotheca Nautica part IV* (London, 1938), 152.

⁴⁰⁹ These aspects of survey work are discussed at length in Chapter Four.

America.⁴¹⁰ Therefore the need for new surveys to replace those eighteenth-century efforts, which did not have sufficient information to lay the data accurately onto Hurd's 'modern' Hydrographic Office charts was a fundamental requirement for data collection. White and Smyth were well aware of this and had submitted numerous examples within the parameters laid down by Hurd. White, for example, had surveyed Jones Bank (to the west of the Isles of Scilly) and 'ascertained [it] to be 20 instead of 10 leagues' distant from it, as it was marked in the charts.⁴¹¹ So accurate was White's work that his surveys on the south coasts of Devon and Cornwall were the only ones of the English Channel to survive Beaufort's grand scheme for re-charting the whole of the British Isles during the 1830s and 1840s.⁴¹²

The data which Hurd inherited from Dalrymple was a mixture of preliminary or sketch surveys, through to tracks (usually a single line of soundings between two points), and running surveys, to the exceptionally detailed works such as those executed by Graeme Spence.⁴¹³ Those of the former variety were out of favour with Hurd and he clearly set an agenda for a much higher calibre of data collection along the lines of that perfected by Spence, although there was some concern over the practice Spence had of correcting Mackenzie's original surveys.⁴¹⁴ There was also a large number of 'remark books' in the Hydrographic Office that had been accumulating since the 1750s, in connection with which Dalrymple had sent a reminder to all vessels to keep sending in. The remark book was a useful medium for sending written navigational information to the Admiralty, which then could be used to update charts and include in sailing directions; one officer recorded in 1825 that 'nautical details, . . . all my remarks, bearings, soundings, &c., which I have carefully taken in this voyage I keep in a distinct remark-book'.⁴¹⁵ This system of sending in information was extremely variable, as some 'remarks' were scant and of virtually no use, but others were exceptionally useful. The latter occasionally included surveys, views and occasionally scientific data, in addition to the standard information on

⁴¹⁰ The specific area included 'the whole of the Newfoundland coast, and likewise of joining the northern coasts thereof with Cape Charles on the Labrador coast, so as to give the Straits of Bellisle, as well as that island itself their true position' (UKHO, LB1 f.271, Hurd to Admiralty Board, 31 December 1819).

⁴¹¹ UKHO, LB1 f.266.

⁴¹² Ritchie, *Admiralty chart*, 269.

⁴¹³ Robinson, *Marine cartography*, 179.

⁴¹⁴ Cook, 'Alexander Dalrymple', 168.

⁴¹⁵ Lady Biddulph, *Charles Philip Yorke, Fourth Earl of Hardwicke, Vice-Admiral R.N.* (Ledbury, 1910), 61.

‘situation’, ‘directions for sailing into or out of ports’, ‘anchorages’, ‘trade and shipping’ and ‘inhabitants’. However, the return of remarks to the Admiralty was slim during Dalrymple’s time⁴¹⁶ and measures were taken to ensure officers did return them.

There was a growing problem of commanding officers making a nil return of data in their remark books, which would have been easy for Hurd to administer as no action would have been taken on the data as there was none returned. Hurd was far too diligent for that state of affairs to become commonplace and by 12 November 1810 the printed instructions to commanders had been revised, although the changes to the form were disapproved of by the Board. It was resubmitted in January 1811⁴¹⁷ and on 20 May 1812 an Admiralty order was issued to all commanding officers informing them that

after the 1st of July next, that no certificate of remarks shall be granted until the Hydrographer of the Admiralty shall have reported whether there was an opportunity for making remarks or not, or (should any be furnished) upon the value of the remarks which may have been made’.⁴¹⁸

Hurd also stated how a remark book should also contain the latitudes and longitudes of the places visited outside of Great Britain and Ireland, and ‘bearings, soundings, tides, currents, and all other circumstances of nautical utility’ were to be carefully recorded. This was also a good opportunity of reminding those commanding officers (who needed reminding) of the importance of navigational information to the Admiralty.⁴¹⁹ Subsequently a system was introduced whereby commanding officers would not receive their pay until their remark book(s) had been approved by the Hydrographer,⁴²⁰ which meant the Hydrographer spent a substantial amount of time dealing with the administration of this function. This can be seen between 1815 and 1817 when he recorded 54 letters in his ‘out’ letter book relating to remark books, but this changed dramatically in 1818 when the number of letters dropped to single figures, which was partly due to the reduction in the number of ship in commission. The responsibility for administering remark books eventually devolved from the

⁴¹⁶ Quoted in Cook, ‘Alexander Dalrymple’, 170.

⁴¹⁷ TNA, ADM3/172 Hurd to Barrow, 9 January 1811.

⁴¹⁸ TNA, ADM1/5122/2.

⁴¹⁹ TNA, ADM1/5122/2.

⁴²⁰ Day quotes article V of the *Naval regulations* of 1813 as the source for this decision (Day, *Hydrographic Service*, 351).

Hydrographer to one of his staff during Parry's time; for the numbers received see Figure 3.1.

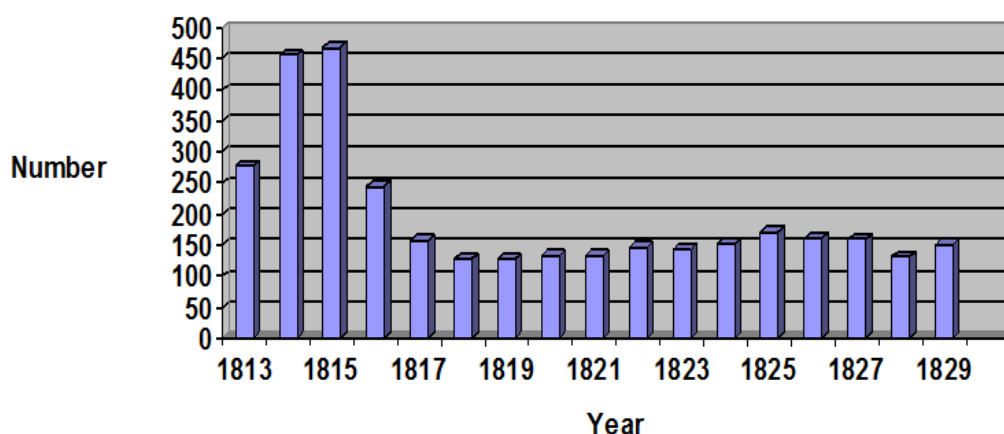
Sir,

A PRACTICE having obtained among several of the Commanding Officers of His Majesty's Ships and Vessels of applying to this department, as a matter of course, for Certificates to be granted upon statements furnished by themselves of *no remarks* towards the furtherance of hydrographical knowledge having been made, though the opportunity of making such remarks must have occurred; I am commanded by my Lords Commissioners of the Admiralty to acquaint you that they have directed that, after the 1st of July next, no certificate of remarks shall be granted until the Hydrographer of the Admiralty shall have reported whether there was an opportunity for making remarks or not, or (should any be furnished) upon the value of the remarks which may have been made; and I have further to acquaint you of their Lordships' direction that you transmit, half yearly, to this Office, a remark book which shall contain, at least, the latitudes and longitudes of all places (out of the United Kingdom of Great Britain and Ireland) in which the Ship you command may have been; and, whenever time and circumstances will permit, particulars of bearings, soundings, tides, currents, and all other circumstances of nautical utility, are to be carefully entered therein; and I am, also, to apprise you that no certificate of remarks will be issued from this department, unless the observations in the several remark books shall appear to their Lordships to be such as, with reasonable diligence and accuracy, might be made. And my Lords trust that you, with the other Officers in His Majesty's Naval Service, will see the advantage of collecting a body of hydrographical information, and that you will exert yourself to the utmost of your power in contributing to an object so necessary to the general advancement of science, and so highly advantageous to the best interests of a great maritime people.

Illustration 3.3 Admiralty order of 1812 concerning the return of remark books (TNA, ADM1/5122/2)

Hurd was in a position that on the one hand saw him in charge of a large quantity of information of varying types, but on the other most of it was not to a high enough level to meet the needs of the standard he set for Royal Naval charting. It is within those parameters that the need for new surveys were mainly undertaken, with consideration given for operational and political requirements.

Figure 3.1 Chart showing the number of remark books received, 1813-29



Source: UKHO, MLP185, ledger recording remark books received⁴²¹

Planning

From a Royal Navy perspective how the surveys were planned was critical, especially in the years running up to the Peace when resources were tight because of the pressures of war:⁴²² this was also true to a certain extent after the Peace, when pressure was on to make cuts. To be able to plan a successful data acquisition programme the Hydrographer needed information on what materials were already held, as well as the support of the Admiralty Board. Dalrymple prepared a list of printed charts held in the office (by 1802) and from this it was readily obvious that there was a significant lack of printed material for South America and Australasia, with only two charts associated with those two areas, both of which were very small-scale. Dalrymple's list does not explain why there was such a dearth of material in the Admiralty to refer to, or why there were only 16 charts covering the whole of France, Spain and the Mediterranean.⁴²³ The answer may have been due to the amount of charts contained in atlases which were not included in that survey by Dalrymple but could well have been on another separate list, as could manuscript charts and surveys. This was a good start towards obtaining a full picture of what was held in the office, but did not address the question of what was available outside of the office, and of those charts which were the most accurate.

⁴²¹ There are no records of ships under letter 'J' of this volume, therefore the figures were slightly higher than shown here. The volume does not start until half way through 1812 and therefore those few months have been omitted.

⁴²² A useful view of the number of operations in the run up to the Peace is given in Woodman, *The victory of seapower*.

⁴²³ UKHO, MLP183/1.

Dalrymple's list would have been of use to the Chart Committee when they prepared a list of 'all [the] Charts published in England' in 1807⁴²⁴ and more importantly when they made their assessment of those charts. The assessment established with which charts naval ships would be supplied and their acquisition from the private chartsellers was swiftly put into place. The work of the committee was crucial and provided Hurd with enough information to not only operate an effective chart acquisition program, but to be able to focus on the gaps in world charting. Such gaps needed plugging and Hurd set about trying to persuade the Admiralty Board of the need to allocate resources for this purpose. Hurd knew the value of good planning and how collective efforts resulted in coverage over a wide area because of his experience in North America, where his survey from Saint John to Passamaquoddy Bay formed part of the *Atlantic Neptune* by Des Barres.⁴²⁵ Even when data collection was planned, its capture was often compromised through a lack of resources, which then had a knock-on effect for publication. White was used to capture much needed data covering the Channel Islands, but until the data was received in the Hydrographic Office Hurd could only inform the Admiralty Board how the 'deficiency of knowledge has hitherto prevented us from finishing our plate of that part of the French coast containing this group of islands'.⁴²⁶ Had he been given more resources the survey would have been completed sooner. This ultimately did effect the supply of accurate charts to the Fleet, proving how important planning, resourcing and acquisition issues were to the Hydrographer and the Admiralty Board.

Pressure was brought on the Admiralty in the Press in February 1817 to undertake surveys of parts of Australia left uncharted by Flinders. Such open criticism of the Admiralty, although cloaked by the threat of the French fitting out a vessel at Brest ready to complete the survey of 'New Holland', could not be left unchallenged. Subsequently Philip Parker King R.N. was sent to chart Australian waters in December that same year. The letter that appeared in the papers was not addressed to the Hydrographer but to Barrow in his capacity as Secretary to the Admiralty, which clearly had the desired effect, even though the author remained anonymous.⁴²⁷ Suggestions were also received by the Admiralty Board from surveyors, such as

⁴²⁴ TNA, ADM1/3523. See Appendix 7 for a transcript of this list.

⁴²⁵ Ritchie, *Admiralty chart*, 44. There were also several others who undertook surveys in their own right who contributed to the *Atlantic Neptune*.

⁴²⁶ UKHO, MLP 56/1, Hurd to the Admiralty Board, 25 November 1813.

⁴²⁷ *The Morning Chronicle*, 12 February 1817.

Captain Owen, which can be viewed as feathering their own nests, especially after 1815 when appointments were vastly reduced.

The geographical coverage of British Government-sponsored hydrographic surveys, prior to the Peace of 1815, can only be truly assessed by comparing it with the efforts of other leading nations that also had a government-sponsored hydrographic surveying capability.⁴²⁸ The significance of using 1815 as a cut off has been shown in earlier chapters, as after this date the British Government's capacity for surveying expanded. An outline of the extent of British surveys can be seen in Day's map (Illustration 3.4)⁴²⁹ showing the 'Principal British Hydrographic Surveys to 1829'. This would have looked very different if he had used as his dividing line the year 1815, instead of dividing it between pre and post 1800 surveys. To the pre-1815 map would be added only those surveys by Flinders, Beaufort, Smyth and Spence, of which the former was by far the most prolific, but there were many other useful contributions to this world coverage prior to 1815 which were omitted. Contributions from the numerous Royal Navy masters, whose collective efforts were a significant addition to filling in many of the gaps on Day's map, were not added because it would have been far too difficult to identify all of them.⁴³⁰

After 1815 the accumulation of surveys showed a very different pattern in the number of surveys carried out. However, geographically there was little difference. The Admiralty were still in favour of lengthy voyages to rival those of Cook, Flinders, Broughton and Vancouver undertaken prior to 1815. The most notable was Owen's monumental efforts on the coast of Africa, and to a lesser extent the surveys of Beechey, Franklin and Parry in the Arctic, and King in Australia. It was the end of an era, as with the number of survey officers and vessels increased, so the need to tie up resources for an extended period decreased. Only George Thomas and White could claim any particular longevity in surveying one particular geographic region and that was in Home Waters.

⁴²⁸ No single account has yet been written of the state of World charting in the eighteenth century based on the efforts of all official and non-official printed charts.

⁴²⁹ Day, *Hydrographic Service*, following page 48.

⁴³⁰ Those pre-1815 surveys undertaken by Royal Navy masters can be seen in the contemporary catalogues of the chart sellers and amongst the collections of charts in the National Maritime Museum, United Kingdom Hydrographic Office and The National Archives.

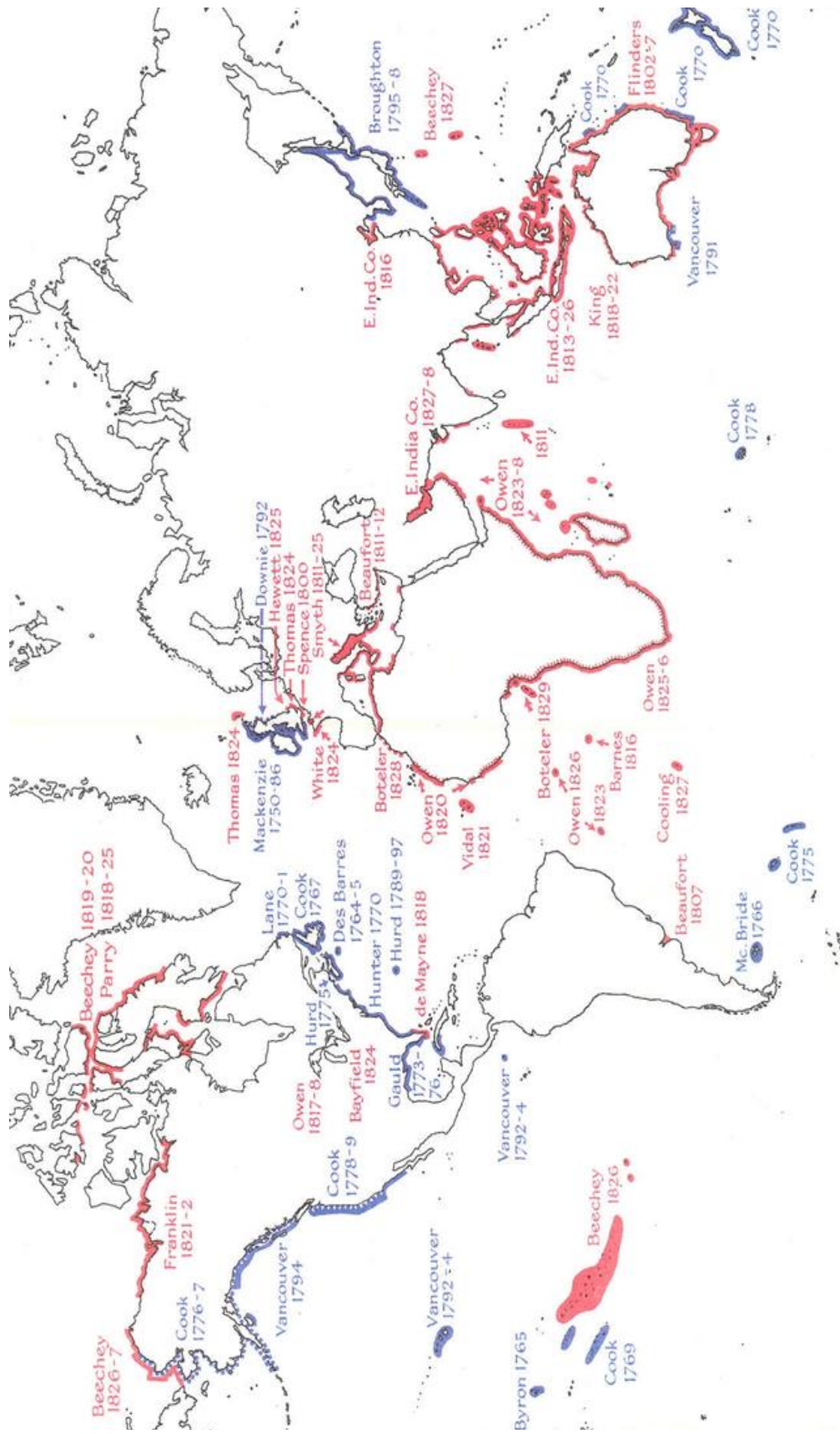


Illustration 3.4 Principal British hydrographic surveys up to 1829 (Day, *Hydrographic Service*)

Reports on the coverage of charts and surveys

For the Hydrographer to be able to address the shortcomings of chart coverage a report appears to have been the favourite mechanism for presenting the facts to the Admiralty Board. After the Chart Committee's prolific report on the current state of survey coverage and the opportunities for data acquisition,⁴³¹ the reaction by the Admiralty Board was not particularly swift or thorough in employing resources to fill in the gaps. By 1810 only four vessels were in employment, so in 1816 Hurd suggested the employment of a group of nine masters, lieutenants and captains to undertake the capture of 'information most wanted'. This later report was divided into two classes of information, *i.e.* those areas needing to be surveyed, and those areas being surveyed. Of those areas needing new surveys Hurd started with the deficiencies in the 'Home Seas' because this was the main priority for defence;⁴³² the report was geographically arranged on similar lines to those prepared in 1802⁴³³ and 1807.⁴³⁴ However, it was not as wide ranging as the two previous reports, with the main focus outside of Home Waters for acquisition being the Atlantic, east coast of Africa, Arabia, the Persian Gulf, northern and western New Holland, and northern and eastern New Guinea.

Although this report is brief, possibly being a summary of a document now lost, it was a useful item for both the Admiralty and Navy Boards to use for planning purposes and for the deployment of resources. In the margin are pencil annotations showing the resources needed to undertake the surveys, such as those for the North Sea and English Channel needing a gun brig each. There are also questions (in pencil) concerning who to send and what vessels to use, but the strength of the report is the justifications the compiler used for choosing the men listed and why the areas needed surveying. The content of the entries are typical of Hurd as they are short enough to be informative, but the report was not signed and may have been a rough version. Nevertheless the entries were clear enough to provide sufficient information to the Admiralty Board, such as that for the English Channel which was so poorly charted Hurd recommended one or two scientific officers to rectify the situation.⁴³⁵ To

⁴³¹ TNA, ADM1/3522.

⁴³² UKHO, MLP70.

⁴³³ UKHO, MLP 183/1.

⁴³⁴ TNA, ADM 1/3522.

⁴³⁵ The English Channel was 'stated to be so incorrectly laid down in all the charts with regard to the soundings, that the Hydrographer strongly recommends the employment of one or two scientific officers on this service – particularly from the first depths out of the Ocean to the interior of the

undertake such an important survey he recommended ‘Capt. Martin White, when finished the survey of Guernsey and Jersey – would require a small sloop of war furnished with necessary instruments and time-keepers’.⁴³⁶ This is just one example of the fourteen entries included in this report.⁴³⁷

In 1819 a report put to the Admiralty Board by Hurd (in answer to their minute of 16 November) on the ‘state and progress of surveys’ was a very different beast to that of three years earlier. Sent to the Board on New Year’s Eve of 1819, it was a benchmark document showing the development of survey activity during the first ten years of Hurd’s Hydrographership. This was a far better organised report than that of a few years earlier, with the sections clearly laid out and headed with the geographical area and the name of the surveyor undertaking the work. This was predominantly a report on progress and an opportunity for Hurd to lay before the Admiralty Board evidence of the proactive way in which data was being acquired under his supervision.⁴³⁸ Hurd set the format for others to follow and in 1826 Parry and Becher produced two reports that eclipsed all previous efforts, with the exception of the Chart Committee’s work. Those reports were ordered at the request of the Admiralty Board held on 17 August 1826⁴³⁹ and both were submitted on 12 October 1826.⁴⁴⁰ It was clearly another of those periodic accounts that the Board were becoming used to asking for in order to keep a close eye on resources, as well as a fundamental point of reference for planning the strategy for any future hydrographic surveying work.

A second report was also prepared and ran to 163 pages covering, like the report prepared by the Chart Committee in 1807, all parts of the globe. Like the work of the Chart Committee, Parry and Becher’s report was equally full of insight and as the former report had been a valuable aid to Hurd, so the latter was to Parry, but even more so to Beaufort. Parry and Becher’s second report was very detailed and

Channel, that the navigator, in thick weather, may enter it with confidence’ (UKHO, MLP 70 Undated account of surveys needed and being undertaken, c.1816).

⁴³⁶ White was still working on his Guernsey chart in 1812 (UKHO, 841 5k, rough survey, 1812).

⁴³⁷ It is not known how this ended up in the Hydrographic Office archive, when it should have remained with the Admiralty or Navy Board papers. It is possible the report was returned to Hurd to answer the questions noted in pencil in the margins and never returned to the originator.

⁴³⁸ UKHO, LB1 fos 262-277.

⁴³⁹ Parry was asked for a ‘report of the several surveys now going on afloat as well as in this office, with a statement of how much has been done in each survey and what time he thinks will be necessary to complete those which are in the office (including *Leven’s* work when it comes)’ and he supplied ‘A report of the several surveys now going on afloat under the orders of the Lords Commissioners of the Admiralty and also of those already transmitted to the Hydrographical Office with an estimate of the time it will probably require to complete them’ (UKHO, MB 1 f.63).

⁴⁴⁰ UKHO, MB 1 f.63; UKHO, MLP 183/3, loose unnumbered sheet at the front of the volume.

presented the Board with a problem of now possessing a document that showed how little the British Admiralty actually knew about the World's hydrography. Because they had been so thorough in studying the World's charting and used a benchmark to define which surveys and charts were acceptable, *i.e.* those being trigonometrically laid down by recognised surveyors, there were many important gaps that once again needed filling.⁴⁴¹ For example, in Home Waters from the River Tay to the Orkney Islands there were 'no regular' surveys, having to rely on a six sheet small scale chart of the North Sea originally published by Faden in 1812 and purchased by the Hydrographic Office.⁴⁴² Further afield in Hudson's Bay they wrote how 'no part has been surveyed, except a few detached portions, in the neighbourhood of our Hudson's Bay Company's settlements'.⁴⁴³ Such were two of the many entries highlighting deficiencies. Other entries were less informative, merely stating 'not a regular survey',⁴⁴⁴ 'tolerable', 'good' or 'We have no information whereby to judge of its merits',⁴⁴⁵ all being self explanatory to the Board. From this report the Admiralty Board would have been able to see exactly what was needed in the form of new surveys.⁴⁴⁶ It is also mainly as a result of this report that the number of survey vessels increased, showing how the Admiralty Board reacted positively to the evidence placed before them.

The importance of geographic knowledge and awareness when it came to administering survey planning can be seen in Appendix 11 where the priorities of government are seen by the order of importance the data in the reports was arranged. Thus in all cases (with the exception of surveys afloat in 1826) the main area was Home Waters, but as time went on the importance of different regions can be seen. For example in 1802 and 1807 there were entries for France, Spain and Portugal (excluding the Mediterranean) and the Americas, but in 1816 and 1819 there were no entries for those areas. In 1826, for the first time, there was an entry for Polynesia,

⁴⁴¹ UKHO, MLP 183/3 'A General Account of the present state of our Hydrographical Information on all the Coasts throughout the World; Comprehending all the Charts, Plans &c, which are published (or bought) and issued by the Hydrographical Office at the Admiralty – with General Remarks, on their respective merits – an account of the M.S. Surveys now in the Office – and a notice of the principal parts which still remain defective'.

⁴⁴² UKHO, MLP 183/3 f.5. The copper plates of charts 73-78 are on display in the Ritchie Archive building at the UKHO (April 2008).

⁴⁴³ UKHO, MLP 183/3 f.119.

⁴⁴⁴ UKHO, MLP 183/3 f.155.

⁴⁴⁵ UKHO, MLP 183/3 f.93.

⁴⁴⁶ In addition to those longer reports were details supplied to the Hydrographer from mainly Naval colleagues (Scottish Record Office, GD51/2/517, Owen to Melville, 1814; UKHO. LP1857 f197, Fleeming to Parry, 15 May 1828).

showing a growing interest in the strategic value of those isolated islands and how a much wider view was being taken within the Admiralty of the importance of all parts of the globe.

Those plans were a good reminder, from the Board's perspective, whereby they could see exactly what was planned but also had been achieved in relation to work in progress. After which the small sphere of hydrography came into collision with the realities of Government strategy. In the pre-1815 era the threat was obvious, but after this even though the French had been defeated the English Channel was still of great importance, as was the Mediterranean,⁴⁴⁷ because of the threat they still posed on both fronts. However, the deployment of surveying resources by the Board did not always reflect the current strategic thinking. In 1807 the British Parliament passed an act to abolish slavery and it would not be unreasonable to think that a detailed geographical knowledge of African waters would have been essential in operations against slavers. Initially some hydrographic work was made under the superintendence of William Dawes, Third Commissioner, using H.M.S. *Crocodile* in 1809 and 1810, but this was only to establish the latitudes and longitudes of the principal points on the coast.⁴⁴⁸ It took until 1821⁴⁴⁹ before any serious attempt was made to execute any Royal Navy surveys on that station, having to rely on materials from the private chart trade and foreign governments. This is in contrast to those surveys which had strategic benefits but were not always carried out after hostilities had ceased. For example, on the Canadian Lakes surveys were undertaken by Captain W.F.W. Owen from 1815, utilising the experience of Lieutenants A.T.E. Vidal and Becher, as well as John Harris, master, who had served on the Lakes during the war of 1812.⁴⁵⁰ However, the surveys undertaken in the Mediterranean theatre by Smyth (from 1813), in the English Channel by White (1812-1817) and the West Indies (1811-1817) by DeMayne were clearly during periods of hostilities.⁴⁵¹ Even so, Parry and Becher's reports were great levers of reform and stimulated the Admiralty Board

⁴⁴⁷ D. Lyon and R. Winfield, *The Sail & Steam Navy list. All the ships of the Royal Navy 1815-1889* (London, 2004), 16.

⁴⁴⁸ House of Commons, *Report from the Select Committee on Papers Relating to the African Forts* (London, 1816), 203-4.

⁴⁴⁹ For an account of the African survey see Burrows, *Captain Owen*, 78-207.

⁴⁵⁰ R.W. Sandilands, 'Hydrographic surveying in the Great Lakes during the nineteenth century', *The Canadian Surveyor* 36:2 (1982), 140-2.

⁴⁵¹ Tizard, *Preliminary chronological list*, 11.

into action resulting in more work for the Hydrographic Office and increased employment for surveyors.

Even after all those plans had been submitted and read by the Admiralty Board, with some of their contents being acted upon, there were still many areas left poorly charted. Some areas were certainly overlooked, but there was often a strategic need to chart other areas first. A good example was New Zealand, which was in great need of surveying in far more detail than those preliminary running surveys produced under Cook in the eighteenth century. A recent study has shown that the two islands were a patchwork of surveys by the English, French and Spanish navies, New Zealand missionaries, merchant shipping, men involved in sealing, whaling and one vessel that was searching for flax.⁴⁵² From a data acquisition perspective many of those surveys were taken during the briefest of opportunities and executed by men who fortunately had enough experience to do so, which if they had not been on board the surveys might not have happened at all. It was only the French who showed any sort of systematic effort to obtain a complete survey until the British sent the *Pandora* in 1848 to survey the coastlines of the two islands in their entirety.⁴⁵³

Scheming and instructions

After it had been agreed that a particular geographic area should be surveyed, it was up to the Hydrographer to work out the detail of the survey work to be undertaken and the extent of the resulting printed charts; it is undeniable that the various surveys of charting (referred to above) were key to the more detailed scheming of survey and chart coverage. From the very beginning of Hurd's term as Hydrographer he was able to consult the records of the Chart Committee and concentrate on completing the shortcomings in the chart series. It is not known exactly when, but Hurd planned at least one chart scheme (of Nova Scotia) that involved surveys from various authors collected over a wide period of time; Beaufort continued Hurd's planning⁴⁵⁴ showing

⁴⁵² B. Byrne, *The Pandora survey. The completion of the 1848-1856 great survey of New Zealand by H.M.S. Pandora together with an account of its genesis and initial phase* (Auckland, 2007), 1-16.

⁴⁵³ Day, *Hydrographic Service*, 61. The French also used information from missionaries and local shipping intelligence in the 1820s to obtain as full as possible geographic picture. This was supplemented by surveys made by men involved in the sealing industry that were published during the first three decades of the nineteenth century (Byrne, *The Pandora survey*, 11, 15-16).

⁴⁵⁴ Beaufort was 'endeavouring to give a connected series of charts from Nova Scotia to the southward so that by the time that Captain Bayfield has finished his survey of the Gulf and River St Laurence, we shall have something better to offer HM ships than the dispirited patchwork which we are at present obliged to buy from the map sellers' (UKHO, LB2 f.162, Beaufort to S.P. Hurd, 18 May 1831).

how chart schemes could take decades to complete, as in this instance the plans had been laid at least ten years before, as Beaufort made this statement in 1831 and Hurd died in 1823.

Once the overall plans had been laid the next step was to draw up the instructions for the surveyors to work from. How often the Admiralty Board consulted with the Hydrographer over those matters is impossible to know, especially as many non-hydrographic voyages could potentially have included some element of surveying if he had been consulted; as a matter of capacity in 1829 it was known that there was ‘scarcely a ship of war without an officer capable of making a satisfactory survey of a harbour, line of coast . . . amply sufficient for the purpose of navigation’.⁴⁵⁵ It is known that Barrow consulted with Hurd in 1810 over the survey of the southern coast of Turkey which was undertaken by Captain Beaufort, making a precedent which should have been followed by the Admiralty Board as a matter of routine, thus allowing its Hydrographer to fill in many of the ‘gaps’ in chart coverage.⁴⁵⁶ Hurd at some time prior to 1815 made a proposal to their Lordships ‘to attach two maritime surveyors to the American command’ but when in 1816 he wrote to Croker in peacetime his view had dramatically changed, stating that ‘it would not be either prudent or proper to make surveys beyond our own shores’.⁴⁵⁷ This was an interesting viewpoint and would have had significant ramifications for future expansion of the hydrographic surveying capabilities of the Admiralty. Why Hurd decided on this viewpoint is not clear, but perhaps Admiralty Board thinking at that time was echoed by him when he lost sight of the development of the surveying specialism in favour of going along with the Board. Had Hurd been successful in this thinking then the number of surveys and surveyors would have been drastically smaller, subsequently restricting the Admiralty’s capacity for data acquisition. Fortunately this was not the case and the numbers of specialists continued to grow.

The instructions drawn up by Hurd and Parry were very similar in their conciseness, such as those for the work undertaken by Lieutenant Hewett on the east

⁴⁵⁵ Anon, *The United Service Journal and Naval and Military Magazine* 1829, part 1 (London, 1829), 80.

⁴⁵⁶ When Beaufort made his will on that voyage he made provision for everything connected with the survey to pass to Hurd. This statement concerning Beaufort leaving official documents in his will can be best explained in his possible thinking that even his personal records would have been of more use to the Admiralty than to any other beneficiary of his will (N. Courtney, *Gale Force 10: the life and legacy of Admiral Beaufort, 1774-1857* (London, 2002), 162, 195).

⁴⁵⁷ UKHO, LB1 f.59 Hurd to Croker, 11 July 1816.

coast of England. Because this area was well known in charting terms, the instructions given to Hewett were very detailed and Hurd reported to the Board what the lieutenant had surveyed, as well as pointing out what was needed to be done.⁴⁵⁸ Other more high profile voyages ended up having their instructions printed in the introduction to their narratives, such as those given to Parry on 1 May 1819 and 27 April 1821 for his voyages in search of a north-west passage.⁴⁵⁹

Despite having worked out a strategy and drawn up instructions there were always going to be flaws in any planning. Vice Admiral Fleeming, whilst Commander-in-Chief of the North American Station, wrote to Parry in 1828 in a private letter deploring the strategy the Admiralty had sanctioned for surveying the West Indies and South America. His main concern was how there were many instances in which ‘well known ground has been gone over again; much time lost, and money thrown away’. Not happy with pointing out that the work in progress was virtually a waste of time he then turned his attention to charts already published by Parry, such as that of the south side of Cuba (issued in 1826). Many of the officers on his stations had found the chart to be incorrect, disagreeing with a Spanish chart published at Madrid in 1821 (constructed by Lieutenant Ventura de Barcaiztegui in 1793 and revised by Captain José del Rio in 1804). Officers who had been on the coast ‘about Cape Gracias a Dios, complain of the uselessness of the Admiralty charts’ and Fleeming suggested using data from the Spanish who had ‘very good materials for constructing a chart of all this coast, but the penury they labour under, prevents it’. The problem of constructing a chart of this area could have been solved by communicating with Bauzá, who at that time was well acquainted with Parry.⁴⁶⁰

⁴⁵⁸ UKHO, LB1 f.264.

⁴⁵⁹ W.E. Parry, *Journal of a voyage for the discovery of a North-West Passage from the Atlantic to the Pacific; performed in the years 1819-20, in His Majesty's ships Hecla and Griper, under the orders of Captain William Edward Parry, R.N. F.R.S., and commander of the expedition* (London, 1821), xix-xxix; *ibid*, *Journal of a second voyage for the discovery of a North-West Passage from the Atlantic to the Pacific; performed in the years 1821-22-23, in His Majesty's ships Fury and Hecla, under the orders of Captain William Edward Parry, R.N. F.R.S., and commander of the expedition* (London, 1825), xxi-xxx.

⁴⁶⁰ LP1857 F197, Fleeming to Parry, 15 May 1828. Fleeming specifically mentioned ‘. . . in many instances well known ground has been gone over again; much time lost, and money thrown away: Mr De Mayne was a year employed on the Key Sal Bank, which was most accurately surveyed by Captain Galidna, and the survey published long before; in fact, a great deal of the Bahama survey is but copies, and, it is astonishing that in 16 years so little has been done. We are told to expect charts of the Crooked Island, and Turks Island passages, but they have not yet appeared, and nothing can be worse than those at present, as I have had an opportunity of proving. Captain King too, I am told has commenced his survey at the Rio de la Plata, going southerly: the whole of which has been most accurately examined by the Spanish’.

Although there had been many instances of people pointing out inaccuracies on single charts, the scale to which Fleeming's letter potentially undermined the work of the surveyors and the Hydrographer's planning was not insignificant.⁴⁶¹ The Fleeming exposé was rare but what surveying was going on elsewhere was being undertaken to a much higher level of accuracy than was previously possible, therefore justifying going over previous surveys only occasionally, regardless of who made them.

There were also extremely well planned acts of naval surveying, a handful involving collaborative operations, such as the work with the Ordnance Survey. One event that took place much further from the Admiralty involved Captain Beechey and His Majesty's Sloop *Blossom* in 1827. Beechey was given specific instructions to meet up with Franklin who was searching for a north-west passage. However, Beechey had gone via Cape Horn into the Pacific and sailed up to Bering Strait to try and join up with his colleagues, who (at the same time) were trying to negotiate the Arctic from the opposite direction. What was all the more remarkable was the thought by Admiralty planners that it was actually achievable. This shows just how confident the mood must have been when Beechey's instructions were drawn up, to think that voyages could be taken across such a vast area and hope to succeed where no other expedition had done before them.⁴⁶² The resulting charts from such ventures were definitely needed as those vessels were surveying uncharted waters.

Ships⁴⁶³

Vessels used for surveying duties were on the whole rather small, including some which had to be hired locally as the logistics of deploying a Royal Naval vessel for this type of work was not always possible. The number of vessels involved in surveying was also particularly small, but grew as time progressed to some fifteen in number, including four hired boats in 1829.⁴⁶⁴ The choice of vessels was not always particularly good but initially the Hydrographer had little say over this, although he

⁴⁶¹ Unfortunately the reply by Sheringham on 13 August 1828 was not entered in the minute book kept in the Hydrographic Office because the 'in' letter from Fleeming was marked private (UKHO, MB 1).

⁴⁶² For the instructions see F.W. Beechey, *Narrative of a voyage to the Pacific and Beering's Strait. To co-operate with the Polar expeditions: performed in His Majesty's Ship Blossom, under the command of Captain F.W. Beechey, R.N. in the years 1825, 26, 27, 28* 2 vols (repr. London, 1968), viii-xii. See also B.M. Gough, *To the Pacific and Arctic with Beechey. The journal of Lieutenant George Peard of H.M.S. 'Blossom' 1825-1828* Hakluyt Society 2nd ser., 143 (Cambridge, 1973).

⁴⁶³ For details of the tonnage of survey vessels and the numbers of men employed see Chapter Two Figure 2.6.

⁴⁶⁴ Dawson, *Memoirs*, 102.

could complain when they were found to be unsuitable for surveying duties. For example, in February 1818 he wrote to Rear Admiral Sir Byam Martin at the Navy Office complaining that the *Congo* ‘was found so leewardly as to be of no use’, leading Hurd to recommend that ‘she be discharged altogether from the survey service or that her destination and outfit would be materially changed . . .’.⁴⁶⁵

Of the seven surveying operations in progress in 1819 two were found to have been restricted by the poor quality of the vessels they were using,⁴⁶⁶ but none of those were purpose built for surveying except for the *Investigator*.⁴⁶⁷ Hurd wrote to the Admiralty Board concerning De Mayne’s work in the Bahamas for although it was a ‘great national undertaking’ the vessel was ‘declared totally unfit for further service’.⁴⁶⁸ He also reported how Mr Holbrook, a master deployed to survey the waters of Newfoundland, not only had problems with his vessel, but the men who were employed to man it ‘were inadequate to the purposes of her employment’ causing less progress than was expected.⁴⁶⁹ Hurd showed the Board that if they did not provide the proper materials then progress would be hampered. This was Hurd at his best, showing the subtleties of pointing out the blindingly obvious to the Admiralty Board, and also suggesting how to remedy the situation by ‘bringing his labours to a close by granting an additional assistant with a small vessel or tender, not exceeding 40 tons and a crew of 8 or 10 men’.⁴⁷⁰

It is surprising to see so many vessels (although from a small sample) being unfit for the purpose they were intended, especially when the number of surplus vessels after 1815 meant there would have been plenty to choose from. The surveying flotilla may have been unfortunate to have so many unsuitable vessels but it is unlikely Hurd had had any choice of what was allocated, or been able to select from those vessels left in 1815. The administration of shipping matters was handled in several ways, by commanding officers writing to the Admiralty Board, or to the Hydrographer, who would then write to the Admiralty Board. The Hydrographer needed the sanction of the Admiralty Board to instruct the Navy Board to carry out any actions regarding shipping, which with hindsight was a cumbersome way of

⁴⁶⁵ UKHO, LB1 f.136, Hurd to Martin, 19 February 1818.

⁴⁶⁶ UKHO, LB1 fos 262-7.

⁴⁶⁷ Morris, ‘Surveying Ships ...’, 388.

⁴⁶⁸ UKHO, LB1 f.269.

⁴⁶⁹ UKHO, LB1 f.270.

⁴⁷⁰ UKHO, LB1 f.271.

doing business, but in the early nineteenth century administration there was little chance of any other way of undertaking that function.

Table 3.1 Sample of Tonnage, wages paid and number of men connected with seven surveying voyages in 1829

Ship	B	A	C	H	I	M	P
Tons	235	314	237	375	126	184	185
Number of men	63	86	57	86	35	52	37
Wages (£)⁴⁷¹	2803	2976	2573	3315	1439	2357	1855
Wear and tear (£)⁴⁷²	1846	220	62	30	724	n/a	560
Men to wages average (£)	44.5	34.6	45.1	38.5	41.1	48.8	50.1
Tons to wages average (£)	11.9	9.4	10.8	8.8	11.4	13.7	10.0

Key to Ship names: A=*Adventure*, B=*Beagle*, C=*Chanticleer*, H=*Hecla*, I=*Investigator*, M=*Mastiff*, P=*Protector*

Source: UKHO, SL101/1; *ibid*, MLP5/2/6

Table 3.1 shows how it was more economical for the Admiralty to run larger survey vessels because it actually cost them less per man to pay them. The *Herald's* crew of 86 were paid on average £34 12s per man per year and the cost of the ship in relation to her tonnage was £9 8s per ton per year in wages. This is in contrast to the *Protector* which cost £50 2s per man but only £10 per ton in wages, but the smallest vessel,⁴⁷³ the *Investigator*, did not have the highest men to wages (£41 2s) or tonnage to wages (£11 8s) average, although it was not far from it. There were other factors to be taken into consideration, such as wear and tear, as well as victualling, for overall effectiveness and financial viability of using vessels of less than 400 tons for survey work. The wear and tear is difficult to factor into this analysis as it was so variable, due to the age of the ship and the type of waters she was operating in, thus any comparison on those figures is fraught with anomalies. However, with more men being accommodated on larger vessels this also meant more data could be captured, but deep draughted vessels were totally impractical for inshore work in areas of shallow water. Thus, paradoxically, what appears as a straightforward matter of economics to employ larger vessels was in fact not the defining factor, as geography was.

The provision of survey vessels to particular stations and interference by commanders-in-chief with their deployment once they came under their jurisdiction

⁴⁷¹ The wages column is rounded down to the nearest pound.

⁴⁷² The wear and tear column is rounded down to the nearest pound.

⁴⁷³ This does not include hired vessels.

was inevitable. It is clear that even though Admiralty orders dictated what the surveyors' duties were, the commander-in-chief often thought differently and in one case in a private letter he stated a survey vessel should be made available for sole use on his station, under his command. Vice Admiral Fleeming wrote a private letter to Parry in May 1828 lamenting the deployment of vessels, stating 'there cannot be a more useful employment in time of peace, but, hitherto the establishment has been better calculated to defeat the purpose, than to forward it'. He suggested using 'old ten gun brigs, with a reduced complement of men, and of course less guns', and pointed out how data was laying around waiting to be sent to the Hydrographic Office, stating 'let them send the data home to you every three months, instead of loitering about in port two thirds of their time'.⁴⁷⁴ This was not an isolated example⁴⁷⁵ and Fleeming had made some valuable suggestions for improvements in efficiency for the Royal Navy and the Hydrographic Service.

Having a vessel specifically charged with recording unsurveyed areas was (and still is) a precarious venture, as in most cases there was always a risk of coming across unknown obstacles, especially in poorly surveyed areas. The whole *genre* of survey work was to record such dangers, however having trained men and state-of-the-art equipment on board to do so did not make the vessels themselves immune to disaster. Fortunately the loss of survey vessels during this period was small, with only three being lost. The *Fury* was lost whilst exploring the northern coast of Canada in August 1825 whilst trying to navigate a narrow channel, when her keel was so badly damaged the vessel had to be abandoned.⁴⁷⁶ This was put down to the difficulty of the conditions but the loss of the *Kangaroo* in 1828 was laid firmly on the master, second master and mate, all of whom were dismissed from the service.⁴⁷⁷ The other instance involved the *Columbine*, which came to grief in particularly bad weather whilst at anchor, with some blame being put on both the commander and master, but unlike the senior members of the *Kangaroo*'s crew they were not dismissed.⁴⁷⁸ With a reputation for expertise in navigation and seamanship those losses must have reflected badly on their specialism, even if they were not always at fault themselves especially when

⁴⁷⁴ UKHO, LP1857 F196, Fleeming to Parry, 15 May 1828. Includes an enclosure from William Sandom, H.M.S. *Espeigle* at sea, 28 March 1828 to Vice Admiral C. Fleeming.

⁴⁷⁵ This had often been the case as Hurd's survey work on Bermuda was cut short when the commander of the station diverted his efforts to fitting out ships instead of surveying.

⁴⁷⁶ Hepper, *British warship losses*, 158.

⁴⁷⁷ Hepper, *British warship losses*, 160.

⁴⁷⁸ Hepper, *British warship losses*, 157.

consideration is given to the relatively high number of defective vessels allocated for survey duties.

Survey data acquisition

After the planning was complete and the logistics of manning and fitting out accomplished, the Hydrographer then had to wait for the surveys to be undertaken. There were fundamentally three types of survey: the extended survey, lasting more than one season and covering a substantial geographical area; the local survey, covering a harbour or bay, not lasting more than one season; and the sketch or running survey recording only the briefest but most essential information. In the early years during which Hurd was Hydrographer the amount of data being gathered by specialists was miniscule compared to the resources available to the Admiralty; therefore any opportunity Hurd could find to obtain data was taken up. Foremost in the field of specialists during that early period was Beaufort, who Hurd wrote to in July 1808 virtually pleading with him for ‘whatever observations or corrections you may in the course of service be able either to make or procure we shall be prepared to receive with thanks and know how properly to value’, after stating how barely a quarter of the Mediterranean had been surveyed satisfactorily.⁴⁷⁹ The situation in the Mediterranean was soon to be vastly improved when in 1811 Beaufort commenced his extended survey of Karamania and in 1813⁴⁸⁰ the newly appointed Lieutenant Smyth started work on what was to become one of the most important hydrographic and scientific surveys of the early nineteenth century.

Those longer voyages yielded far larger numbers of surveys simply because they encompassed much larger geographical areas. In the post-Peace situation even Melville never failed to squeeze something out of tight budgets for another voyage of scientific exploration. The expeditions he sent to the Arctic and northern Australia were commemorated (respectively) by Melville Sound and Melville Island.⁴⁸¹ Those longer voyages were nothing new but they were ideal for training, data gathering and gaining navigation experience on a much broader scale than in any other posting. Of the surveys being undertaken in 1819 Hurd could claim seven distinct operations, only one of which was defined by a small geographical limit, that of George Thomas’s

⁴⁷⁹ Huntingdon Library, FB1365, Hurd to Beaufort, 26 July 1808.

⁴⁸⁰ Dawson, *Memoirs*, 53; TNA, ADM12/161; David, ‘British hydrography in the Mediterranean’, 1.

⁴⁸¹ M. Fry, ‘Dundas, Robert Saunders, second Viscount Melville (1771–1851)’, *ODNB* [accessed 24 Nov 2007].

work in the mouth of the Thames. The remaining areas were much larger but still well defined and planned with the involvement of the Hydrographer.⁴⁸² Those larger surveys, at great distance from the Admiralty, required fewer man hours for the Hydrographer and the Admiralty Board to manage, as each survey was planned for one distinct task, *i.e.* surveying. The smaller surveys were often viewed as incidental to other deployments, such as in the case of Lieutenant Frederick Bullock who was ordered in 1828 to

occupy any leisure time which the performance of other duties may admit, in surveying [the] River Thames, from Deptford to Leigh . . . this survey not to interfere with other duties, and to incur no extra expence'.⁴⁸³

The smaller surveys were also overshadowed by those epic longer voyages, but each had their value with the former having a strategic purpose, often filling an immediate need which the longer voyage could not quickly achieve.

The longer voyages often involved men having to go to extreme limits to record as full a picture as possible of the geographical terrain of the area they were charged with surveying. Such extremes were a daily occurrence in the Arctic for the likes of Parry and Franklin due to the weather, and to a greater extent because they were sent to chart previously uncharted waters. Other one-off feats of exploration included that undertaken by Lieutenant Skyring and Midshipman James Kirke in 1829 when surveying the Cockburn Channel in Southern Chile. As part of their survey they had to establish the height of an unnamed mountain, later named 'Skyring Mountain'. On reaching the summit they deposited (amongst other things) four medals commemorating the voyage with 'HMS Adventure and Beagle 1828' marked on them and a message giving the names of the principal officers of the party with instructions to preserve the items they had left.⁴⁸⁴ This was truly some feat of exploration as the two naval officers had to carry their equipment in freezing conditions up a 3,000 feet mountain that was the highest point they had recorded in the vicinity.⁴⁸⁵ Hardship and extreme conditions were common occurrences during surveying voyages and the longer the voyage the harder it was for some men, both mentally and physically.

⁴⁸² UKHO, LB1 f.264.

⁴⁸³ UKHO, SL101/1.

⁴⁸⁴ UKHO, H4100/81, Cabezas to Haslam, 4 August 1981.

⁴⁸⁵ UKHO, SL19b, quoted in a report by Lt-Cdr A.C.F. David, *c.*1981. This period also saw another Naval officer engaged in a voyage involving mountaineering, when Lieutenant Maw crossed the Andes in 1827 (Maws, *Pacific to the Atlantic*).

The value of the data collected could not be underestimated, but it came at a price. The problems affecting both men and materials were clear on the South American survey during the second half of the 1820s. Captain Philip Parker King of the *Adventure* had an arduous task in surveying the southern parts of South America, which came to an abrupt end when scurvy broke out. King reported how several men had died despite his efforts to prevent its onset and he himself had become incapable of active duties due to a rupture brought on by fatigue in ascending a mountain and requested to return home.⁴⁸⁶ The ship's surgeon insisted on a complete period of rest for the ship's company of 14 days, which was agreed to by Captain Stokes. Meanwhile the *Beagle*, that was also in the same region, lost the use of its yawl which had been an essential vessel for gathering survey data.⁴⁸⁷ But those were just some of the extremes of the harshness of surveying, which also included the total loss of some surveying ships. If there was any lesson to be learnt then it was that the longer the voyage the greater the price the Admiralty had to pay, not just financially in keeping a vessel running but in the losses of men due to both sickness and mortality (such as those during Owen's African voyage), as well as equipment and vessels. When conditions started to deteriorate it took every ounce of leadership skill for the commanding officer to avoid disaster. Despite such extremes, surveys were completed in great numbers and men continued to volunteer for those duties.

Local governance and accountability

With surveys being undertaken at great distance from any immediate authority, such as the Hydrographer or a commander-in-chief of a geographical station, there was a tendency to view surveyors as being in isolation and having some independence over exactly what it was they should have been doing. There was also a growing number of surveyors permanently operating from one particular port, or over a particular geographical area, such as Anthony Lockwood the 'Maritime Surveyor of Halifax' and Smyth in the Mediterranean. The management of those men in their data acquisition duties was not always straight forward. Part of the problem was the distance from the Admiralty and the surveyor, but also the jurisdiction of the local commander-in-chief. Distance and lack of authority was certainly a problem for Anthony Lockwood who had been employed for two years to survey the shores of

⁴⁸⁶ UKHO, SL101/1.

⁴⁸⁷ Ritchie, *Admiralty chart*, 197.

Nova Scotia. After two years he allegedly had not attended to this and was recalled to England,⁴⁸⁸ despite having been directed by Vice Admiral Sir Alexander Cochrane to examine and report on them in 1814.⁴⁸⁹ Lockwood had been recommended to Hurd and it was Cochrane as commander-in-chief who gave the instructions for the survey.⁴⁹⁰ However well advised and supported, Lockwood soon found himself in trouble. The main problem was communication, as Hurd reported to him in July 1816 that his ‘chart of the eastern end of Nova Scotia sent by Admiral Griffiths has not yet made its appearance’.⁴⁹¹ What made matters worse was that Hurd thought Lockwood had been surveying the wrong area, stating ‘why he should have employed himself in surveying the western extremity of Nova Scotia or the shores of Cape Canso is to me inexplicable’. But even worse for Lockwood was Hurd’s view that he appeared

to act independent of any controul [*sic*], may be directed to report his proceedings to this office, as well as to receive instructions from hence, so that his labours may be conducive to some public good.⁴⁹²

Shortly afterwards Griffiths wrote to the Board that he thought Lockwood’s services were no longer necessary⁴⁹³ and the Admiralty Board wrote to Sir David Milne at Halifax instructing him to send Lockwood home and pay off the *Examiner*.⁴⁹⁴

Matters got even worse for Lockwood, as he wrote to the Board with a claim for surveying pay for his son as ‘Assistant’ in the Nova Scotia survey, and also the cost of his passage back to England in a merchant ship, both of which they did not allow.⁴⁹⁵ But Lockwood’s troubles were far from over, as his work was brought into the Hydrographic Office where his North American surveys were scrutinised by Hurd and found to be inadequate. Lockwood subsequently had to spend time in the

⁴⁸⁸ He was tasked with surveying ‘the distant banks and soundings off the shores of Nova Scotia, the shoal spots on St. George’s bank, reported to be dry in some places, [and] the numerous sunken ledges off the Menan Islands in the Bay of Fundy’ (UKHO, MLP70). Lockwood was in charge of the *Examiner* schooner. His failure to undertake those duties is not recorded in his biography in the *Dictionary of Canadian Biography*, 506.

⁴⁸⁹ UKHO, LB1 f.57 Hurd to Croker, 11 July 1816.

⁴⁹⁰ UKHO, LB1 fos 25-6, Hurd to Lockwood, 9 May 1815.

⁴⁹¹ UKHO, LB1 f.57 Hurd to Lockwood, 6 July 1816.

⁴⁹² UKHO, LB1 fos 57-8 Hurd to Croker, 11 July 1816.

⁴⁹³ TNA, ADM12/179, Griffith to the Admiralty Board, 23 August 1816.

⁴⁹⁴ TNA, ADM12/179, Admiralty Board to Milne, 24 August 1816.

⁴⁹⁵ TNA, ADM12/188, Lockwood to the Admiralty Board, 18 March 1818; *ibid*, Lockwood to the Admiralty Board, 20 January 1818.

Hydrographic Office correcting his charts⁴⁹⁶ and by 25 March 1818 the matter had been resolved as Hurd recorded he had ‘completed them very much to his own credit, as well as to my satisfaction’.⁴⁹⁷ The result shows how fair Hurd was, as well as supportive of his fellow surveyors by allowing Lockwood the chance to correct his errors, but also critical of poorly planned surveys. Lockwood’s work had a strategic value, as with the loss of America the two most important bases at that time were Bermuda and Halifax,⁴⁹⁸ the latter of which Lockwood had surveyed. Had Hurd been in charge of the whole acquisition process from start to finish then the problems of local governance and surveying the wrong area were very unlikely to have occurred.

Acquisition of data by purchase and gift

Many charts were purchased from the private chart trade, particularly those produced by William Faden, during Hurd’s period as Hydrographer. This was a quick and efficient way to acquire data. As charts were also purchased for supply purposes it is difficult to tell exactly what charts actually were purchased solely for reference purposes, but the huge number of charts acquired by the Chart Committee must have satisfied the need for charts to be used for compilation for many years. This did not stop further charts being purchased, as towards the end of Parry’s term many were bought from all the top London makers, such as Norie, Laurie, Wyld and Arrowsmith.⁴⁹⁹ Purchasing charts was a regular occurrence but as the number of charts based on Admiralty surveys grew so the dependence on the private chart trade diminished.

One area where the Hydrographic Office profited was from war and conflict, in contrast to the overbearing demands placed on it to supply data, especially through the occasional windfall of charts from captured vessels. Earl St Vincent at the Battle of Cape St Vincent acquired 55 sheets of Spanish manuscript charts and plans of

⁴⁹⁶ Hurd wrote of Lockwood’s work that ‘various soundings in different parts of the coast have been accidentally omitted, as also a number of necessary explanations are still wanting to render his works useful to navigators’ (UKHO, LB1 fos 133-4, Hurd to the Admiralty Board, 21 January 1818).

⁴⁹⁷ UKHO, LB1 f.142, 25 March 1818. Lockwood’s sailing directions were printed by G. Hayden of Brydges Street, Covent Garden and sold by Cadell and Davies of the Strand in 1818, when he described himself as Professor of Hydrography, Assistant Surveyor-General of the provinces of Nova Scotia and Cape Breton (A. Lockwood, *A brief description of Nova Scotia, with plates of the principal harbors; including a particular account of the Island of Grand Manan* (London, 1818)).

⁴⁹⁸ A. Lambert, ‘Preparing for the long peace: the reconstruction of the Royal Navy, 1815-30’, *Mariner’s Mirror* 82 (February, 1996), 42.

⁴⁹⁹ UKHO, MLP 62/1/iv, undated list of money expended on map and chart purchases, c.1828.

South America which Dalrymple was aware of,⁵⁰⁰ but other contemporaries were not so benevolent. To ensure all such charts came to the Admiralty an order was issued on 11 November 1813 to all HM ships instructing them to send any captured charts to the Admiralty. They were then examined and copied if they were thought to be of any use; a similar clause was also issued instructing judges of the Vice Admiralty Court to take the same action.⁵⁰¹ Subsequently 17 manuscript charts which were obtained by Captain Walker following the destruction of a French frigate off the Isle of France eventually arrived at the Hydrographic Office, via the Dutch Government, in 1828.⁵⁰² More peaceful naval interests also resulted in acquisitions of data ranging from single items to complete atlases, from small amounts of geographical intelligence in a letter to whole collections of material. Smaller items of note included a Norwegian chart of Alten in Finmarken that was given to Captain Parry when he was at Hammerfest⁵⁰³ that found its way into the Hydrographic Office. Also a copy of the *Pilote Francais, Environs de Brest* that was presented to White by the French Admiral Rossel in 1827.⁵⁰⁴ Data was also given by members of the Admiralty Board, such as a sketch of Dublin Bay given by Croker in September 1826,⁵⁰⁵ a coloured plan of the harbour, town and fortifications of Brest given two months later,⁵⁰⁶ a sketch of part of the interior of Africa by ‘Bello an African chief’ given by Mr Barrow⁵⁰⁷ and a plan of river communications from Lord Melville.⁵⁰⁸ All of which is further evidence of how supportive the Board was of its Hydrographer and his office.

Individuals who gave a significant amount of data to the Hydrographic Office during this period were King George IV, Don Felipe Bauzá the exiled Spanish Hydrographer, and by Alexander Dalrymple, the first Hydrographer to the Admiralty Board. King George III had an extensive collection of charts which George IV gave to the Admiralty in 1828 for the specific use of his brother the Lord High Admiral

⁵⁰⁰ UKHO, MLP183/2. Captain John Peyton captured at least two volumes of French charts from the *Franklin*, 80 guns, Vice Admiral Blanquett de Chailac after the action of the 1 August 1798 in the Road of Bequier off the Nile. These did not come to the Admiralty and were offered for sale (Henry Stevens, Son and Stiles, *A catalogue of atlases and maps and books relating to the sea, new series no.24*).

⁵⁰¹ TNA, ADM2/1084, order dated 11 November 1813.

⁵⁰² TNA, ADM12/254, Walker to Admiralty Board, 17 February 1828.

⁵⁰³ UKHO, Accession ledger ‘Book 1’, entry E555.

⁵⁰⁴ UKHO, Accession ledger ‘Book 1’, entry E506.

⁵⁰⁵ UKHO, Accession ledger ‘Book 1’, entry E331.

⁵⁰⁶ UKHO, Accession ledger ‘Book 1’, entry E343.

⁵⁰⁷ UKHO, Accession ledger ‘Book 1’, entry E274.

⁵⁰⁸ UKHO, Accession ledger ‘Book 1’, entry E297.

(William, Duke of Clarence).⁵⁰⁹ Clarence had long been interested in naval matters and as early as 1812 had shown an interest in charting,⁵¹⁰ so it is not surprising that such a wealth of maritime information found its way into the hands of the Admiralty for use in the Hydrographic Office, rather than into a public museum or library. The George III maritime collection was vast with the catalogue running to eight volumes, although some of the material was missing when it came to be transferred, or had made its way to the British Library. Nevertheless the scope was breathtaking, with charts from English, Dutch, Spanish, French, Italian, Danish, Swedish and Russian publishers (although the majority were from British publishers such as Mount and Page, and Faden) and even more nationalities of authors including German, American and Welsh, as well as manuscript material from Russian sources. Parry received the material on 21 August 1828⁵¹¹ leaving Beaufort with a wealth of material to refer to that was not readily to hand for Dalrymple or Hurd.

The George III collection was very similar to that accumulated by Dalrymple. However, Dalrymple's interests were that of an antiquarian, surveyor and chart producer, but both collections included material that was both current and of historic value. The Dalrymple material came to Hurd as a bequest, although when one considers the disappointment Dalrymple felt when asked to leave the Hydrographic Office it is surprising that he wanted anything to be given to the Admiralty.⁵¹² Dalrymple's collection was so prolific that its content drew people to use it, such as Captain Matthew Flinders, when he was compiling his manuscript for publication on his return from captivity on Mauritius. The Hydrographic Office also had the benefit of some 450 charts that Dalrymple had originally produced for the H.E.I.C., although it had to purchase the copper plates after his death.⁵¹³

Bauzá's arrival in England due to political problems in Spain was unfortunate for Spanish hydrography but quite the opposite for the British equivalent. Having a man of his calibre and resources in the circle of the Admiralty meant the data he

⁵⁰⁹ AL, MSS 96, fly leaf of the catalogue of charts of the George III Collection.

⁵¹⁰ M. Estensen, *The life of Matthew Flinders* (Crows Nest, NSW, 2003), 455.

⁵¹¹ AL, MSS 96, catalogue of charts of the George III Collection.

⁵¹² His bequest to the Admiralty was ' . . . in trust for the Publick, all my Collection of Voyages and Travels in print or manuscript, my Atlases, Charts and Maps, Views of Land and all Nautical Papers in manuscript, leaving to the Publick to make to my Heirs, Executors or Administrators such a consideration for the same as the said Commissioners for executing the Office of Lord High Admiral shall think competent' (TNA, PROB10/3854, will of Alexander Dalrymple. This quotation also appears in Cook 'Alexander Dalrymple', 22).

⁵¹³ Cook, 'Alexander Dalrymple', 206.

brought with him was made freely available to Parry. One of those circles of activity was the Royal Society, where Bauzá regularly met with fellow astronomers and enjoyed the benefit of its library.⁵¹⁴ Subsequently a great deal of data, unsurprisingly mainly of Spanish origin of areas not particularly well surveyed by British interests, came into the Hydrographic Office. Although not in the same quantity as George III's collection, or that of Dalrymple's, Bauzá's was just as valuable because of its uniqueness and benefit to current charting interests. It is also fair to state that Bauzá's own material was published in greater quantities by the Hydrographic Office than Dalrymple's because most of the latter had already been published by the H.E.I.C.. Bauzá's own surveys that he had made in New Zealand (whilst serving under Malaspina) were soon included in Admiralty charts.⁵¹⁵ A key area in which Bauzá's data was useful to British hydrographical charting concerned the accurate recording of meridian distances and geographical positions. Therefore his work in the West Indies was used to compare against the data collected by the Admiralty surveyors and a mean reading calculated. Also, when Commander Foster commanded the *Chanticleer* on a scientific cruise he was sent Bauzá's positional data of South America. Bauzá also supplied material for Captain King's and Captain Fitz Roy's surveys in South America. He contributed at least 13 sets of geographical positions, 17 charts and several other geographical reports, but equally important was the advice he was able to give Parry (and later Beaufort) based on his practical experience.⁵¹⁶

Many other charts came gratis from the H.E.I.C.'s Hydrographer, James Horsburgh, although others from this source had to be paid for, such as those in 1818 costing £16 6s 9d (for charts and Horsburgh's *East India Directory*). Hurd paid £2 7s 6d in 1819 and £69 15s 10d in 1820 to his H.E.I.C. equivalent,⁵¹⁷ with Horsburgh continuing to supply charts for both internal office use (such as the three charts in October 1826)⁵¹⁸ as well as multiples for Fleet use. Charts also came from the Danish Hydrographer, but although sent gratis they had to be transported to the Admiralty at a cost of £1 14s 10d, which was charged against the Hydrographer's account. In 1821 a

⁵¹⁴ Lamb, 'London years', 322-3. Bauzá was associated with Alexander Humboldt in 1825 using his astronomical knowledge to assist Humboldt establishing the position and size of Cuba (A. Humboldt, *Personal narrative of travels to the Equinoctial regions of the new continent, during the years 1799-1804* (London, 1829), 39-40).

⁵¹⁵ Byrne, *The Pandora survey*, 9 quotes the New Zealand survey being included on chart 1281.

⁵¹⁶ UKHO, H1260/80, David to Lamb, 31 October 1980.

⁵¹⁷ TNA, ADM17/28; BL, IOR, L/MAR/1/24.

⁵¹⁸ UKHO, Accession ledger 'Book 1', entries E335-E337.

further consignment cost £1 17s 6d in freight charges from Copenhagen and a further 4s 6d for coach hire in bringing them from the Custom House to the Admiralty. Similarly a consignment of Russian charts from Admiral Spafarieff arrived in 1823 (just before Hurd's death) through Mr Rollaston of the Foreign Office.⁵¹⁹ Such a network of international chart producers, which Hurd tapped into, laid the foundations for the mutual free exchange of data between hydrographers all over the world for decades to come. The free exchange of data also existed between the Admiralty and the Ordnance, who (for example) supplied 35 printed sheets in March 1826,⁵²⁰ which along with the cooperation with the Foreign Office showed how Hurd used his position within Government to obtain data for the Admiralty. Hurd also consulted numerous maps and surveys in the Foreign and Colonial Offices in 1816 to obtain information 'useful to the Naval Service'.⁵²¹

Croker was also involved in buying over £200 worth of French charts for the Hydrographic Office in 1818 which attracted a 6s Customs duty, but whether these were for reference use within the Hydrographic Office, or for supply to the Fleet, is not stated; two further consignments of French charts were purchased in 1819 and again in 1820. In 1818 Hurd also purchased a copy of Freycinet's atlas⁵²² *Voyage de Découvertes aux Terres Australes*, published at Paris in 1812⁵²³ that was added to the ever growing library of geographical information. He also purchased numerous maps, some of which had obvious immediate uses, such as the map of the Polar Seas purchased in 1818 for 10s 6d that coincided with the explorations being undertaken in that region. Others, such as the 'Map of the Mountains' purchased in the same year have less obvious uses; other maps were purchased of Georgia, London, the British Isles, England, India and the World.⁵²⁴ Frustratingly the numerous entries in the

⁵¹⁹ TNA, ADM17/28. Captain Leontey Spafarieff of His Russian Imperial Majesty's Navy authored *A new guide for the navigation of the Gulf of Finland* published at St Petersburg in 1813, a copy of which is held by the Admiralty Library that could have been contemporary with the supply of the charts quoted here (AL, P60 part 12).

⁵²⁰ UKHO, Accession ledger 'Book 1', entries E280-E291.

⁵²¹ TNA, ADM1/3459, Hurd to Croker, 8 May 1816.

⁵²² TNA, ADM17/28.

⁵²³ Freycinet commanded the *Causuarina* in an expedition to the Pacific, 1800 to 1814, led by Captain Nicholas Baudin, which explored the south coast of Australia. Freycinet's atlas *Voyage de découvertes aux Terres Australes . . .*, published in Paris, 1812, contains charts from the survey work carried out during the voyage (<http://www.nmm.ac.uk/server/show/conWebDoc.591/viewPage/2>, accessed 29 March 2008).

⁵²⁴ Purchases included a map of the World in 1818 (for £5), one of Georgia in 1819 (£3 3s), in 1821 Smyth's map of the British Isles 'for Office use' (£4 10s), Cary's large map of England (£3 10s), a map of India (16s), Mogg's map of London and the environs also for the office (£5 5s), and in 1822 Arrowsmith's map of Greece (£4 4s) (TNA, ADM17/28). It is important to stress that this was not an

accounts for purchases such as ‘American charts’ and ‘South American charts’ between 1818 and 1823 also do not specify whether these were for office use only or for wider supply.⁵²⁵

Data often came to the Admiralty with strings attached regarding the Admiralty’s use of the information. Anthony Robson, who had served in H.M. Brig *Emulous*, but in 1821 was serving on a merchant vessel, was one such case. He was an experienced surveyor who whilst in command of a vessel (in 1816) made a survey of the Columbia River and in 1821 approached Barrow with a proposal to purchase and publish it. The proposal was welcomed as the existing charts, especially those further to the south covering South America, were ‘on so small a scale and in many respects erroneous’, and based on Spanish surveys. Robson had been trading on the coast of Peru for two years and made a survey that was ‘laid down upon a large scale in a clear and distinct manner such as I flatter my-self has not before been attempted here’. In return for the Admiralty using his data Robson asked for £250,⁵²⁶ which was a small amount compared to the costs of running a survey vessel and sending it to collect the same data. When the charts were critically examined by Hurd (at the request of the Admiralty Board), he found that, despite containing some new information that would have been of use to naval vessels on the South American Station, the Hydrographer had already published some of the data used by Robson as his source material. Hurd was also ‘in daily expectation of receiving from the officers serving under Sir Thomas Hardy further knowledge of the western side of the American Continent’. Therefore Robson was offered a maximum of £30, or if he decided to take his chart to the private chart trade then the Lords of the Admiralty would subscribe to a certain number of copies.⁵²⁷ Robson was not alone in offering the Admiralty data in return for a monetary award.

innovation by Hurd as many maps were purchased by the Admiralty during Dalrymple’s time, such as ‘Chauchard’s map of Germany, Italy, &c’ and a map of London (TNA, ADM17/8). There were also many other purchases from booksellers, such as those from Byfield and Son of Charing Cross Road in 1819 and 1820 but whether these were for data or stationery is not specified (TNA, ADM17/28). Hurd also used Byfield for personal purchases (Library and Archives Canada, MG23-HI4 Captain Hurd’s liquidated account, c.1824).

⁵²⁵ TNA, ADM17/28.

⁵²⁶ UKHO, LP1857 Hu21, Robson to Barrow, 7 August 1821.

⁵²⁷ UKHO, LP1857 Hu21, Hurd to the Admiralty Board, 9 August 1821. Hurd’s examination found the charts to contain ‘some information useful to navigators who frequent the seas within their limits, such as plans of ports and anchorages with their several depths of water and also marking the positions and general course of the different rivers, together with the towns and settlements on and in the neighbourhood of the sea coast’. The chart was published by the Hydrographic Office in 1821, although the £30 reflects the sketchy content of Robson’s work.

Data also came more freely from serving officers. In 1828 Vice-Admiral Fleeming offered to compare a list of the Spanish charts held by Parry against those in the Hydrographical Office at Havana, to which he had access. He offered to send any wanted by Parry to England and pointed out that charts were regularly supplied to Havana from Spain.⁵²⁸ Such mass acquisition of data could only be rivalled by the use of the consular service, or the links established by Hurd with foreign Hydrographers. Franklin gave a Russian chart in 1828,⁵²⁹ which was yet another useful addition to the burgeoning amount of data that was accruing in the Hydrographic Office. As time progressed and the office became more established so the amount of unsolicited data increased.

Domestic collaboration

The most important area for data acquisition was Home Waters and the relationships with long standing data suppliers, such as Trinity House, as well as the survey department of the Ordnance Office were particularly beneficial. Other domestic suppliers included the Northern Lighthouse Board but a similar organisation for Ireland was wanting. One of the earliest tasks Hurd took in hand in 1808 was to act on information from Trinity House (obtained through the Admiralty Board), which resulted from work undertaken by the Chart Committee. Trinity House provided an extensive report on buoys and beacons in reply to Hurd's queries concerning the north coast of Kent and the adjacent channels from the North Foreland to the Isle of Sheppey.⁵³⁰ This was one of numerous exchanges of correspondence, that in 1817 saw Hurd prevented from visiting Trinity House in person to consult their records, writing for information on lights and lighthouses on the English coast from Orfordness to Cromer as a result of a request from the Danish consul.⁵³¹

⁵²⁸ UKHO, LP1857 F197, Fleeming to Parry, 15 May 1828.

⁵²⁹ UKHO, Book 1, entry E734.

⁵³⁰ The report was sent on the 17 November 1808 (TNA, ADM12/133).

⁵³¹ UKHO, LB1 f.79, Hurd to Cotton, 12 February 1817.

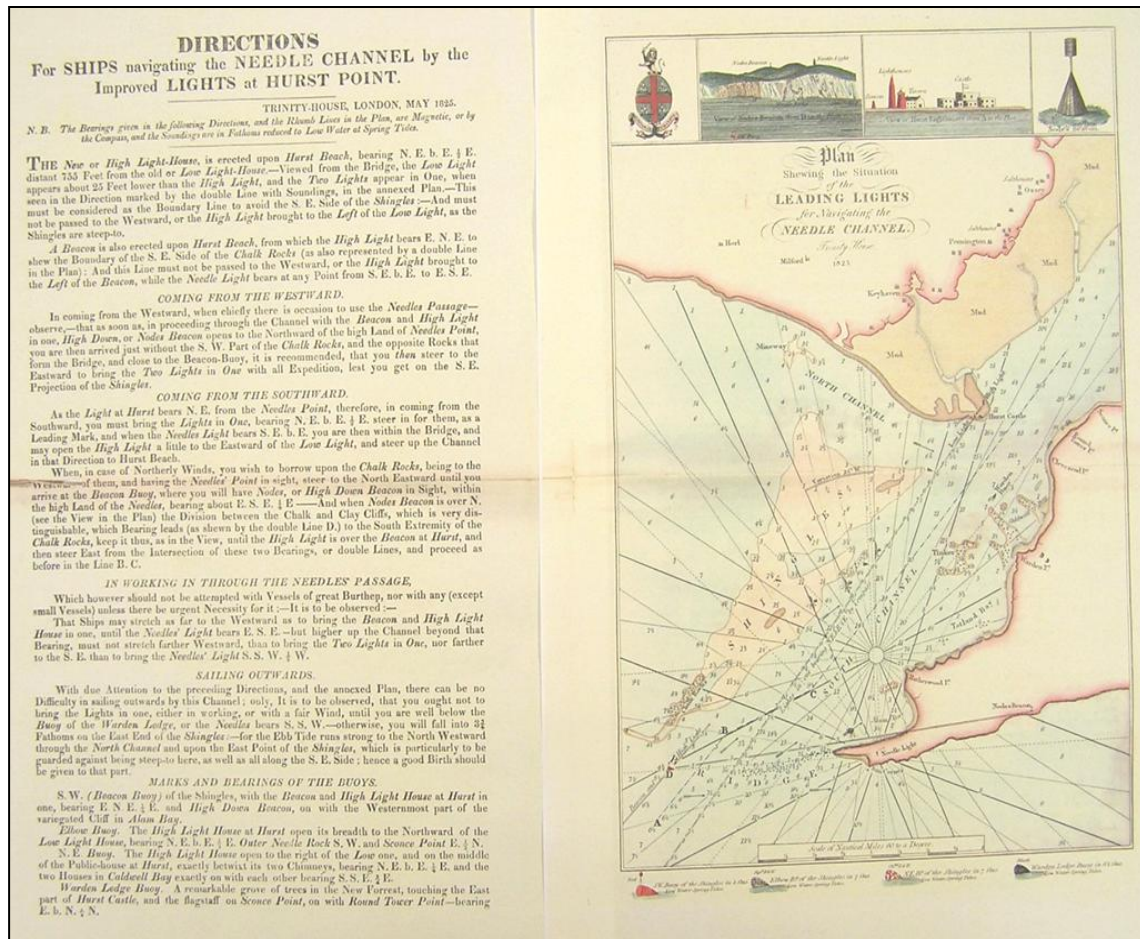


Illustration 3.5 Printed *DIRECTIONS For SHIPS navigating the NEEDLE CHANNEL by the Improved LIGHTS at HURST POINT* published by Trinity House, London, May 1825 (UKHO, MLP 23/7)

Parry also wrote to Trinity House for information in 1826 to establish whether the windmill near Warden Point, at the west end of the Isle of Wight, had been rebuilt, left as a ruin, or totally cleared away.⁵³² And again in 1828 Parry wrote for information concerning navigational aids off Selsey Bill,⁵³³ and tide times at London Bridge,⁵³⁴ which on all occasions showed the meticulous nature of both Hurd and Parry in pursuing even the smallest amounts of data. More important was the acquisition by Parry from them of sailing directions compiled by Spence and Mackenzie for the coasts between the Isle of Wight and the mainland. The purpose of obtaining those documents was, in Parry's mind, that they 'would prove of great

⁵³² UKHO, LB2 f.59, Parry to Herbert, 24 January 1826.

⁵³³ UKHO, LB2 f.138, Parry to Herbert, 8 May 1828.

⁵³⁴ UKHO, LB2 f.228, Parry to Herbert, 16 December 1828.

utility in drawing up for publication some sailing-directions now in progress in the Hydrographical Office'.⁵³⁵ The books were duly supplied with the offer that

should these books not contain the directions for the whole of the line of coast with which you are desirous of being furnished, I shall feel much pleasure in sending to you any others which are in this House.⁵³⁶

Why those Government sponsored sailing directions were not in the Admiralty is slightly surprising, as both Spence and Mackenzie were paid by the Admiralty to draw them up to complement their surveys that were in the Hydrographic Office. The mutual exchange of information that grew up between the two organisations also included the regular supply of Trinity House notices to mariners.

Ordnance Survey

The relationship the Admiralty enjoyed with the Ordnance Office,⁵³⁷ through the equivalent of their Hydrographer, was on the whole a healthy one. Both organisations had a mutual interest in accurate geographical information and they collaborated closely with each other over its acquisition, although they were not without a little controversy. Lieutenant-Colonel Richard Mudge was Hurd's counterpart and after Hurd requested the Admiralty Board to obtain copies of all the coastal mapping of England a letter was sent to the Ordnance on 1 November 1808.⁵³⁸ The Ordnance informed the Admiralty that Mudge had been instructed to supply them on the 30th⁵³⁹ and hence a flourishing and healthy relationship developed between the two offices. A relationship that Hurd (also using the Admiralty Board) used to procure a survey of the Islands of Guernsey and Jersey that was kept in the Tower of London in May 1809⁵⁴⁰ and further Ordnance maps in May 1813.⁵⁴¹ But it was not all one-way traffic as in 1823 the Admiralty Board agreed to supply the Ordnance with a set of charts of the Pacific Ocean and the coast of New Holland, that were forwarded to New South

⁵³⁵ UKHO, LB2 f.215, Parry to Herbert, 13 November 1828.

⁵³⁶ UKHO, LP1857 H513, Herbert to Parry, 17 November 1828. The following volumes were supplied, 1. The west part of the channel between the Isle of Wight and the main; 2. The east part of the channel between the Isle of Wight and the main; and, 3. A nautical description of the Owers &c.

⁵³⁷ This section concentrates on the survey aspects of the relationship rather than the supply of ordnance, such as the rockets supplied to Captain Foster in 1828 (TNA, ADM12/254, Ordnance to Admiralty Board, 15 February 1828).

⁵³⁸ TNA, ADM12/133, Hurd to Admiralty Board, 1 November 1808.

⁵³⁹ TNA, ADM12/133, Ordnance Board to Admiralty Board, 30 November 1808.

⁵⁴⁰ TNA, ADM12/139, Hurd to Admiralty Board, 2 May 1809.

⁵⁴¹ TNA, ADM12/161, Hurd to Admiralty Board, 25 May 1813. The maps were known to have been used by surveyors, such as Fitzmaurice who was supplied with one in late 1820 by Hurd (UKHO, LB1 f.342, Hurd to Fitzmaurice, 20 November 1820).

Wales.⁵⁴² A loan of a survey of Kingston, Upper Canada was made in November⁵⁴³ and charts of the Canadian Lakes in December 1827⁵⁴⁴ and January 1828.⁵⁴⁵ Parry also supplied tracings of the hydrographical survey of the coast of Glamorganshire by Commander Richard Owen, although it was not complete, asking him for a receipt when it arrived.⁵⁴⁶ All of these were supplied free of charge as an inter-government transaction setting a mutually beneficial precedent.

A much closer operational task took place with the survey of Ireland, which had been mentioned in 1815 when Croker offered the task to Beaufort.⁵⁴⁷ However, Beaufort wrote to Croker in 1816 wisely pointing out that a nautical survey should not be undertaken before the triangulation of the main points on the land had been made.⁵⁴⁸ The scheme was temporarily shelved until June 1819 when it came to the attention of the Admiralty Board and the Hydrographer, when Captain Martin White was informed by them that it would be undertaken when the survey of Great Britain had been completed.⁵⁴⁹ It was raised again in May 1823 by the Ordnance⁵⁵⁰ and in 1827 Commander William Mudge R.N. (a relation of Colonel Mudge), was sent to survey the Irish coast after volunteering for those duties in April,⁵⁵¹ as well as pointing out to the Admiralty Board the advantages of co-operating with the Ordnance.⁵⁵² Commander Mudge received further instructions in March 1828, when he was assisted by Lieutenant Frazer, possibly working in hired boats with the

⁵⁴² TNA, ADM12/204, Ordnance Board to the Admiralty Board, 11 April 1823.

⁵⁴³ TNA, ADM12/246, Ordnance Board to Admiralty Board, 5 November 1827.

⁵⁴⁴ TNA, ADM12/246, Ordnance Board to Admiralty Board, 21 December 1827.

⁵⁴⁵ TNA, ADM12/254, Ordnance Board to Admiralty Board, 31 January 1828.

⁵⁴⁶ UKHO, LB2 f. 291, Parry to Colby, 7 April 1829.

⁵⁴⁷ For the background see Croker's evidence in *Report from the select committee on the survey and valuation of Ireland* (London, 1824), 35-42; T.C. Hansard, *The parliamentary debates from the year 1803 to the present time: forming a continuation of the work entitled "The parliamentary history of England from the earliest period to the year 1803" published under the superintendence of T.C. Hansard vol. xl comprising the period from the third day of May, to the thirteenth day of July, 1819* (London, 1819), 804-6; J.H. Andrews, *A paper landscape. The Ordnance Survey in nineteenth-century Ireland* (Dublin, 2001), 1-33.

⁵⁴⁸ Friendly, *Beaufort*, 228. Beaufort was well aware of the scope of topographic mapping of Ireland as his father (Revd Daniel Augustus Beaufort, 1739-1821) had produced *A new Map of Ireland - Civil and Ecclesiastical* and a *Memoir of a map of Ireland ... with a complete index to the map*, marking all the Protestant and none of the Catholic churches, in 1792 (http://www.pgileirdata.org/html/pgil_datasets/authors/b/Beaufort,DA/life.htm, accessed 26 July 2009).

⁵⁴⁹ TNA, ADM12/193, White to the Admiralty Board, 2 June 1819; *ibid*, Admiralty Board to White, 26 June 1819.

⁵⁵⁰ TNA, ADM12/204, Ordnance Board to the Admiralty Board, 20 May 1823.

⁵⁵¹ TNA, ADM12/246, William Mudge to the Admiralty Board, 7 April 1826. Two years later he was stationed at the Ordnance Survey Office, Phoenix Park, Dublin working closely with the Ordnance (Dawson, *Memoirs*, 123).

⁵⁵² TNA, ADM12/246, Mudge to the Admiralty Board, 21 June 1827.

Ordnance officers.⁵⁵³ The Hydrographic Office also supported the survey of Ireland by loaning White's survey from Carlingford to Lough Larne (in September 1827),⁵⁵⁴ at a time when Parry and Major Thomas Colby were working closely together on strategic deployments to complete the survey of Ireland.⁵⁵⁵

The planning for the survey of Ireland by the Hydrographer shows how detailed the plans were and how close an interest the Board took in hydrographic matters. Captain Portlock, of the Royal Engineers, wrote to Parry from the Ordnance Map Office on 21 February 1828, and two days later Parry wrote to the Admiralty Board showing the progress that had been made. He explained that Colby thought that naval surveyors 'should be employed on the whole of the northern part of Ireland, a great part of which is, and the rest will soon be, completed by the Ordnance'. Parry agreed and thought it could be achieved economically because the naval surveyors could use the Ordnance's survey marks that would save time by not having to make their own. Consequently Parry was verbally directed by Cockburn to prepare an estimate of how long the survey would take. Parry prepared a detailed estimate including the number of men, boats, amount of area to be surveyed (divided into yearly coverage), costs of wages, lodging, boat hire, carrying the instruments, leads, lines, flags and staves. He also pointed out to the Board how by adopting his calculations it would be one fifth cheaper than using a survey vessel, such as the *Shamrock*. Parry's suggestion was accepted and the orders to the surveyors sent out.⁵⁵⁶

However, it was inevitable that as new hydrographic surveys were being compared against the work of the Ordnance Survey there would be discrepancies. Such as the difference raised by Hurd in 1811 over the position of the Smalls lighthouse and Gresholm Isle, when Lieutenant-Colonel Mudge was keen that the errors were either proved wrong, or 'these errata put to rights'.⁵⁵⁷ Further differences were brought to the Hydrographer's attention by Fitzmaurice's survey of Lundy in

⁵⁵³ TNA, ADM12/254, Admiralty Board to Mudge, 11 March 1828. When Commander Mudge died in 1837 such was the camaraderie between the two services that his funeral at Howth was attended by both officers from the Ordnance and the Royal Navy (Dawson, *Memoirs*, 123). It is not explicitly clear that the Ordnance officers were actually in the boats at the same time as the Naval surveyors.

⁵⁵⁴ TNA, ADM12/246, 1 September 1827. This was returned in July 1828 (TNA, ADM12/254, Ordnance Board to Admiralty Board, 26 July 1828).

⁵⁵⁵ UKHO, MB1 f.150. For a biography of Colby see J.E. Portlock, *Memoir of the life of Major-General Colby, R.E., LL.D., F.R.S.L. & E., F.R.A.S., F.G.S., M.R.I.A., etc. together with a sketch of the origin and progress of the Ordnance Survey of Great Britain and Ireland; a work with which General Colby was connected for forty-five years* (London, 1869). Also, E. Baigent, 'Colby, Thomas Frederick (1784–1852)', *ODNB* [accessed 29 Aug 2009].

⁵⁵⁶ UKHO, MB1 fos 150-3, Parry to the Admiralty Board, 25 February 1828.

⁵⁵⁷ Portlock, *Memoir of the life of Major-General Colby*, 38-9.

1820, by which time Hurd was dealing with Colby,⁵⁵⁸ and more publicly with the discrepancies over the Plymouth Breakwater in 1821.⁵⁵⁹ In 1827 there was a further disagreement over White's survey of the Bristol Channel and that by the Ordnance Survey concerning who had recorded the coastline correctly,⁵⁶⁰ particularly Barry Island and the River Ebwy.⁵⁶¹ The matter came to the attention of the Admiralty Board who consulted John Walker senior over the difference. Walker advised Barrow that it was ' . . . impossible to determine in this office the differences between these two contending gentlemen Coln. Colby and Captn White', hoping that White's work would resolve the issue. Colby had admitted that the work by White was more detailed than that of the Ordnance surveyors, but Walker knew a comparison would probably not resolve the matter. Walker therefore advised Barrow, if he was not aware of it already, that the dispute was

much to be regretted as it will no doubt tend to destroy much of that confidence and unanimity, which ought to subsist between the two services acting in concert, and render them less effectual and efficient than they ought to be for the public good.⁵⁶²

At the same time Walker was advising Barrow, Colby had three maps drawn up by Captain Robe R.E. to show the differences,⁵⁶³ but it is unclear what, or if, anything came of it. Fortunately that episode did not adversely affect relationships as in the following year Captain Owen and Lieutenant Denham were sent orders to complete the soundings and dangers off the Welsh coast for the use of the Ordnance Survey; they were also supplied with documents by the 'Engineer Officer' at the Tower to help them in that task.⁵⁶⁴ The differences did not stop discussions between the Admiralty Board and Colby shortly afterwards.⁵⁶⁵

The close collaboration between the Ordnance and the Admiralty departments of government extended a great deal further than just the mutual exchange of data. In 1822 the senior officer at Leith ordered the *Bat* and *Earl Moira* hired cutters to be used to assist Colby on his trigonometrical survey of the Western Islands.⁵⁶⁶ And in

⁵⁵⁸ TNA, ADM12/198, Fitzmaurice to the Admiralty Board, 31 August 1820.

⁵⁵⁹ UKHO, LB1 fos 368-9, Hurd to White, 5 February 1821.

⁵⁶⁰ TNA, ADM12/246, 5 July 1827.

⁵⁶¹ TNA, ADM12/246, White to the Admiralty Board, 21 April 1827.

⁵⁶² UKHO, MLP77, copy of a letter from Walker to Barrow, 26 April [no year stated].

⁵⁶³ TNA, MPH 1/511/1-3.

⁵⁶⁴ TNA, ADM12/254, Admiralty Board to Owen, 15 September 1828.

⁵⁶⁵ TNA, ADM12/254, Admiralty Board to the Ordnance Board, 26 September 1828.

⁵⁶⁶ TNA, ADM12/210, 7 May 1822.

1823 Hurd was in correspondence with Colby over the issues surrounding the sale and distribution of Admiralty charts to the public.⁵⁶⁷ Colby even recommended one man as an assistant surveyor, whom the Admiralty Board appointed to the *Kangaroo*, such was the influence of Colby by that time.⁵⁶⁸ In 1824 and again in August 1827 the Admiralty Board proposed to the Ordnance Board the possibility of the latter providing the coastline from their surveys. The Hydrographic Office would then ‘put in such parts as might be required for nautical purpose, and return it to them for publication’.⁵⁶⁹ This was an important moment in United Kingdom mapping as this became the standard way of using Ordnance data on charts and surveys for the following 180 years. But of equal importance was the work naval men undertook with their Ordnance counterparts.

Hurd was of the opinion that the mapping of the coastline could be ‘better performed by the Ordnance surveyors’,⁵⁷⁰ thus any duplication would be avoided saving valuable time and money that could then be used for other deployments. Subsequently naval and army personnel working alongside each other involved many officers over many years. In 1821 Lieutenant Hewett had to accommodate Ordnance officers aboard the *Protector*, although they were not part of the ship’s complement⁵⁷¹ only supernumeraries⁵⁷² and in 1825⁵⁷³ and 1826 White was in ‘cooperation with the Ordnance’,⁵⁷⁴ sending that Board a statement of his progress for the year in November.⁵⁷⁵ White worked alongside the Ordnance surveyors again in August 1827, when he had to make a weekly report to the Admiralty.⁵⁷⁶ George Thomas, Admiralty Surveyor and master of the *Investigator*, reported in 1826 that all the principal points of his survey had already been fixed by the Ordnance surveyors.⁵⁷⁷ In January 1828 Parry was able to state to his Danish equivalent how Thomas had been employed with the Ordnance surveyors on the trigonometrical survey, having supplied numerous positions of important features in the Orkneys and Shetlands as well as completing

⁵⁶⁷ TNA, ADM12/204, report by Hurd, undated but before May 1823; TNA, ADM1/3462, Colby to Croker, 5 March 1823. For a detailed analysis of chart selling see Chapter 8.

⁵⁶⁸ TNA, ADM12/246, Colby to Admiralty Board, 20 December 1827.

⁵⁶⁹ TNA, ADM1/3463, Admiralty Board to the Ordnance Board, 26 March 1824; TNA, ADM12/246, Admiralty Board to the Ordnance Board, 28 August 1827.

⁵⁷⁰ UKHO, LB1 f.428 Hurd to Fitzmaurice, 21 August 1821.

⁵⁷¹ TNA, ADM12/204, Hewett to the Admiralty Board, 21 February 1821.

⁵⁷² TNA, ADM12/204, Hewett to the Admiralty Board, 28 May 1821.

⁵⁷³ UKHO, MB1 fos 65-6, Report of Surveys, 1826.

⁵⁷⁴ TNA, ADM12/239, White to the Admiralty Board, 3 September 1826.

⁵⁷⁵ TNA, ADM12/239, White to the Admiralty Board, 8 November 1826.

⁵⁷⁶ TNA, ADM12/246, Admiralty Board to White, 21 August 1827.

⁵⁷⁷ UKHO, MB1 f.69, Report of Surveys, 1826.

one of the triangles.⁵⁷⁸ Such was the friendship built up between Thomas and Colby (during their work in 1817) that when Thomas was involved in a lawsuit, Colby offered his wife a gift of £500.⁵⁷⁹

Despite such close collaboration, the Ordnance Survey were years ahead of their naval equivalents, in both their planning and commercialism. Their survey of the Scottish coasts was evidence of this, when in 1822 Hurd planned to wait until they had finished surveying so he could use their triangulation to ‘proceed and commence . . . operations on these unknown coasts’.⁵⁸⁰ This thinking was carried on into Parry’s time, when Bullock was implicitly instructed to use the Ordnance Survey mapping for the banks of the River Thames.⁵⁸¹ In addition to this the Ordnance’s sale of maps was well established by the time the Admiralty Board finally agreed to follow suit and start selling charts in 1821. It was so established that Hurd was able to consult Colby over the problems they had faced with copyright infringements by the London map dealers. Such was the level of correspondence between the two men that the Superintendent of the Trigonometrical Survey requested the Admiralty Board to consider whether he could communicate directly with the Hydrographic Office; this was instead of having to go through the Ordnance Board and the Admiralty Board, thus making a considerable saving in time and resources. In March 1828 the Lord High Admiral, in his capacity as head of the Admiralty Board, ordered this to happen, being yet another example of Clarence’s support of more efficient methods of administration.⁵⁸² The close collaboration between the two offices that lasted for decades to come was formed at that time.⁵⁸³

Data receipt and archiving⁵⁸⁴

The courteousness of Admiralty administration meant that all data was either acknowledged by the clerks to the Admiralty Board, by the Hydrographer, or whoever was deputising for him during his absences. After the correspondence had been

⁵⁷⁸ UKHO, LB2 f.95, Parry to the Danish Hydrographer, 26 January 1828.

⁵⁷⁹ Robinson, *Marine cartography*, 131.

⁵⁸⁰ UKHO, LB1 f.487, Hurd to the Admiralty Board, 29 April 1822.

⁵⁸¹ UKHO, MB1 f.136, Parry to Bullock, 23 January 1828.

⁵⁸² TNA, ADM12/254, Admiralty Board to the Ordnance Board, 3 March 1828; UKHO, MB1 f.169.

⁵⁸³ Day, *Hydrographic Service*, 59, 75, 121, 126, 135.

⁵⁸⁴ An outline of the history of archiving in the Hydrographic Office can be found in Pascoe’s *The story of the Curator*, mainly pages 1-13 for this period. In this he quotes many examples of how groups of documents were handled by Becher and where they were located. Pascoe goes into a great deal of detail which has not been included here but unfortunately he did not always directly quote his sources within the text.

digested and marked accordingly, the cartographic material was usually passed to the Hydrographer where it was further annotated and stored.⁵⁸⁵ Prior to 1808 Dalrymple had made good in-roads towards a catalogue of all the printed and manuscript hydrographic documents within the Admiralty. By 1800 he had identified all the single sheet printed charts (*i.e.* those not bound into atlases) and kept his inventory up-to-date until 1802, after which he made no further additions. It is most likely that because of the production of new charts after 1800 and his failing health, that he had little time or energy to put into keeping this list up-to-date, or he simply failed to acquire any new single sheet charts for use in the Hydrographic Office until prompted to do so by the Chart Committee in 1807. His catalogue of published charts then held in the Hydrographic Office listed 284 charts and maps divided into 12 geographical regions with details of their size, scale, when surveyed and by whom and the year and name of the publisher.⁵⁸⁶ As this document shows multiple copies of charts held in the office it was probably also used as a planning document for chart supply.

The arrangement of the charts was not ideal (despite new premises being granted in 1809),⁵⁸⁷ but as the Admiralty paid £500 a year in 1810 to the Keeper of the Records and Papers,⁵⁸⁸ so the chance of the Hydrographer receiving any extra money at that time for similar duties was pretty slim. Hurd was described as being ‘entrusted with the custody and care of all Plans and Charts deposited in the Admiralty, belonging to the Public, pursuant to His Majesty’s Order in Council . . .’⁵⁸⁹ However, although he was in custody of them there appears to have been little advances into their sorting, classification, labelling, indexing and storage for efficient retrieval. By 1816 Hurd had devised an efficient method for the supply of the printed charts produced in the Office but progress on the valuable manuscripts was a different matter, although by this time new items were being dated and stamped on receipt.⁵⁹⁰

⁵⁸⁵ Before Becher’s appointment the duties fell to the office clerk (Nares), although even Hurd was receipting items as late as 1820, which also passed through Nares’ hands (AL, MSS165).

⁵⁸⁶ UKHO, MLP183/1.

⁵⁸⁷ Order in Council, 7 October 1809, 27 June 1810.

⁵⁸⁸ House of Commons, *The ordinary estimate of His Majesty’s Navy for the year 1810* (London, 1810),

1.

⁵⁸⁹ House of Commons, *The ordinary estimate of His Majesty’s Navy for the year 1810* (London, 1810),

2.

⁵⁹⁰ UKHO, 135 shelf Pu*.

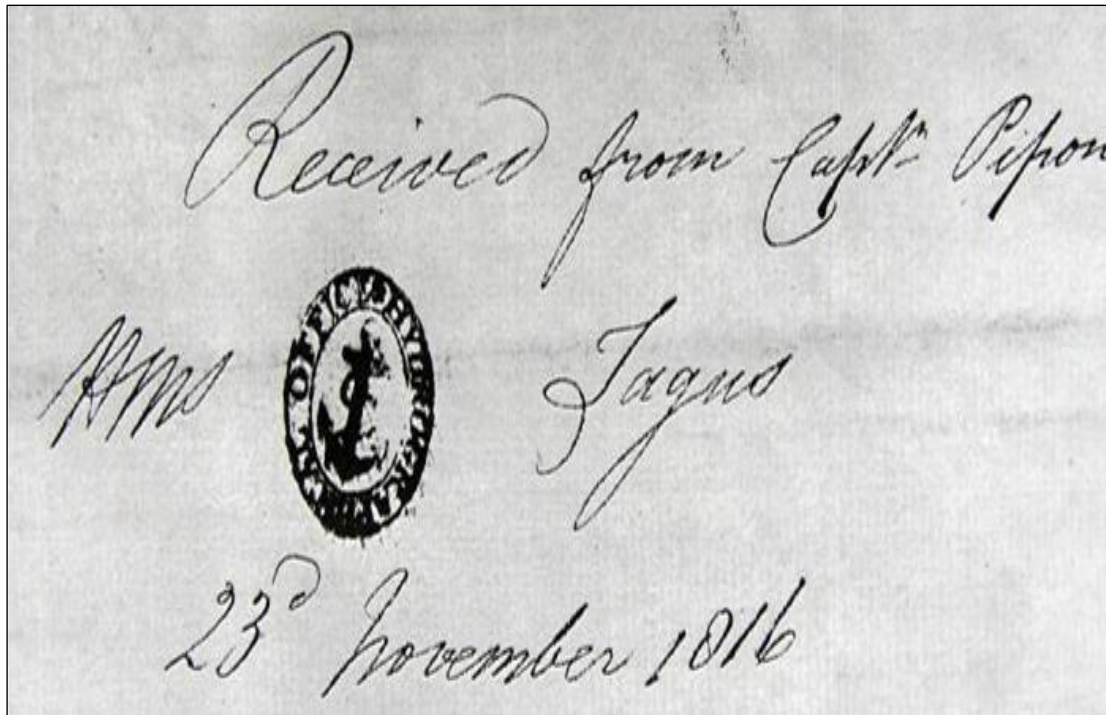


Illustration 3.6 An example of the receipting of surveys (by William Nares) and the hand stamp applied in the 'Hydrographical Office' in 1816 (UKHO, 135 shelf Pu*)

In 1819 the Admiralty Board instructed Dyer to make a report on the progress Hurd had made 'relative to a Classification and arrangement of the numerous Maps, Charts and other valuable documents in the Hydrographical department'. This had been a matter of some concern to the Board since at least 1810, during which time several minutes had been written trying to resolve the situation. The reason for the lack of progress since 1812 had been due to the pressures of chart supply during war time, which had taken precedence over almost everything else. In addition to which a lack of staff, as well as insufficient space to store the documents in, did not help. Hurd described the manuscript collections as being an 'infinite variety of materials composing our stock of maritime information', but without sufficient room no proper examination, extraction and publication schedule could be drawn up, let alone executed. A brief glimmer of hope occurred shortly after the Peace of 1815 when the Model Room in the Admiralty was 'destined to Hydrographical uses', but this period of breathing space for Hurd was short lived. Any progress that was made in the arrangement of the materials was put to a stop when the room was commandeered for other uses by the Admiralty Board. The documents were returned to their previous

locations⁵⁹¹ and probably remained there until Becher started working on them in 1823.

Matters had to be taken in hand and action taken. The Board drew up a lengthy minute in which ‘the arrangement and classification of the information which may exist in the office’ was to be handled, with clerks from the Record Branch to be used to arrange the hydrographic materials.⁵⁹² That order did not stop the Hydrographer having access to the materials and bringing them into order would surely have been of benefit to him. How far the clerks got with this arrangement is not known but in 1823 Becher was appointed to arrange and catalogue the documents within the Hydrographic Office. That was one of the best moves the Admiralty Board made towards the efficient running of the Office and the supply of data to the Navy since Dalrymple’s dismissal and Hurd’s appointment. Becher ended up not only cataloguing the hydrographic materials but sorting, classifying, labelling, indexing and storing them for efficient retrieval.

Becher clearly thought through the task in hand and using Croker’s geographical coding classification⁵⁹³ devised a simple but highly effective archiving and retrieval system. He also left notes and instructions on how his system worked, and his idea for keeping a ledger recording the loan of documents from the ‘archive’⁵⁹⁴ although possibly introduced much later was essential for keeping track of valuable manuscript documents. One area of criticism that could be brought against his system was his decision to include in his second accession ledger, or ‘Book 1’,

⁵⁹¹ TNA, ADM1/3461; UKHO, LB1 fos 247-8, Hurd to John Wilson Croker Esquire, 18 September 1819.

⁵⁹² The order principally stated ‘. . . their Lordships are of opinion that the inappropriate charts themselves and the various materials and documents relative to hydrography are part of the official records and ought to be made subject to the same principles of custody and arrangement what have been so eminently successful with regard to the other records of the department, the Secretary is therefore to take proper measures that the Chief and other clerks in the Record Branch shall take the charge of arranging the hydrographical materials in the principles already directed in several minutes of the Secretary and shall be responsible for the care and good orders of these papers’ (TNA, ADM1/3461, Admiralty Board minute 16 November 1819).

⁵⁹³ Pascoe, *Curator*, 7. The introduction to the geographical index ledger (most likely written in 1826), gives the best account of the contemporary working of Becher’s system ‘. . . The letters and figures in red ink which appear against the title of each, are those by which they are always to be found, being inserted generally on the right hand lower corner of the chart. The sections in the general classification have been redivided into smaller portions, as affording dispatch in finding a chart, by requiring a smaller number to be looked over, where it may be deposited. The figures over and against those in red ink express the portion of the section which contains the chart and are inserted on it with the other mark to preserve order, as by this means, after use there will be no difficulty in replacing it. When an M is annexed to the latter figures, it signifies the document to be in the Model room press, when not it will be found in that of the Hydrographical room’ (UKHO, Ledger ‘Book B’, introduction).

⁵⁹⁴ UKHO, Register of documents on loan, 1845-54.

details of Owen's Africa surveys which had already been catalogued. This meant that in the first folios of Book 1 can be found surveys arranged by their date of receipt as well as both geographically and thematically, and not in the correct alphanumeric sequence.⁵⁹⁵ Why he decided to enter some of the surveys again is not clear, but it might well have been due to the extra resources given to the Hydrographer to bring Owen's documents into print in 1828. Perhaps Becher thought it would be far more organised if he had a record of the surveys arranged geographically so the survey fair sheets could be engraved and published in batches, or so he could check that there were no missing sheets. He also made an error with the sequence of numbers following B262⁵⁹⁶ and either omitted or duplicated entries at E527, E582, E615, E638-E667, E709 and E715.⁵⁹⁷ Nevertheless those were minor hiccups in an otherwise efficient administration.

When Becher had completed his work the catalogues were sent to the Board for approval.⁵⁹⁸ Even after Becher had been through the mass of material and sorted and labelled the majority of it, items still turned up that needed labelling and placing in the right location, such as an 'old' chart by Captain Cook of the River Thames and Mercury Bay, New Zealand.⁵⁹⁹ However, not all charts were labelled and Pascoe cites the original manuscripts that were obtained by Hurd from Des Barres that were never numbered, only being placed on the appropriate shelf with other documents from the east coast of North America.⁶⁰⁰ But by this time Becher was ready to receive new material and record in more detail its provenance. He arranged his printed ledger book into seven columns so that the first thing to be recorded when the next document arrived would be the next consecutive 'office mark', giving order to his system. Following this, columns for the date the map, chart or plan was drawn and the date it was received in the office would be filled in before moving on to recording the 'nature of the drawing'; this column was useful because if someone identified an item in the ledger it would give them an idea of what type of document it was they were looking for, either a chart, plan, tracing, survey, sketch, trigonometrical survey, map or combination of the former examples. Following this the next columns showed who was the author of the work, the location of the document in the office and finally the

⁵⁹⁵ UKHO, Receipt ledger book 1, fos 1-17.

⁵⁹⁶ Pascoe, *Curator*, 8.

⁵⁹⁷ UKHO, Receipt ledger book 1, fos 1-41.

⁵⁹⁸ Pascoe, *Curator*, 13.

⁵⁹⁹ UKHO, Accession ledger 1, entry E320.

⁶⁰⁰ Pascoe, *Curator*, 14.

geographical description of the item,⁶⁰¹ such as ‘The Bermuda Islands. Purchased by order of Sir G. Cockburn’.⁶⁰² Thus the pattern was set for recording new cartographic information received in the office, which for survey data remained virtually unchanged until the twenty-first century showing the practicalities of Becher’s administration.

By the time Becher introduced the recording of the date data was received, he had listed some 4318 entries in his ledgers, many containing multiple items. Those documents were now more accessible than at any other time since they arrived in the Admiralty. Becher’s work was truly a monumental piece of administration that enabled the more efficient use of data for a variety of purposes, which fitted in well with Croker’s ethos of achieving objectives in the quickest and least expensive way possible, as well as Clarence’s and Parry’s drive for improvements.

Conclusion

The period 1808 to 1829 concerning the administration of data acquisition and its subsequent storage was one of extremes. Without a doubt survey planning took up much less time than any other subject for the Hydrographer in 1808 during his first year,⁶⁰³ but as time progressed it was a subject that took up increasing amounts of time.⁶⁰⁴ Data acquisition within Home Waters was a constant undertaking by surveyors at sea with the surveys planned by Hurd and Parry forming a vital benchmark for Beaufort to base his planning work upon.⁶⁰⁵ Similarly the numbers of surveys being administered vastly grew from 2 in 1808 to 15 in 1829, by which time the system had been well and truly tried and tested. Those surveys fitted in well with Britain’s foreign policy of expansion, with geographical knowledge being key to its control.⁶⁰⁶

Although the Admiralty had given more resources to their objective of improving the hydrographic knowledge available to them, by increasing the numbers of surveyors afloat, there was also an increasing need to keep a close eye on them. In

⁶⁰¹ UKHO, Accession ledger ‘Book 1’.

⁶⁰² UKHO, Accession ledger ‘Book 1’, entry B300.

⁶⁰³ TNA, ADM1/3523.

⁶⁰⁴ UKHO, LB1.

⁶⁰⁵ Of the 21 principal surveys identified by Ritchie of Home Waters in the ‘Beaufort era’ over a quarter of them actually had their origins in the Hurd Parry era (Ritchie, *Admiralty chart*, 260).

⁶⁰⁶ C.J. Bartlett, *Defence and diplomacy. Britain and the great powers 1815-1914* (Manchester, 1993), 20.

November 1819 the Board instructed Hurd to ‘make a quarterly report of the proceedings of the several surveyors and survey vessels as far as they may have reach’d him’.⁶⁰⁷ Although this was not continued, by 1828 the ethos of control and administration had swung significantly away from the Admiralty Board and into the hands of the Hydrographer. This was due to the administration under the Lord High Admiral, which undoubtedly made it easier for the Hydrographer to administer the data acquisition function for the Admiralty. In administrative terms the receipt of data in 1808 was less than satisfactory, but by 1829 Becher had put in place a slick and efficient system that remained virtually unchanged in principle for 180 years. Such an efficient system of receipt was mirrored by that of planning and acquisition, also thanks to Becher, who with Parry compiled a definitive reference work from which Beaufort in 1829 could easily find those areas which needed surveying next.⁶⁰⁸

The achievement of the Admiralty in increasing the number of surveys afloat and the greater number of data suppliers, was in the long term one of the spoils of war. With the capacity to obtain more data having been built up in Hurd’s time and capitalised upon by Parry, the acquisition of new surveys was flourishing by the time Beaufort took over. In addition to this were a growing number of civilian contacts⁶⁰⁹ who supplied varying amounts of geographical information, which ultimately turned the Hydrographic Office archive into a repository of some standing. All of that capacity building was fundamentally laid down during both Hurd’s and Parry’s time as Hydrographer (with support from the Admiralty Board), which allowed the Admiralty’s hydrographic capability to expand.

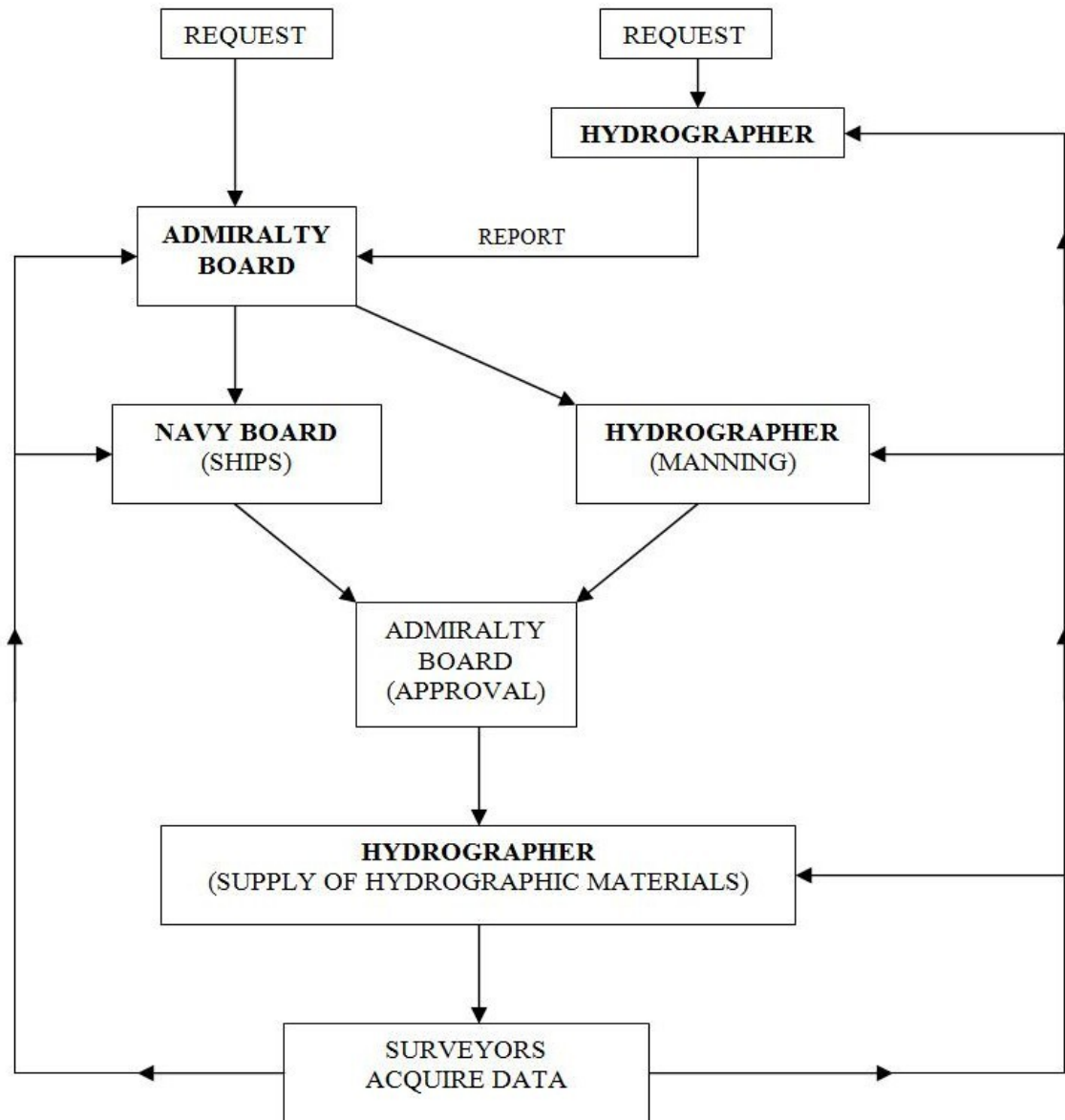
Figure 3.2 Acquisition of Royal Navy hydrographic data

⁶⁰⁷ TNA, ADM1/3461, Admiralty Board minute 16 November 1819. The Admiralty Digests record that Hurd sent such a report on 14 July 1820 (TNA, ADM12/198) but this has not survived and no other reports appear to have been recorded in the digests.

⁶⁰⁸ UKHO, MLP183/3.

⁶⁰⁹ One such acquisition was given by Mr Henry Salt, after returning from his mission to Abyssinia, presented a Portuguese chart of ‘Mosambique Harbour to Cape Delgado’ to the Admiralty that was left with Hurd in 1812 when Salt promised to send him a further chart he was working on (H. Salt, *A voyage to Abyssinia, and travels into the interior of that country, executed under the orders of the British Government, in the years 1809 and 1810* (Philadelphia, 1816), 76; TNA, ADM12/155).

Items in **bold** show the decision making part of the planning process



Chapter 4

Science and Technology

During the period 1808 to 1829 there were three fundamental strands of hydrographic activity involving the world of science. First, the science of recording hydrographic data, which involved navigation, surveying, mathematics and astronomy.⁶¹⁰ Secondly, the involvement of scientists (as opposed to surveyors) on voyages of hydrographic exploration, who mainly recorded non-hydrographic data, such as natural history specimens. Thirdly, the scientific element of new technological inventions and the trials of those ideas involving the Hydrographer and hydrographic surveyors using their professional skills. All three of these subjects and their relevance to the Admiralty through the work of the Hydrographic Service are examined in this chapter.

There was no specific written agenda for the Admiralty to build up a worldwide coverage of scientific data, after all if it had the capacity to undertake such a task then what would they have done with the results? In 1812 the Admiralty viewed hydrography more as a contributor to ‘the general advancement of science’ through the collection of navigational information, rather than a leader in the field of science.⁶¹¹ What the Admiralty did have was the capacity to offer the scientific world the opportunity, by letting scientists travel on board their ships, to collect scientific data during voyages of surveying and exploration. It was also beneficial to the scientific world to be able to use hydrographic information, in the form of charts, sailing directions and basic tidal information.⁶¹² Requesting details of tides to be collected on voyages had become commonplace since the days of Byron, Carteret and Wallis⁶¹³ and was reinforced by Dalrymple in 1804.⁶¹⁴ After 1815, following the revival of physical sciences in Britain, that capacity expanded to such an extent that Smyth wrote publicly in 1829 that ‘as much has been done in the advancement of

⁶¹⁰ For the role of scientific servicemen in the Navy see Miller, ‘The Royal Society . . .’, 120-43 and Deacon, *Scientists and the sea*. However, Miller did not use the records at the UKHO in his thesis.

⁶¹¹ TNA, ADM1/5122/2, Admiralty order dated 20 May 1812.

⁶¹² SRO, GD51/2/517, W. Owen to Melville, 4 May 1814.

⁶¹³ Deacon, *Scientists and the sea*, 185. See Chapter 11 of her work for an account of early 19th century oceanography, which includes both civilian and military activity.

⁶¹⁴ Hydrographic Office, [printed instructions on the form of remark books] (London, 1804), 3-4. The instructions issued to all ships also requested information (amongst other things) on currents.

hydrographical knowledge as could reasonably be expected'.⁶¹⁵ Smyth's view was supported by Beaufort,⁶¹⁶ but what, if any, was the involvement with science and hydrography between 1808 and 1829 to arrive at such a position?

One key post-Peace scientific venture was the search for a north-west passage (backed by Barrow and led by Parry) in 1819, which threw science, the Royal Navy and the magnetic crusade into the public gaze; subsequently having Parry as Hydrographer was certainly advantageous to scientific exploration. Barrow's control of Arctic exploration and closeness to Parry can be seen in the preparations for Parry's 1827 voyage. Parry (whilst Hydrographer) wrote to Barrow in June 1826 replying to questions that had been asked concerning the specific objects of Parry's proposal. In that letter he pointed out and justified the advantages to science through such a voyage, detailing the different types of data he intended collecting for the benefit of the nation, also asking members of the Royal Society to add any other types to his list. In that letter he summed up the whole ethos of exploration, the advantages to Great Britain and to science.⁶¹⁷

Those objectives were ideal and had been so for many years, therefore voyages of discovery were a medium for scientists and surveyors to go and collect data safe in the knowledge that they had the protection of the Royal Navy. Behind the push for such voyages was Banks, whose involvement with the Royal Society ensured the interests of the scientific world (predominantly based in England) was always high on the agenda for the Admiralty Board. And it was the Admiralty Board who held the key to assigning men and materials for scientific ventures, as they often did. One surveyor in 1824 referred to the Board as having a 'laudable zeal for promoting nautical science'.⁶¹⁸ Such voyages had since that of Captain Cook's *Endeavour*

⁶¹⁵ D.P. Miller, 'The Revival of the Physical Sciences in Britain, 1815-1840', *Osiris* 2 (1986) 107-34; A.W.A. Pollock, *The United Service Journal and naval and military magazine* part I (London, 1829), 81; American Philosophical Society, BSm98, Beaufort to Smyth, 4 February 1829.

⁶¹⁶ American Philosophical Society, BSm98, Beaufort to Smyth, 4 February 1829.

⁶¹⁷ The full quote reads 'Independently, indeed of any such specific objects, it would surely, in the present instance, be highly creditable to this country to make an attempt, having for its general object the improvement of science and the acquirement of useful knowledge, and of a kind altogether unique in the history of discovery. Even the very spirit of enterprize which such undertakings keep alive, is of no inconsiderable service, in a national point of view, to a country such as this. And, must it not tend to raise Great Britain in the eyes of every civilised nation, that, while a spot upon the earth remains untrodden by the foot of man, her subjects should be employed in exploring it – that, with that liberal and enlightened policy which disregards the prospect of immediate and elusive benefit, her flag should be the first to wave over the most remote and hitherto inaccessible portions of the globe, from the equator to either pole?' (Royal Society, DM3 f.122, Parry to Barrow, 10 June 1826).

⁶¹⁸ W.H. Smyth, *Memoir descriptive of the resources, inhabitants, and hydrography, of Sicily and its islands, interspersed with antiquarian and other notices* (London, 1824), xiii.

‘created a tradition of scientific research with naval exploration’,⁶¹⁹ a tradition which put scientific advancement before war. So in 1825 the Admiralty Board was able to instruct Beechey on his voyage to the Pacific that he was ‘. . . sent out only for the purpose of discovery and science, and . . . so employed as excluded from the operations of war’.⁶²⁰ This summed up the international view of the benefit of science, outside of any hostilities, in which the Admiralty’s Hydrographer and surveyors were major players.

Scientific officers

It is difficult to state just how much pure scientific training the men who specialised in surveying received prior to joining the Navy, but it is known that hydrography and astronomy were ‘little encouraged or cultivated in the British Navy’ at the start of the nineteenth century.⁶²¹ Hore quotes an effort in 1826 to offer young officers on half pay the chance to obtain a scientific education and there were numerous colleges and academies that taught science, in one form or another.⁶²² There were also opportunities available once they found the right ship, if it was under the command of men of scientific leanings (such as Captain John Knight or Captain Smyth) who specialised in more than just hydrography. On voyages of exploration sailors would have come into contact with naturalists, landscape and figure draughtsmen, botanic draughtsmen, miners, botanists and gardeners,⁶²³ who could have educated any number in their field of expertise. Here men who had an education in a branch of science connected with navigation⁶²⁴ would have had some affinity with others of scientific leanings. What was more important for the successful capture of scientific

⁶¹⁹ J. Gascoigne, *Joseph Banks and the English enlightenment. Useful knowledge and polite culture* (Cambridge, 1994), 9 quoted in Cock, ‘Sir Francis Beaufort’, 34.

⁶²⁰ He was instructed ‘not on any account to commit any hostile act whatsoever; the vessel you command being sent out only for the purpose of discovery and science, and it being the practice of all civilised nations to consider vessels so employed as excluded from the operations of war: and, confiding in this general feeling, we should trust that you would receive every assistance from the ships or subjects of any foreign power you may fall in with’ (F.W. Beechey, *Narrative of a voyage to the Pacific and Beering’s Strait. To co-operate with the Polar expeditions: performed in His Majesty’s Ship Blossom, under the command of Captain F.W. Beechey, R.N. in the years 1825, 26, 27, 28* 2 vols (repr. London, 1968), vol.1, xii).

⁶²¹ M.K. Barritt, *Eyes of the Admiralty. J.T. Serres an artist in the Channel Fleet 1799-1800* (Greenwich, 2008), 115.

⁶²² Hore, ‘Lord Melville, . . .’, 159.

⁶²³ TNA, ADM7/818, Salary and pension book, 1801-1807.

⁶²⁴ An Admiralty order of 1 July 1824 stipulated the employment of men intending to rise to the rank of master should have been educated in ‘such branches of Science as are connected with Navigation’ (TNA, ADM7/889).

data was the ability to be able to observe and record information accurately, even if the conditions were harsh and the data mundane.⁶²⁵

The situation in other navies was not vastly different to that of the British, as for example in the 1790s Bauzá recorded experiments with a pendulum, made barometric readings when he crossed the Andes and compiled data on the propagation of sound over land, all of which heightened his profile amongst his colleagues in the international sphere of hydrography.⁶²⁶ It could be said that science and hydrography were good partners, and in an effort to develop that link the Admiralty's position in 1812 was issued to every commanding officer, pressing:

. . . the advantage of collecting a body of hydrographic information, and that you will exert yourself to the utmost of your power in contributing to an object so necessary to the general advancement of science, and so highly advantageous to the best interests of a great maritime people.⁶²⁷

Such a statement shows how science was on the Admiralty's agenda even during times of war and they openly encouraged men to become involved in such matters.

Foremost in the Royal Navy in the collection of that data for that objective in the fields of oceanography and navigational science, throughout this period, was Commander (later Captain) Martin White.⁶²⁸ Since 1809 he had taken many opportunities to collect data, which was not unusual, but what set him apart was the variety of observations and the way in which he presented his findings.⁶²⁹ There were also circumstances to be considered that not only allowed him the time to collect the variety of data but also gave him the time to draw it up, *i.e.* peace in Europe. During those difficult years (prior to the Peace) he was in the Channel Islands, during which time his duties allowed for some surveying work; he measured base lines in 1809,⁶³⁰ and on Grouville in 1810, Guernsey in 1813 and Alderney in 1813-14.⁶³¹ Subsequently White had a close working relationship with Hurd and on one visit to

⁶²⁵ For an example of those conditions see Chapter Three and also A. Savours and A. McConnell, 'Journal kept by Midshipman Joseph Henry Kay during the voyage of H.M.S. *Chanticleer*, 1828-1831' in *Four travel journals. The Americas, Antarctica and Africa, 1775-1874*, Hakluyt Society 3rd ser., 18 (2007), *passim*.

⁶²⁶ Lamb, 'The London years of Felipe Bauzá', 321.

⁶²⁷ TNA, ADM1/5122/2.

⁶²⁸ Although he did not become a commander until 1818 he was regularly referred to as such prior to that date.

⁶²⁹ Beaufort, Parry and Smyth were also involved in many different branches of science, but not to such an extent as White who undertook scientific observations without being tasked to do so. The types of data are put into context throughout this chapter.

⁶³⁰ White, *Sailing directions for the English Channel*, 27.

⁶³¹ UKHO, OD542A.

London in January 1817 the two men discussed the manning of the *Shamroc*.⁶³² It was at that time that White received the go ahead from the Admiralty Board to re-sound the whole of the English Channel, as Hurd thought he was ‘fully competent’ to carry it out. Such a mammoth task was a jointly thought-out venture between the Admiralty and Trinity House, although Hurd was clearly involved, which benefited science.⁶³³

Hurd was very supportive of White and enthusiastically looked forward to receiving his chart and remark book of the Channel Islands in May 1817.⁶³⁴ When they arrived in the Admiralty and Hurd laid them before the Board, he wrote to Croker pointing out White’s genius and talent.⁶³⁵ High praise indeed, especially considering Hurd’s own experience, but more importantly for science Hurd was able to promote White’s work as containing ‘useful and scientific observations and calculations’.⁶³⁶ The Board duly considered and concurred with Hurd, instructing him ‘to dispose of these rare talents of Captn. White to the very best advantage of the public service’,⁶³⁷ which he dutifully did. Hurd also took the arrival of White’s work as an opportunity to write to Melville, pointing out White ‘as an officer particularly gifted for scientific researches and worthy of your Lordships peculiar patronage’⁶³⁸ and White was promoted in the following year.⁶³⁹ But how could the Admiralty Board not be impressed with White’s scientific work, as it is very doubtful that any of them had ever seen a remark book of such quality as that laid before them by their Hydrographer.

⁶³² UKHO, LB1 f.78, Hurd to Martin, 23 January 1817.

⁶³³ UKHO, LB1 f.79, Hurd to Cotton, 12 February 1817.

⁶³⁴ UKHO, LB1 f.99, Hurd to White, 6 May 1817.

⁶³⁵ Hurd wrote of White’s work that it was ‘one of the most difficult and laborious works an officer could have been called upon to perform, and in the execution of which Captain White has evinced uncommon genius and talent and has performed its duties generally speaking in an open boat, and at a comparatively trifling expence to the Public’ (UKHO, LB1 fos 101-2, Hurd to Croker, 26 May 1817).

⁶³⁶ UKHO, LB1 fos 101-2, Hurd to Croker, 26 May 1817.

⁶³⁷ UKHO, LB1 f.102, Admiralty Board minute, 28 May 1817.

⁶³⁸ UKHO, LB1 fos 102-3, Hurd to Melville, 26 May 1817.

⁶³⁹ The delay in his promotion may have been due to their Lordships displeasure with him when he sent a chart to the Admiralty at a cost of £8 instead of using a coach. Hurd had to ‘do away the displeasure their Lordships have so strongly expressed’ by presenting White’s reasons for such an expensive action (UKHO, LB1 f.121, Hurd to White, 19 August 1817).

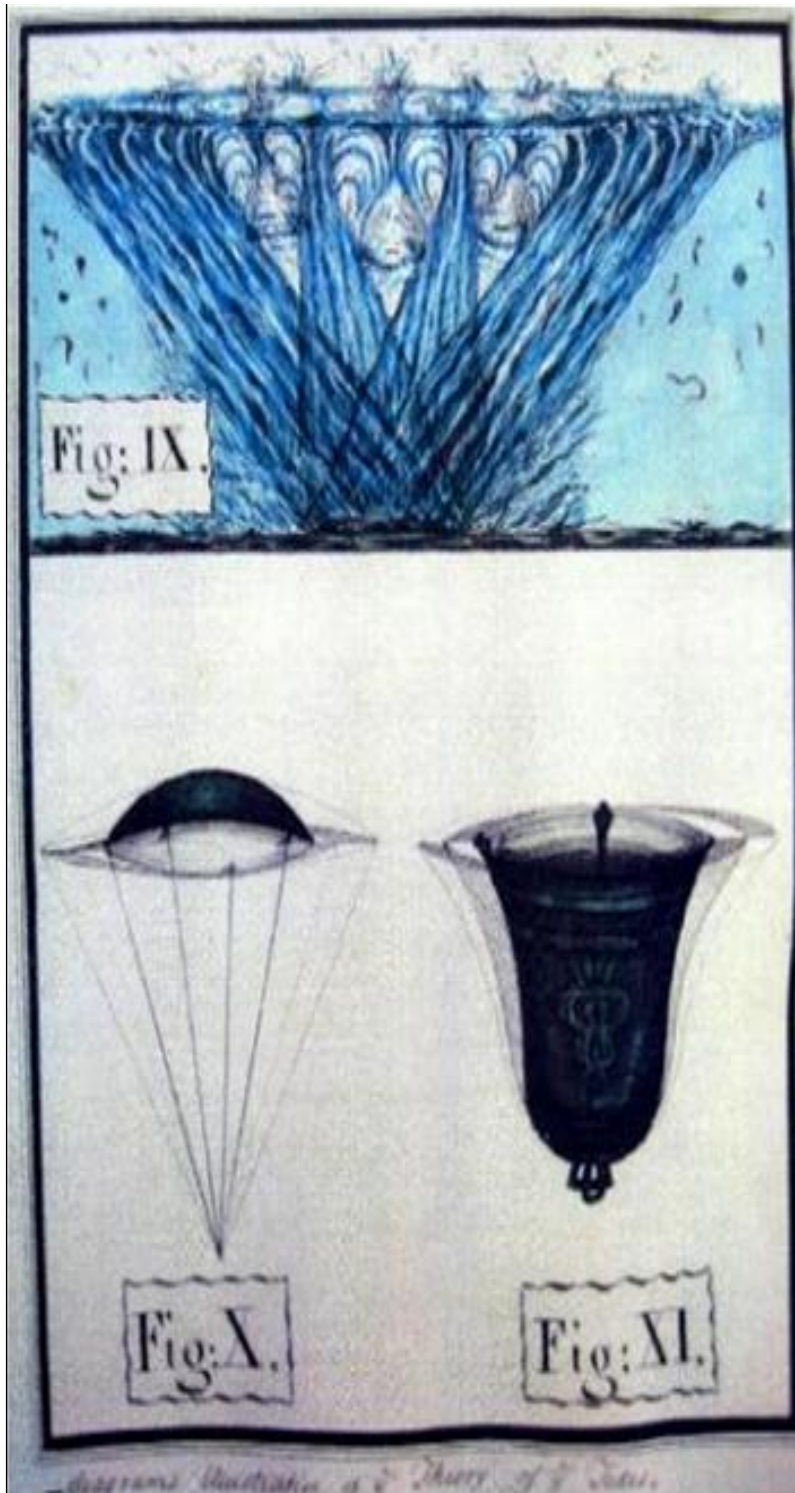


Illustration 4.1 Diagrams illustrative of the theory of tides by Captain Martin White R.N. (UKHO, OD541)

By 1829, when four remark books had been deposited in the Hydrographical Office by White,⁶⁴⁰ there were few others whose works had reached a similar level of accomplishment. His sketching, written descriptions and quality of presentation were

⁶⁴⁰ UKHO, OD537, 537A, 541, 542A.

works of art in their own right, combined with his scientific observations and diagrams, mathematical calculations and methodology towards data collection, were landmarks in the history of hydrographic surveying.⁶⁴¹ White took the science of oceanography to a new level and his four remark books show information concerning his method for correcting courses steered and for ‘trying tides’, remarks on the corrections for ‘reclination and inclination in the plane of the log ship’,⁶⁴² soundings, bottom qualities, accounts of chronometer, monthly mean barometer and temperature readings, abstracts of variations taken on shore using a theodolite and afloat using an azimuth compass, conchological, botanical and lithological observations, views of the land, courses and distances from headland to headland, drawings of light sectors,⁶⁴³ diagrams illustrating the theory of tides, calculations of latitudes and longitudes, triangulation to show the length of a degree on a meridian, ornithological observations, mutilated and perfect specimens of shells,⁶⁴⁴ how to work a hygrometer and logarithmic calculations of his survey angles.⁶⁴⁵ If any other naval officer had achieved as much, they had failed to deposit it with the Hydrographer, although many of the observations made by White were sadly at that time of spurious use to the Navy.

But all those varieties of scientific data were merely an aside to the main purpose of White’s work and that was to prepare accurate charts (and sailing directions) to replace the existing ones Hurd was supplying to the Fleet, which in itself was an act of science. Hurd’s view on the matter was clear as he wrote to White on 20 November 1818 acknowledging the errors in printed charts of the English Channel, looking forward to White’s work ‘upon scientific principles’.⁶⁴⁶ Here Hurd showed not only his dislike of the charts produced by the chart trade (due to their poor composition) but how he demanded Admiralty charts had to be composed on

⁶⁴¹ Deacon does not mention any of White’s work, nor anyone else from this specific field in any depth that comes anywhere close to the achievements White made during that period.

⁶⁴² UKHO, OD537. He observed the motions of the tides throughout the English Channel (Deacon, *Scientists and the sea*, 266).

⁶⁴³ UKHO, OD537A.

⁶⁴⁴ UKHO, OD541.

⁶⁴⁵ UKHO, OD542A.

⁶⁴⁶ Hurd wrote ‘I have noted all your observations relative to the gross errors existing in all the printed charts of the English Channel, both as to the depths of water and quality of soundings, and shall experience much gratification when enabled by the close of your present labours, to display to the maritime part of the creation the difference between a real survey upon scientific principles, and an imaginary one, formed from loose materials occasionally picked up and badly put together’ (UKHO, LB1 fos 177-8, Hurd to White, 20 November 1818).

scientific principles. White exhibited all the qualities that fitted well within Hurd's ideal picture of a model hydrographic surveyor.

Such were White's many contributions to the 'benefit of nautical science' that in Hurd's eyes showed 'infinite credit to his zeal, perseverance and talents as a surveyor'.⁶⁴⁷ White also proposed preparing a 'scientific memoir' that Hurd suggested would have been of benefit to 'the learned which might be address'd either to the Admiralty Board or to the Royal Society'. But Hurd thought such a scientific voyage would not be 'either useful or necessary to the mere seamanship or to a common navigator',⁶⁴⁸ after which White moved on to survey the southern coast of Ireland. His contribution was exceptional and he would have been at home on H.M.S. *Challenger* whose famous scientific cruise in the 1870s did not materialise for some 60 years after White showed an interest in oceanography. Thus White was some two generations ahead of his time and if Cook was the founder of the hydrographic specialism, then White was surely a pioneer of naval oceanography. Sadly only a small amount of his oceanographical material was published, with those observations made in the month of January 1817 printed later that year, by the Falmouth bookseller James Lake, under the heading *Investigation of the soundings, and other nautical matter, in the English and Irish Channels, from Beachy Head to the edge of the Soundings*.⁶⁴⁹ That publication was printed by order of the Lords Commissioners of the Admiralty, as was the small amount that appeared in his sailing directions covering the English Channel, issued by the Hydrographic Office. Sanction from the Board was an important step forward for the advancement of science, having competent practitioners such as White was an even greater step.

Hydrography, the scientific world and the Royal Society

It cannot be overstated how important the relationship was between the Royal Society, the Admiralty and its hydrographic capability. As a result of an almost obsessive desire to record physical objects, both man-made and natural, saw surveyors such as Beaufort and Smyth (who were both very involved in scientific data collection)⁶⁵⁰ take more than a passing interest in archaeology. Although not strictly a science, but

⁶⁴⁷ UKHO, LB1 f.267, Hurd to the Admiralty Board, 31 December 1819.

⁶⁴⁸ UKHO, LB1 f.467, Hurd to White, 23 February 1822.

⁶⁴⁹ A copy can be found at UKHO, OD541.

⁶⁵⁰ Deacon, *Scientists and the sea*, 233, 239. See also Chapter 3 'Beaufort and the Study of Antiquities in the Navy' in Cock, 'Beaufort'.

more of an art of recording, it still involved observation and measuring in great detail objects ranging from small domestic dwellings to amphitheatres⁶⁵¹ and the spectacular Leptis Magna.⁶⁵² In addition to Beaufort's and Smyth's interests in antiquities (that are well documented),⁶⁵³ there were others who made contributions to this field. Men such as Captain F.W. Beechey⁶⁵⁴ and White recorded architectural ruins⁶⁵⁵ at a level of detail that was far beyond anything that would have been of navigational significance, although the details were included on the printed charts. This was not the exclusive reserve of naval surveyors as Nimmo noted numerous ancient graves whilst surveying near Liverpool in 1828.⁶⁵⁶ The opportunity to use their surveying skills for something other than hydrography must have been a welcome departure from the monotony of sounding, although closer to the interests of the Society of Antiquaries rather than the Royal Society.

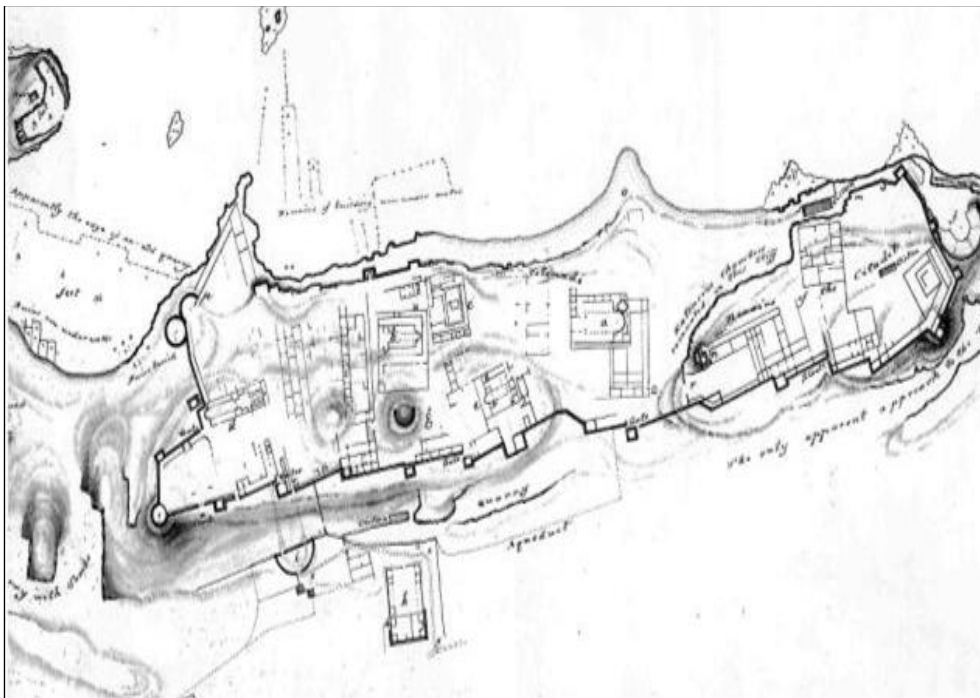


Illustration 4.2 Plan of the port and ruins of Apollonia, now called Mersa Suza by Captain F.W. Beechey RN (UKHO, C63 shelf Rf)

⁶⁵¹ Friendly, *Beaufort*, 207.

⁶⁵² David, 'British hydrography in the Mediterranean', 7.

⁶⁵³ Day records how Smyth was also tasked with 'the recovery of works of art' (Day, *Hydrographic Service*, 26).

⁶⁵⁴ For Beechey's work at Apollonia see D. White, 'Excavations at Apollonia, Cyrenaica Preliminary Report' in *American Journal of Archaeology*, Vol. 70, No. 3 (July, 1966), 259-65. No scholarly account of White's activity exists, but his interest in antiquities is shown on the title page of his remark book of 1822 showing ecclesiastical ruins (UKHO, OD537a), as well as recording similar details on his surveys.

⁶⁵⁵ UKHO, OD537a.

⁶⁵⁶ *The Liverpool Courier*, 29 May 1833.

Foremost in the promotion of the widest fields of science and oceanography was the Royal Society, whose involvement with hydrographic exploration has been well documented.⁶⁵⁷ The involvement with Banks and Cook's exploration threw the importance of charting and science into the public gaze during the 1760s and 1770s.⁶⁵⁸ Following the successes during that era there was a constant trickle of voyages involving the Society and particularly Banks. But by the time Hurd was Hydrographer there were other individuals who had far more influence in the Admiralty than Banks. Second Secretary Barrow was elected to the Royal Society in 1805, who at Banks's suggestion served on the council of the Royal Society in 1815 and over the next fifteen years alternated his council membership with Croker.⁶⁵⁹ Those men knew the value of geographical knowledge in relation to the strategic control of the earth's oceans and subsequently the scientific community benefited from the voyages undertaken to acquire that knowledge.⁶⁶⁰

At a lower level were many surveyors who made a contribution to those operations. When compared to Parry, White or Beaufort (who was made a Fellow of the Royal Society in 1814) Hurd has not been credited as a man of science, but his position in relation to that subject was described by his son in 1837. Samuel Proudfoot Hurd stated to Beaufort that he was 'a true disciple of my Fathers in a disinterested desire to assist science in every possible way', when he wrote to him concerning the establishment of a university with an observatory at Toronto.⁶⁶¹ Captain Hurd, the assistant of science (although to a lesser extent than Parry) had many connections with the scientific world and, of course, to those surveyors who had established links with the Society. One of those men was Captain Matthew Flinders R.N., who surveyed the whole of Australia, took measurements of temperature and salinity of the water (as had for example Cook, Dalrymple and the Russian surveyors

⁶⁵⁷ See W.J. Ashworth, 'John Herschel, George Airy, and the Roaming Eye of the State', *History of Science* 36 (1998); J. Gascoigne, *Joseph Banks and the English enlightenment. Useful knowledge and polite culture* (Cambridge, 1994).

⁶⁵⁸ See Deacon, *Scientists and the sea*, 185-9 for an analysis of the scientific work undertaken on Cook's three voyages.

⁶⁵⁹ J.M.R. Cameron, 'Barrow, Sir John, first baronet (1764-1848)', *ODNB* [accessed 24 Nov 2007].

⁶⁶⁰ See the introductory paragraphs of 'Chapter 2 'The authorized organ of scientific communication in England': Beaufort and the scientific societies' in Cock, 'Beaufort' for an account of Beaufort, Banks and the Royal Society.

⁶⁶¹ UKHO, LP1857 Hu22, S.P. Hurd to Beaufort, 27 May 1837.

Krusenstern and Hörner),⁶⁶² returning to England two years after Hurd became Hydrographer. Flinders was one of Banks's circle of friends,⁶⁶³ who by the time he returned to England had become one of the most successful explorers and hydrographers since Captain Cook. Before his return to England he instructed his wife to write to Banks⁶⁶⁴ but after arriving in England he continued his association with him,⁶⁶⁵ even introducing a fellow surveyor to him,⁶⁶⁶ although he did not undertake any further voyages of exploration. Flinders was also involved in scientific experimentation concerning magnetism in ships, which was supported by Hurd.⁶⁶⁷

Parry also used his position to bring other like-minded hydrographic surveyors into the scientific community in London, such as Bauzá, who also met the president of the Royal Society, using the opportunity to spread the results of experimentation with his Spanish connections.⁶⁶⁸ For Parry, science (along with exploration), was very much on the agenda. His son wrote how his father 'employed the few leisure moments he could snatch from the duties of his office' to draw up a proposal for a voyage to the North Pole supported by a recommendation from Sir Humphrey Davy, president of the Royal Society.⁶⁶⁹ After some opposition the proposal was accepted and Parry was given yet another command for a voyage of exploration.⁶⁷⁰ The Royal Society supported many voyages during Parry's term as Hydrographer, that was helped by his association with men like Barrow, Davy and John Herschel.⁶⁷¹ His role, when not taking part himself, involved the supply of scientific materials, such as instruments and books, as well as advice on similar matters. Here Parry was far more experienced than Hurd as he could draw upon his own experiences in the Arctic to assist fellow officers with their planning and preparations.

⁶⁶² Deacon, *Scientists and the sea*, 194, 202, 226; A. McConnell, *No sea too deep. The history of oceanographic instruments* (Bristol, 1982), 24

⁶⁶³ Darby, 'Bligh's disciple ...', 410-11.

⁶⁶⁴ NMM, FLI/25, Matthew Flinders to Ann Flinders, 11 May 1810.

⁶⁶⁵ For example on 12 March 1811 Flinders visited Banks (A.J. Brown and G. Dooley (ed.), *Matthew Flinders private journal from 17 December 1803 at Isle of France to 10 July 1814 at London* (Adelaide, 2005), 350).

⁶⁶⁶ M. Horden, *King of the Australian coast the work of Phillip Parker King in the Mermaid and Bathurst 1817-1822* (Melbourne, 1997), 10.

⁶⁶⁷ NMM, FLI/25, Matthew Flinders to Ann Flinders, 20 April 1812.

⁶⁶⁸ Lamb, 'The London years of Felipe Bauzá', 321.

⁶⁶⁹ For Davy's role in the Royal Society see Miller, 'The Royal Society . . .', 243-96.

⁶⁷⁰ Parry, *Memoirs*, 188-9.

⁶⁷¹ Royal Society, HS218, Parry to Herschel, 4 January 1824; *ibid*, HS219, Parry to Herschel, 6 April 1826; *ibid*, DM3 f.122, Parry to Barrow, 15 June 1826; *ibid*, f.124, Parry to Davy, 25 July 1826. Herschel, alongside Beaufort, was on the Royal Society's committee overseeing Foster's voyage (Miller, 'The Royal Society . . .', 185).

However, Captain Franklin,⁶⁷² who on his return from his Polar expedition was elected a Fellow of the Royal Society was equally as experienced as Parry and could count himself as unlucky by not being considered for the post of Hydrographer. Franklin's voyage collected a large quantity of scientific data, not only on astronomy and natural history, as was common in those days, but also on the *Aurora Borealis*, as well as geognostical observations by Dr Richardson.⁶⁷³ Richardson, a talented physician and naturalist, had served onboard several naval vessels when he rose to the rank of senior surgeon. Although Franklin's cruise principally charted some 500 miles of coastline Richardson made a valuable contribution to science through his participation on the voyage.⁶⁷⁴

One of the most significant scientific voyages of the period that was supported by the Royal Society⁶⁷⁵ was undertaken by Foster on the *Chanticleer* in the Atlantic,⁶⁷⁶ even though they wanted a round-the-world cruise.⁶⁷⁷ Foster was exceptionally competent and had made pendulum experiments at the Galapagos Islands and San Blas, measured meridian distances, observed transits of the Sun⁶⁷⁸ as well as having constructed the charts on Hall's⁶⁷⁹ cruise on the *Conway*; his talents were put forward by Hall through Commodore Hardy (who had supported pendulum experiments)⁶⁸⁰ to the Admiralty Board 'as highly deserving their Lordships notice', of which Hurd was also aware.⁶⁸¹ Foster was also Beaufort's 'most intimate friend' and it is thought that through him he obtained the command of the *Chanticleer*.⁶⁸² From an administrative perspective the Hydrographer, Parry, played an active role

⁶⁷² B.A. Riffenburgh, 'Franklin, Sir John (1786–1847)', *ODNB* [accessed 27 July 2008].

⁶⁷³ For the observations see the appendix to Franklin's *Narrative of a journey to the shores of the Polar seas, in the years 1819, 20, 21, and 22* (London, 1823).

⁶⁷⁴ J. Richardson, *Observations on solar radiation, made at Fort Franklin in the years 1825, 1826 and 1827* (London, 1841); R.E. Johnson and M.H. Johnson, 'Richardson, Sir John (1787–1865)', *ODNB* [accessed 27 July 2008].

⁶⁷⁵ Royal Society, DM3 fos 125–48, Pendulum Committee minutes and letters, 1816–29. This contains a rough early draft of instructions for Foster's voyage (fos 145–9).

⁶⁷⁶ For the most recent and scholarly account of the voyage and the scientific research see Savours, *Midshipman Kaye*.

⁶⁷⁷ Savours, *Midshipman Kaye*, 263. The Society also allowed Foster to take with him a pair of pendulums and two clocks that were owned by them (*ibid.*, 272–3). See also G.E. Fogg, 'The Royal Society and the Antarctic', *Notes and Records of the Royal Society of London* 54:1 (January 2000), 58–98 for the background to the Society's involvement.

⁶⁷⁸ UKHO, MB29, Pendulum experiments made at the Galapagos Islands and San Blas by Captain Basil Hall and Mr Henry Foster H.M.S. *Conway*, 1822.

⁶⁷⁹ Hall had provided 14 samples of seawater from the Atlantic and Indian Oceans to the scientist Alexander Marcet (1770–1822) (Deacon, *Scientists and the sea*, 225).

⁶⁸⁰ Miller, 'The Royal Society . . .', 183–4.

⁶⁸¹ UKHO, LP1857 H144, Hardy to Croker, 1 October 1821.

⁶⁸² Friendly, *Beaufort*, 260.

with the preparations for the voyage and the process he followed was one which reached its maturity by that time.⁶⁸³ From the time it took from Parry's first involvement on or before 11 January 1828⁶⁸⁴ to the time it took to set sail on 27 April later that year⁶⁸⁵ the Hydrographer wrote over a dozen letters seeking information and received as many in return, attended at least two meetings and acted as a consultant on the logistics and objectives of the voyage.⁶⁸⁶

After Foster's tragic death the Admiralty requested Dr Tiarks⁶⁸⁷ to examine Foster's chronometrical observations and his report was lodged in the Hydrographic Office. Tiark's report was not full of praise for Foster's work, as along with two areas of miscalculation he highlighted how Captain W.F.W. Owen had correctly pointed out how the chronometers on the deck of the *Chanticleer* were incorrectly suspended.⁶⁸⁸ From an administrative perspective the involvement during Hurd's time as Hydrographer (even though he had many associations with Banks, including being Secretary to the Board of Longitude when Banks was its *ex officio* member)⁶⁸⁹ was not overly obvious but for Parry, being a fellow of the Royal Society, the link was well established. Parry established himself as one of those men who formulated the high level thinking behind voyages of exploration and science thanks to his position as Hydrographer. But it should be remembered that the Royal Society in London was

⁶⁸³ Parry also wrote to Charles Babbage (1791-1871) in February 1824 concerning his 'computing machine', which he suggested Foster should 'see the effect of a few turns' of the winch. Foster was introduced to Babbage through Captain John Franklin R.N. (1786-1847) (BL, Add 37183 f.109 Parry to Babbage, 27 February 1824).

⁶⁸⁴ UKHO, LB2 fos 88-90 Parry to Rossel, 11 January 1828.

⁶⁸⁵ Savours, *Midshipman Kay*, 282.

⁶⁸⁶ UKHO, LB2 fos 88-90, Parry to Rossel, 11 January 1828; *ibid.*, f.90, Parry to Horsburgh, 14 January 1828; *ibid.*, f.90, Parry to Bauzá, 14 January 1828; *ibid.*, f.90-1, Parry to Vidal, 17 January 1828; f.98, Parry to Boteler, 4 February 1828; f.114, Parry to Austen, 16 March 1828; *ibid.*, f.120, Parry to Foster, 1 April 1828; *ibid.*, f.129-32, Parry to Rossel, 19 April 1828; *ibid.*, f.244, Parry to Foster, 10 January 1829; *ibid.*, MB1 f.137 Admiralty Board to Parry, 2 and 4 February 1828; *ibid.*, f.170, Parry to Hope, 3 March 1828; *ibid.*, f.223, Parry to Boteler, 26 January 1829; *ibid.*, LP1857 F83, Foster to Croker, 20 March 1828. For the printed account of the voyage see W.H.B. Webster, *Narrative of a voyage to the Southern Atlantic Ocean, in the years 1828, 1829, and 1830, performed in H.M. Sloop Chanticleer* vol.2 (London 1834), 369-82; Webster was also responsible for the natural history collections made during the voyage. Royal Society, DM3 fos 125-48, Pendulum Committee minutes and letters, 1816-29; this contains a list in Parry's hand of places where the longitudes should be determined on the voyage signed by himself and Horsburgh (f.148). Kater was a leading figure in the metropolitan scientific community who had three papers published in the *Philosophical Transactions* in 1818 and 1819 and instructed Sabine and Parry how to use scientific instruments (Miller, 'The Royal Society . . .', 180-2).

⁶⁸⁷ Dr John Louis Tiarks was an astronomer and involved with the Astronomical Society. During this period the Admiralty let him have the use of a sextant (UKHO, LP1857 P308).

⁶⁸⁸ UKHO, AO32/1/1, Dr Tiark's report on Captain Foster's chronometrical observations in H.M.S. *Chanticleer*, no date, watermarked 1828.

⁶⁸⁹ CUL, RGO 14/7, Board of Longitude confirmed minutes, 1802-1823; J. Gascoigne, 'Banks, Sir Joseph, baronet (1743-1820)', *ODNB* [accessed 30 June 2008]; Hordern, *King of the Australian coast*, 10.

not the only scientific organisation in the world that took an interest in nautical science, as the Danish equivalent was involved with the Danish hydrographer.⁶⁹⁰ The association that the Hydrographic Office held with the Royal Society, established through Dalrymple and Banks,⁶⁹¹ was further developed by Parry. From then on, every nineteenth century Hydrographer added F.R.S. to their string of post-nominals.

Experimentation, development and technology

The post-Peace situation, despite the reduction in the number of men and ships in the Navy, offered more opportunities for experimentation in scientific fields. The Hydrographer's role in the administration of those opportunities for the improvement of navigational science was one that he was deeply involved with because of his position on the Board of Longitude from 1810 until 1817. He wrote many letters on behalf of the Board and his attendance at meetings drew him into discussions over those experimental instruments and ideas brought before them.⁶⁹² Hurd was not the only Hydrographer dealing with ideas for solving the longitude problem as his H.E.I.C. counterpart put ideas forward to his directors in 1818 and 1829.⁶⁹³ It was through the Board of Longitude that Hurd was able to gain advantage for the Hydrographic Service and the Navy, such as in 1813 when Mendoza Rios' book containing lunar observations was added to each chart box supplied to the Fleet.⁶⁹⁴ During the time Hurd served as secretary between 1810 and 1817 the Board of Longitude paid out over £900 towards expeditions and experiments, and £35 6s 9d in recompense for Hurd's postage!⁶⁹⁵

Serving the Board increased Hurd's connections with the scientific world and also benefited the Hydrographic Office when they sent Hurd data for charting purposes. But there may have been some long-held resentment by Hurd for his dismissal from the Board when he was replaced by Dr Young, as in December 1821

⁶⁹⁰ *The Annals of Philosophy*, new series 1 (January-June 1821), 113-15.

⁶⁹¹ R.I. Ruggles, 'Governor Samuel Wegg, intelligent layman of the Royal Society, 1753-1802', *Notes and Records of the Royal Society of London* 32:2 (March, 1978), 193.

⁶⁹² See Cambridge University Library Royal Greenwich Observatory papers, RGO 14. A box list can be accessed through <http://janus.lib.cam.ac.uk/db/node.xsp?id=EAD%2FGBR%2F0180%2FRGO%2014>. He also dealt with other administrative matters such as the salaries of the Board members (TNA, ADM1/3460, Hurd to Croker, 17 March 1817) and a petition from the only woman to be employed as a computer for the *Nautical Almanac* between 1765 and 1811 (M. Croarken, 'Mary Edwards: Computing for a Living in 18th-Century England' in *IEEE Annals of the History of Computing*, 25:4 (Oct-Dec, 2003), 9-15. For Hurd's involvement see also TNA, ADM1/3458, Hurd to Barrow, 10 June 1813).

⁶⁹³ IOR, L/MAR/1/24, 29 April 1818 and 29 July 1829.

⁶⁹⁴ TNA, ADM1/3458, Hurd to Croker, 6 December 1813.

⁶⁹⁵ D. Howse (ed.), *The Board of Longitude accounts, 1737-1828* (typescript at the N.M.M.).

he returned a letter to Young, Secretary to the Board of Longitude, with dismissive comments regarding its contents and criticising the originator (Mr Swingston) for not using his lead and line during his passage.⁶⁹⁶ This did not deter Young from sending further data to the Hydrographic Office in 1824,⁶⁹⁷ but Hurd's removal from the secretaryship left him unhappy with the decision and ambivalent towards his successor.

The effect of war did not totally preclude innovation between 1808 and 1815. Flinders, as an experienced navigator and hydrographer, was paid by the Admiralty to undertake experiments at Sheerness and Portsmouth on the magnetism of ships in 1812,⁶⁹⁸ but after 1815 there was more time to experiment with new ideas. The greatest advancement for hydrography materialised in the use of steam vessels, from which surveyors had far greater control over their manoeuvrability, especially in shallow waters.⁶⁹⁹ Here hydrography and the Navy benefited from commercial uses of technology, one that was a spin-off from the Industrial Revolution that expanded in those post-conflict years.⁷⁰⁰ For example in 1816 H.M.S. *Congo* was sent to survey the river of that name, but after some initial problems she was not used under steam.⁷⁰¹ In the following year, after alterations had been made to the vessel, she was put into service⁷⁰² on the east coast of England under Fitzmaurice and put on trial.⁷⁰³ The trial was not successful as 'she was found so leewardly as to be of no use' and it was recommended, probably by Hurd, that 'she be discharged altogether from the

⁶⁹⁶ UKHO, LB1 f.444 Hurd to Young, 29 December 1821.

⁶⁹⁷ UKHO, LB2 f.27 Parry to Young, 10 February 1824; *ibid*, MP65 f.559, Young to Parry, 20 June 1823.

⁶⁹⁸ TNA, ADM18/126, entry 3022 for December 1812.

⁶⁹⁹ Greenhill and Giffard, *Steam, politics and patronage*, 24, 29-30. Although over twenty years later, Captain Sheringham R.N. publicly stated his view how there was 'no comparison between the advantages of a steam vessel for sounding over boats or even sailing vessels' (W.L. Sheringham, 'Suggestions for manning the Navy with volunteer seamen' in *The Nautical Magazine and Naval chronicle for 1852. A journal of papers on subjects connected with maritime affairs* (London, 1852), 242).

⁷⁰⁰ D. Lyon and R. Winfield, *The Sail & Steam Navy list. All the ships of the Royal Navy 1815-1889* (London, 2004), 28. For of the influence of steam from a merchant marine perspective see J. Armstrong and D.M. Williams's two articles, 'The Steamboat, Safety and the State: Government Reaction to New Technology in a Period of *Laissez-Faire*', *Mariner's Mirror* 89 (2003), 167-84 and 'The steamship as an agent of modernisation, 1812-1840' in *International Journal of Maritime History*, 19:1 (June 2007), 145-60.

⁷⁰¹ J.J. Colledge, *Ships of the Royal Navy* (London, 1967), 88. After the commander and five other officers died of a fever the mission was abandoned (Ritchie, *Admiralty chart*, 123).

⁷⁰² On the 17 March 1817 the Navy Board was 'directed to cause her to be prepared as a Surveying Vessel as it was intended to recommission her' (TNA, ADM1/3460).

⁷⁰³ UKHO, LB1 f.108, Hurd to Fitzmaurice, 12 June 1817.

survey service'.⁷⁰⁴ She continued working during the survey season of 1818 in the River Thames⁷⁰⁵ when she was chosen to undertake trials of experimental sounding machines.⁷⁰⁶ Although she was not used for such duties after that time the concept of using steam vessels for surveying was not totally dismissed as the *Echo* was employed from January 1828 (also in the Thames).⁷⁰⁷ *Echo* worked steadily completing the survey without incident until 1832 when she was converted to a tug boat (lasting until 1885), thus proving to the Admiralty and Navy Boards that steam could be used successfully for surveying despite the initial set back of the *Congo*.⁷⁰⁸ This also proved how geography was the key to success as smaller vessels could not cope with oceanic conditions.

Of a more widespread advantage to the Navy was the use of sounding machines to help determine the depth of water below a ship. David wrote in 1982 that sounding machines were only in use since the 1840s,⁷⁰⁹ however Massey's sounding machine (invented in 1802) was widely used by the Navy as by 1808 an order for 500 had been placed by the Navy Board.⁷¹⁰ Although it was found to be inadequate when used in deeper water due to the pressure, it was strengthened⁷¹¹ and by 1811 the Navy had purchased 1750. Massey extravagantly claimed that his sounding machine (along with the chronometer and the perpetual log) after the compass and the quadrant, was the most important invention for navigation.⁷¹² The 'machine' assisted in recording soundings accurately, but in 1814 a challenge to Massey's monopoly for the supply of such instruments to the Navy came in the form of Peter Burt's rival invention.⁷¹³ Burt invented a similar device that also showed the depth of water as soon as the lead

⁷⁰⁴ UKHO, LB1 f.136, Hydrographic Office to Martin, 19 February 1818.

⁷⁰⁵ UKHO, LB1 f.176, Hurd to Hawtayne, 11 November 1818. She continued until 18 December 1818 (ibid, f.301, Certificate of Fitzmaurice's surveying. 20 April 1820).

⁷⁰⁶ UKHO, LP1857 M213, Fitzmaurice to Burt, 9 May 1817.

⁷⁰⁷ UKHO, MB2, F.202 Parry to Bullock, 21 October 1828.

⁷⁰⁸ It is worth noting that the explorer Captain John Ross R.N. published a treatise on navigation by steam containing an illustration of an armoured paddle-steamer in 1828 (J. Ross, *A treatise on navigation by steam; comprising a history of the steam engine, and an essay towards a system of the naval tactics peculiar to steam navigation, as applicable both to commerce and maritime warfare* (London, 1828)).

⁷⁰⁹ UKHO, H1259/82, David to Cooper, 22 February 1982.

⁷¹⁰ W. Nicholson, *A Journal of natural philosophy, chemistry, and the arts*, vol. XXI (London, 1808), 255.

⁷¹¹ Deacon, *Scientists and the sea*, 234.

⁷¹² A.D. Morrison-Low, *Making scientific instruments in the Industrial Revolution* (Aldershot, 2007), 68. The Patent Log was supplied to surveyors, such as the six to Commander Boteler in 1828 by Parry (UKHO, MB1 f.134).

⁷¹³ TNA, ADM1/3459, Hurd to Croker, 8 June 1815.

touched the bottom⁷¹⁴ and Hurd found himself adjudicating, through his Board of Longitude role, between the two machines.

The Board of Longitude moved swiftly and on 3 March 1814 Hurd wrote how Burt's machine had been accepted in principle and that a trial with Massey's invention should take place.⁷¹⁵ Croker was slow to act and Hurd wrote to him on 8 June 1815, at the direction of the Board of Longitude, asking him to undertake the trials on some of His Majesty's ships so they could decide which machine was the most effective. Croker appeared surprised the trial had not taken place and ordered it to be undertaken in Home Waters.⁷¹⁶ On 8 March 1816 Hurd had to write again because nothing had been done,⁷¹⁷ but that was the last time he had to write. Also, but not as part of the trial, in June 1816 at the request of Captain Owen, Hurd supplied six of Burt's machines to be used on the Canadian Lakes, and a similar number were sent to Smyth in the Mediterranean a year later.⁷¹⁸ However, the subsequent trials by naval officers (ordered by the Board of Longitude) that were published in 1817 did not include any results from Owen and Smyth⁷¹⁹ and in 1818 the Navy adopted Burt's buoy and nipper.⁷²⁰ Two years later Massey wrote a paper in his defence stating his case and pointing out how his rival's machine did not work properly,⁷²¹ after which he petitioned parliament.⁷²² Massey did not give up and wrote to Parry in March 1825 resurrecting letters in his favour from Lewis Fitzmaurice, former Admiralty Surveyor, written in 1817 and 1819. Parry referred the matter to Sheringham,⁷²³ but whether Massey's machine was preferred to Burt's is unclear as there were seven of his

⁷¹⁴ W.H. Smyth, *Sailor's word-book. An alphabetical digest of nautical terms including some more especially military and scientific, but useful to seamen; as well as archaisms of early voyagers, etc* (London, repr. 1996), 498.

⁷¹⁵ TNA, ADM1/3460, Hurd to Croker, 8 March 1814.

⁷¹⁶ TNA, ADM1/3459, Hurd to Croker, 8 June 1815.

⁷¹⁷ TNA, ADM1/3460, Hurd to Croker, 8 March 1816.

⁷¹⁸ UKHO, LB1 f. 55, Hurd to Croker, 28 June 1816; *ibid.*, f.56 Nares to Burt, 28 June 1816; *ibid.*, f.86 Hurd to Nelson, 25 February 1817. Surveyors were also used to trial the use of a 'Patent Buoy and Beacon Machine' in 1818 invented by Mr Dickinson (Robinson, *Marine cartography*, 129; Day, *Hydrographic Service*, 30).

⁷¹⁹ *Copies of reports of experiments, made by order of the Lords Commissioners of the Admiralty, at the request of the Board of Longitude, for the purpose of ascertaining the superiority of Burt's Sounding Buoy and Knipper, over Massey's Sounding Machine: with letters from captains and masters of men of war, and captains in the service of the Hon. East India Company, and other merchants' ships, sea pilots, &c* (London, 1817).

⁷²⁰ Deacon, *Scientists and the sea*, 234.

⁷²¹ E. Massey, *A statement of the case of Mr. Edward Massey, of the city of Coventry, and of Scholes, near Prescott, Lancashire, most respectfully offered to the notice of every Member of Parliament* (Prescot, 1820).

⁷²² Deacon, *Scientists and the sea*, 235.

⁷²³ UKHO, LP1857 M213, Massey to Parry, 31 March 1825.

machines in the Hydrographic Office store in 1828.⁷²⁴ However, rather than choose one machine over the other the Admiralty decided that both could be used together.⁷²⁵



Illustration 4.3 Massey's Sounding Machine, c.1810 (NMM, NAV0673)⁷²⁶

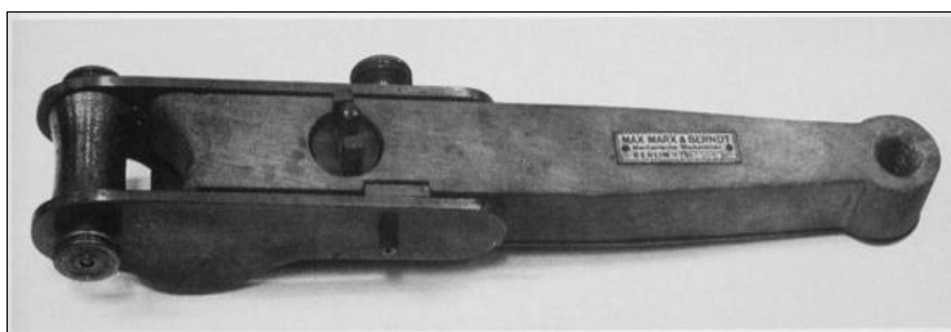


Illustration 4.4 Burt's 'Nipper' (NOAA Photo Library)

During Parry's term as Hydrographer there was a growing movement towards experimentation as those times allowed for this, due to the cessation of hostilities with France. Being a scientific officer Parry was naturally keen on this sphere of activity as during his 1824-5 voyage he had undertaken numerous experiments and observations, including recording the velocity of sound at Port Bowen in 1824-25 with Lieutenant Foster. Experiments such as this were of international importance and the results were compared with experiments made in Germany, France and Chile, the latter of which was made by the Spanish Hydrographer Bauzá.⁷²⁷ The Admiralty also unwittingly

⁷²⁴ UKHO, MB1 f.192.

⁷²⁵ NOAA Photo Library (<http://www.photolib.noaa.gov/htmls/ship4263.htm>, accessed 3 June 2008).

⁷²⁶ This early 19th-century model is made of brass. It has a rotor which drives a pair of counters (one on each face) as it is dropped through the water on a rope. The device automatically locks when it touches the sea bed and can be then pulled to the surface and the final measurement recorded. The counter on the front is marked '0-10', the one on the back '0-150' (fathoms). An inscription on the face also records the patenting of this device (no. 6432) by Edward Massey (about 1768-1852), who patented a number of devices both for depth sounding and for measuring a ship's speed (<http://www.nmm.ac.uk/collections/explore/object.cfm?ID=NAV0673&picture=1#content>, accessed 3 June 2008).

⁷²⁷ The results were published in the *Philosophical Transactions of the Royal Society of London*, 118 (1828), 97-104.

advanced science by allowing extensive trials on waterproof paper by John Walker, the Chief Draughtsman in the Hydrographic Office. Although Walker was not a scientist his technical expertise, when it came to matters relating to map printing, meant he was unrivalled in the Admiralty.⁷²⁸ Other hydrographic specialists were involved with a variety of experiments, such as King's test on rope made from New Zealand flax in 1822⁷²⁹ and Lieut. Henry Bayfield's observations of the soil at Lake Huron that were used by the Canada Company.⁷³⁰ On a lower level there were many examples where hydrography benefited from experimentation, such as the use of canned food,⁷³¹ that was used by Parry during his scientific voyages in 1824 (see Illustration 4.5). From a victualling perspective the supply of tinned food was a godsend and had some influence on the planning of voyages, as well as the likelihood that the objective to keep the men alive by avoiding starvation was greatly enhanced.



Illustration 4.5 A tin of veal taken by Parry to the Arctic in 1824 (Science Museum, London)⁷³²

Scientific enquiry became linked with surveying activities thanks to the opportunities available through the Admiralty and its Hydrographer, especially after 1815. As time progressed so the number of opportunities increased and Parry's

⁷²⁸ Although quoted in Day, *Hydrographic Service*, 43 there is a considerable amount of correspondence and technical details recorded in Minute Book 1 and Letter Book 2.

⁷²⁹ Hordern, *King of the Australian coast*, 362.

⁷³⁰ UKHO, MB1 f.46, Correspondence concerning the Canada Company, 1826.

⁷³¹ E.A.M. Laing, 'The introduction of canned food into the Royal Navy, 1811-52' in *Mariner's Mirror*, 50 (1964), 146-9.

⁷³² This tin was manufactured by Donkin, Hall and Gamble in 1823, for the 1824-25 expedition in search of the North West Passage, which was commanded by Captain Parry. The 7lb tin was opened in 1939 by its previous owners, The British Food Manufacturing Industries Research Association (BFMIRA), to investigate the state of preservation of the veal, and acquired by the Science Museum in 1965. In 1810 Nicholas Appert, a French chef, was the first person to perfect the technique of heating food to high temperatures to kill bacteria and then preserving it in glass jars sealed with cork. The following year, two Englishmen, Donkin and Hall, developed tin vacuum cans and set up the first food canning factory (Science Museum website, <http://www.scienceandsociety.co.uk/results.asp?image=10308576>).

enquiring scientific mind opened doors to fields of expertise with which Hurd would have been proud to be associated. Parry's own activities whilst in the Admiralty saw him take an interest in a plethora of subjects, including Mr Babbage's 'computing machine', which he also recommended to Lieutenant Foster (through Franklin) to 'see the effect of a few turns' of the winch in 1824.⁷³³ This interest in cutting-edge technology epitomised the whole ethos of science and hydrography in the Navy.

Instruments⁷³⁴

To be able to record accurate scientific data the Admiralty needed to supply the latest instruments for that purpose, subsequently the Hydrographer was involved with supplying, and surveyors involved with using, a vast range of examples. The number and range of instruments had grown rapidly from Hurd's time on Bermuda when he was supplied with 12 types of instruments, compared to Parry's 1821 voyage when there were 35 different types, amounting to 150 items, of which eight did not belong to the Admiralty (see Appendix 12).⁷³⁵ Parry took three more types than requested by Commander Boteler in 1828, of which Parry marked seven (of Boteler's) as having no connection with his surveying duties, but 'they would all afford him the means of making experiments of high interest'.⁷³⁶ On the latter occasion Parry's experience undoubtedly saved a significant amount of expense in the supply of those instruments, especially if the additional ones had to be purchased. He also would have known all too well that certain instruments were not required because of the instructions given to Boteler were very different to his own for Arctic duties ten years earlier. This highlights the difference between the levels of scientific activity on certain voyages, with Parry's Arctic exploration being more highly scientific than Boteler's survey of Africa.

Such was the growing variety of instruments that when Barrow wrote his *Chronological history of voyages into the Arctic regions . . . to the departure of the*

⁷³³ BL, Add 37183 f.109 Parry to Babbage, 27 February 1824. Babbage's machine was expected to have been able to calculate and print astronomical tables, for which he was awarded the Royal Society Gold Medal in 1824 (Miller, 'The Royal Society . . .', 216-17).

⁷³⁴ This chapter is not a history of instruments, but many useful descriptions can be found in A. McConnell, *No sea too deep. The history of oceanographic instruments* (Bristol, 1982).

⁷³⁵ TNA, ADM2/264, 20 February 1789; Parry, *Journal of a second voyage*, x-xi. These two lists do not include any privately owned instruments belonging to Hurd and Parry which they might have quite possibly taken with them. It should be noted how the two missions were very different as Parry's involved scientific recording, however this does show the extremes of numbers used by surveyors.

⁷³⁶ UKHO, MB1 f.134, Parry to White, 22 January 1828.

recent expeditions under the orders of Captains Ross and Buchan in 1818, he included a long account of the instruments taken on that latter voyage. His text included a brief description of what the instruments were actually being used for (mainly by naval officers) in the Arctic that helped to justify to the layman why such voyages were being undertaken and also why so many expensive scientific instruments were needed. He also mentioned how equipment was taken for recording atmospherical electricity, the analysis of air and for collecting natural history.⁷³⁷ What he did not mention was what use all the observations that had been taken had. Some clearly had very relevant uses, such as those for measuring positions and distances, but measuring the specific gravity of seawater (like many others) was only of interest to a small number of scientists.

To be able to collect specialist scientific data, such as deep-sea soundings and specimens from deeper waters, officers had specifically to request that type of equipment. Such instruments were ‘not usually given to His Majesty’s ships’, neither were thermometers and apparatus for bringing up salt water from different depths.⁷³⁸ Thus, for non-surveyors to make a name for themselves in scientific terms required not only some degree of initiative, but also the ability to acquire instruments for their own use. This highlighted the difference between surveyors and non-surveyors who were administered through the Hydrographic Office. One instrument that stands out as being more scientific than practical, compared to those used on pre-1808 voyages, was the hygrometer. White was known to have used one in 1812 when he recorded the problem with using it in one of his remark books that he submitted to the Admiralty, which ended up in the Hydrographic Office.⁷³⁹ The use of hygrometers was rare amongst surveyors. Captain Boteler wanted to take two with him on a voyage in 1828 to ‘measure [the] dryness of the Harmakan, and land winds from the deserts, and

⁷³⁷ Barrow wrote ‘a dipping needle . . . is calculated to measure the magnetic force . . . a repeating circle for taking terrestrial angles . . . a dip-micrometer and dip-sector, invented by Dr Wollaston, to correct the variation of the real dip from that given in the tables . . . a macrometer, also invented by Dr Wollaston, for measuring directly the distance of inaccessible objects, by means of two reflectors, mounted as in a common sextant . . . a hydrometer to determine the specific gravity of seawater . . .’ (J. Barrow, *A chronological history of voyages into the Arctic regions, undertaken chiefly for the purpose of discovering a north-east, north-west or polar passage between the Atlantic and the Pacific, from the earliest periods of Scandinavian navigation to the departure of the recent expeditions under the orders of Captains Ross and Buchan* (London, 1818), 368-9).

⁷³⁸ UKHO, LP1857 H1056, Hardy to Viscount Exmouth, 9 August 1819.

⁷³⁹ White stated ‘The only inconvenience or irregularity attending this Hygrometer is, that in consequence of its pendulous position, the distension of the chord, will not be in reciprocal proportion to its contraction, the former having a natural impulse to exceed the latter progressively, which of course must be corrected, in proportion as the standard fixed in June falls short of the pointer, on the same month in the succeeding year’ (UKHO, OD542a).

moisture of the sea breezes', but Parry would not allow it as it had no connection with his surveying duties.⁷⁴⁰ This may have been a little harsh on Parry's part as Beechey had taken one on his voyage that returned the year before,⁷⁴¹ but why White was using one and what the outcome of those experiments was, has not come to light.

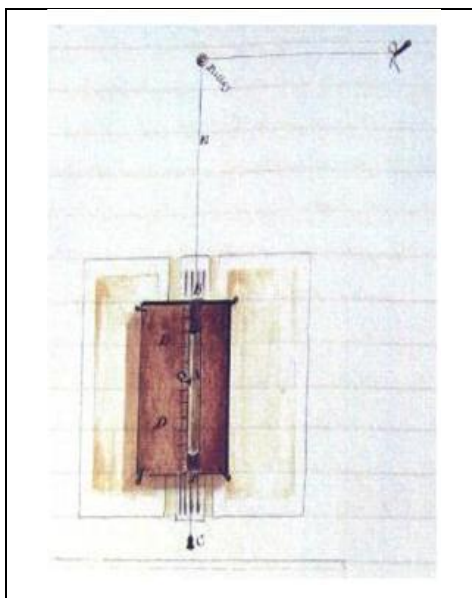


Illustration 4.6 Commander Martin White's drawing of a hygrometer, 1812 (UKHO, OD542a)⁷⁴²

Hydrographic surveyors cannot only be credited with the use of scientific instruments but also their invention. Bligh invented an instrument to 'regulate naval evolutions' and for taking bearings without the use of a compass, that was a 2 feet long hollow wooden tube and 'an inch bore on a circular plate divided into points of a circle to give bearings relative to [the] ship's head'.⁷⁴³ Captain W.F.W. Owen invented a quadruple sextant that was made by the optician Thomas Jones,⁷⁴⁴ which is not surprising considering the nature of surveying and the fact those men would have benefited from their inventions. Even the Frenchman St Amand offered a 'large

⁷⁴⁰ UKHO, MB1 f.134-5, Parry to Admiralty Board, 22 January 1828. The wind referred to is the Harmattan, a dry and dusty West African trade wind.

⁷⁴¹ UKHO, MLP3/3, A list of work returned from H.M.S. *Blossom*, 17 October 1827.

⁷⁴² White explained the hygrometer by annotating it thus: **A** is a piece of wainscot shaped like a triangular prism and made to slide so easily in the groove, **BB** is to fall out, if not suspended, **C** is a weight of ¼ of a pound, attached to the end of the slider, **AD** is the frame nailed against the wainscot is 1 foot long and divided into 10^{ths} of inches, the standard being at 0, **E** is a piece of whip cord 4 yards long (UKHO, OD542a).

⁷⁴³ David, *The surveyors of the Bounty*, 23d quoting a letter in ADM1/1518 from Bligh to the Admiralty Board.

⁷⁴⁴ Ex inf Tony Simcock, Archivist, Museum of the History of Science, Broad Street, Oxford. The instrument is number 47013 in their collection and formerly belonged to the Royal Astronomical Society number 113.

astronomical instrument' to the Admiralty, which was examined and approved of by Hurd.⁷⁴⁵ After the Board of Longitude was dissolved Parry found himself having to deal with any suggestions to the Admiralty to adopt new inventions relating to navigation, rather than just those from surveyors, such as 'a mathematical instrument to form and solve all the problems connected with nautical astronomy'.⁷⁴⁶ But the one instrument that took up the greatest amount of time for the Hydrographer and his assistants was the chronometer.⁷⁴⁷ Not only was the office involved with their acquisition and supply, but also questions had to be dealt with concerning their quality. At the end of the period of this study one writer thought chronometers had been brought to a 'degree of perfection',⁷⁴⁸ which was in part due to the Navy and the administration by the Hydrographer and his staff.

Natural History

The success of scientific voyages sparked enthusiasm and imagination in fellow officers, including those journeys undertaken by Parry to the Arctic, which inspired his colleagues to make similar scientific observations. During non-scientific voyages of exploration there was little time for collecting anything but the most essential types of data prior to the Peace of 1815 depending on where a ship was stationed.⁷⁴⁹ However, after that time men who found employment that wanted advancement, or further postings, could use scientific data collection to make them stand out above their contemporaries, if the opportunity arose for them to collect the data.⁷⁵⁰ There were opportunities for men such as White to not only record the shells he brought up with the lead and his botanical observations, but to advertise the fact in his published account of 1817⁷⁵¹ as well as in his sailing directions. He also recorded a 'Lithological Department', broken down into 13 different categories of classification,⁷⁵² but the

⁷⁴⁵ William L. Clements Library, Croker box 6 St Amand to Yorke, 18 October 1823; *ibid*, Yorke to St Amand, 3 November 1823.

⁷⁴⁶ UKHO, LP1857 B1032, Barnes to the Admiralty Board, 7 May 1829. Also see the later section in this chapter under 'Astronomy'.

⁷⁴⁷ For details of the acquisition and supply of chronometers see Chapter Seven.

⁷⁴⁸ Pollock, *The United Service Journal*, part I, 81.

⁷⁴⁹ John Laing, surgeon authored *An account of a voyage to Spitzbergen; containing a full description of that country, of the zoology of the North, and of the Shetland Isles; with an account of the whale fishery; with an appendix, containing some important observations on the variation of the compass, &c based upon observations made on H.M.S. Sybyll in 1814.*

⁷⁵⁰ Miller puts forward the case that the development of scientific interests was linked to career advancement specifically citing Foster as having a meteoric career (Miller, 'The revival', 107, 115).

⁷⁵¹ UKHO, OD541.

⁷⁵² White, *Sailing directions for the English Channel*, 10-12.

variety of specimens drew him to the conclusion that the effect of winds and tides spread them too widely to be able to identify any patterns of production.⁷⁵³ Such observations and methodology are surely enough to prove that he was a man of science, with more than just an enquiring mind as he had the ability to analyse his findings, as well as the confidence to present them to a wider audience.



Illustration 4.7 The title page of Commander Martin White's Remark Book of 1817 showing a variety of natural history specimens and zoophyta that he recorded whilst in the English and Irish Channels (UKHO, OD541)

Despite White's achievements there was no fundamental request from the Admiralty or Linnean Society for all vessels to suddenly to begin to record natural history specimens, although there were other naval men that did. In 1818 in Baffin's Bay John Ross made a significant discovery that proved to the scientific world that there was life at depths of 1000 fathoms.⁷⁵⁴ Ross was not the only officer to take an interest in this subject as in 1817 observations on H.M.S. *Port Royal* from England to

⁷⁵³ White stated '... the immense variety of submarine heterogeneous substances, so multifariously disguised as they are by coalition, accretion, alternation, and disintegration, independent of indigenous matter, has thoroughly convinced me of the impracticability of designation any particular position in latitude and longitude by the test of chemical analysis alone, even under the most favourable circumstances' (White, *Sailing directions for the English Channel*, 11-12).

⁷⁵⁴ C.W. Thomson, *The depths of the sea* (London, 1873), 18.

Jamaica included records of plants, zoophytes, fish and birds.⁷⁵⁵ Captain T.M. Hardy in 1819 requested for the benefit of science, to ‘be supplied with one of those instruments which Captain Ross called Sea Clams, and which he made use of for bringing up substances from the bottom of the sea’; this was an unusual request, although clearly the invention of the sea clam by Ross in 1817 and its subsequent use by Parry in 1818 sparked an interest in the subject. Hardy also offered to record the relative amounts of salt in seawater from various depths, as well as the temperature of the water.⁷⁵⁶ It is also possible that the influence the Royal Navy had on one former seaman caused him to record fauna, ice formations and make anthropological observations after he left the Navy.⁷⁵⁷ Such observations were not exclusively made by naval officers as William Scoresby junior, a civilian, used the opportunity of whaling voyages to amass scientific data.⁷⁵⁸ There were practical advantages to the Navy of knowing what plants and animals were edible for stranded mariners, but the information was not widely disseminated so such advantages were negligible. Much of this, especially in the field of zoology,⁷⁵⁹ was pioneering work which reflected well on the Admiralty and the association with Banks also reflected well on Government because of his position in society.

⁷⁵⁵ UKHO, MP47, Remark Book of H.M.S. *Port Royal*, 1817.

⁷⁵⁶ UKHO, LP1857 H1056, Hardy to Viscount Exmouth, 9 August 1819; McConnell, *No sea too deep*, 45.

⁷⁵⁷ J. Weddell, *A voyage towards the South Pole, performed in the years 1822-24 containing an examination of the Antarctic Sea, to the seventy-fourth degree of latitude; and a visit to Tierra del Fuego, with a particular account of the inhabitants. To which is added, much useful information on the coasting navigation of Cape Horn, and the adjacent lands, with charts of harbours, &c* (London, 1827), vi and plate opposite the title page showing a ‘Man and Woman of Terra del Fuego’. But all of those admirable efforts were insignificant compared to the work of William Scoresby junior, a civilian who used the opportunity of whaling voyages to amass scientific data in the fields of magnetism, specific gravity of sea water, the temperature, depth and pressure of the Greenland Sea, impregnation of water into wood, currents, wave action, atmospheric conditions, zoology, natural history, meteorology, plants, mineralogy and the specific gravity of ice. His scientific enquiries led to him becoming a Fellow of the Royal Society of Edinburgh and he acknowledged the assistance given to him by Banks in the introduction to his published account.

⁷⁵⁸ Scoresby collected data in the fields of magnetism, specific gravity of sea water, the temperature, depth and pressure of the Greenland Sea, impregnation of water into wood, currents, wave action, atmospheric conditions, zoology, natural history, meteorology, plants, mineralogy and the specific gravity of ice. His scientific enquiries led to him becoming a Fellow of the Royal Society of Edinburgh and he acknowledged the assistance given to him by Banks in the introduction to his published account (W. Scoresby jun., *An account of the Arctic regions, with a history and description of the Northern whale-fishery* 2 vols (London, 1820); T. and C. Stamp, *William Scoresby, Arctic scientist* (Whitby, 1975)).

⁷⁵⁹ The Zoological Society was established in 1826 through the efforts of Sir Humphry Davy, President of the Royal Society and Sir Thomas Stamford Raffles (Miller, ‘The Royal Society . . .’, 267-8).

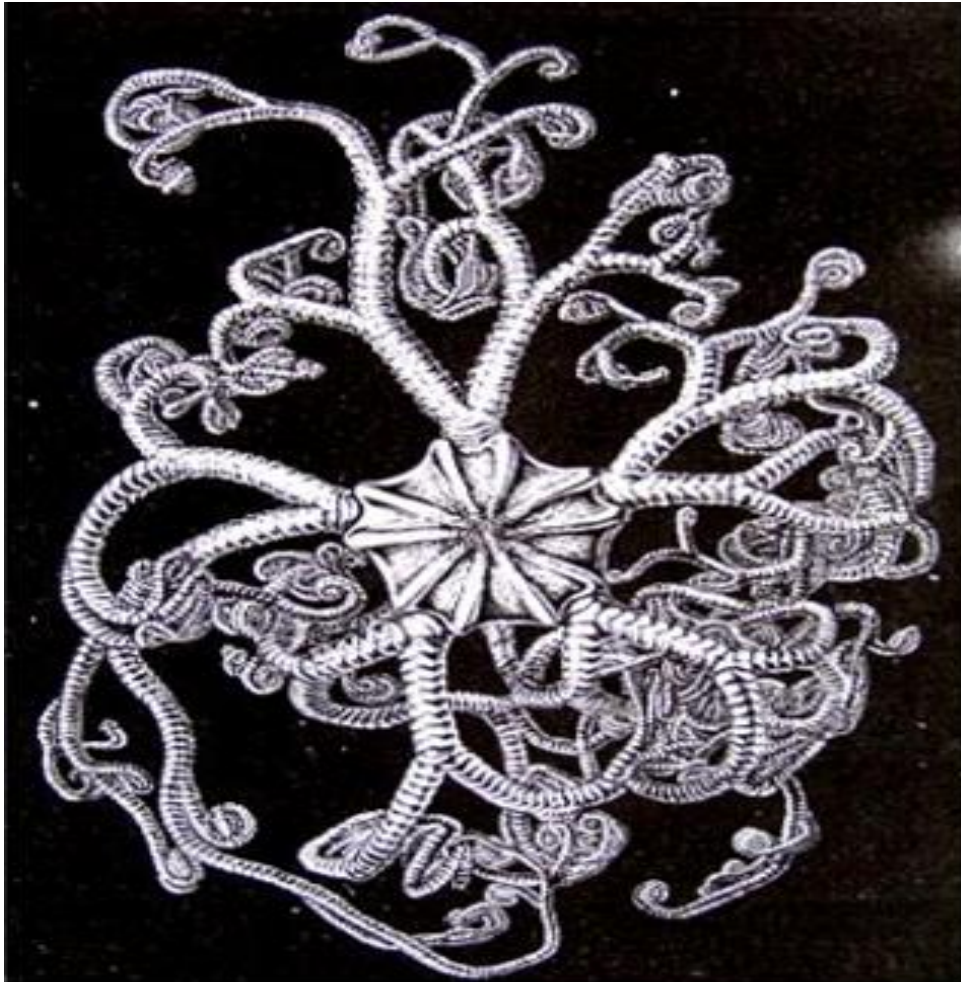


Illustration 4.8 *Asterophyton Rackii* recovered from a depth of 4,800 feet by Sir John Ross in 1818 (C.W. Thomson, *The depths of the sea*, 1873, p19)

Planned voyages of scientific exploration (unsurprisingly) yielded far greater numbers of natural history specimens, such as a book full of objects of natural history recorded by Mr William Smith (mate) on Beechey's expedition on the *Blossom* between 1825 and 1828.⁷⁶⁰ They were not part of his duties as Mr Lay, the naturalist, was responsible for this area of scientific recording and he sent in various papers on natural history, assisted by the ship's surgeon Mr Collie.⁷⁶¹ However, outside of any organised data gathering (by men such as Dr Webster and Allan Cunningham)⁷⁶² there were only occasional references to naval men taking an interest in natural history, recording it and passing it on for the benefit of science. Men such as Lieutenant Symonds who noted on Saint Paul's Rocks in 1814 how he had seen land-crabs dragging 'young birds out of their nests, and devouring them', which he later passed

⁷⁶⁰ UKHO, MB1 f.213, Parry to Barrow, 17 October 1828.

⁷⁶¹ UKHO, MLP3/3, work received from H.M.S. *Blossom*, 17 October 1827.

⁷⁶² A.M. Lucas, 'Cunningham, Allan (1791–1839)', *ODNB* [accessed 30 March 2009].

on to Charles Darwin who subsequently published the information in 1839.⁷⁶³ Lieutenant Kendall recorded sea leopards in the South Shetlands in 1829 when not recording scientific data as part of his official duties.⁷⁶⁴ This does not mean there was little interest in the subject, as many officers sketched natural history specimens and would have received some education in that field. However, out of all of the subjects associated with hydrography, natural history was the poorest of relations. All of which shows how the naturalists benefited more than the Admiralty from the collection and recording of natural history specimens.

Many specimens that were collected were sent to the large museums such as those in Edinburgh, Dublin, and the British Museum,⁷⁶⁵ with the emphasis being very much on making them publicly available. Parry sent a copy of the supplement to the appendix of his 1819-20 voyage covering natural history to the newly formed Astronomical Society in London in 1824, which as a member of that organisation he was keen to support.⁷⁶⁶ Interest in natural history was widespread and many learned societies were in existence which could count members of the Navy and of the Admiralty amongst their number. The most notable of which during this period was James Francis Stephens (1792-1852), who was granted a period of leave from his position in the Admiralty (in 1818) to go and work at the British Museum on their natural history collections.⁷⁶⁷

⁷⁶³ A.J. Edwards, 'Saint Paul's Rocks: a bibliographical review of the natural history of a Mid-Atlantic Island', *Archives of Natural History* 12 (1985), 34.

⁷⁶⁴ UKHO, OD39.

⁷⁶⁵ TNA, ADM1/3464, Parry to the Admiralty Board, 23 June 1826. The Natural History Museum was not established until 1881.

⁷⁶⁶ Royal Astronomical Society, Letters 1824, Parry to Millington, 10 March 1824.

⁷⁶⁷ Y. Foote, 'Stephens, James Francis (1792–1852)', *ODNB* [accessed 30 March 2009].



Illustration 4.9 Sea Leopards on the Island of Deception, South Shetland by Lieutenant Kendall, 9 January 1829 (UKHO, OD39)

Astronomy

Ashworth has shown how astronomical observations lay at the ‘heart of British imperialism’ and commerce, because of the importance of knowing exactly where you were and being able to plan the shortest journey times to save money.⁷⁶⁸ This was nothing new in the early nineteenth century as mariners had relied on astronomical observations for centuries for this purpose. But throughout the period of this study there were still significant gaps in the known position of many places of maritime importance,⁷⁶⁹ which the Chart Committee brought to the attention of the Admiralty Board in 1807.⁷⁷⁰ Apart from the obvious hydrographic interest in astronomical observations, Hurd was more deeply involved with this subject because of his administrative role on the Board of Longitude; that role saw him come into contact with both Flinders and Banks, especially over the publication of the former’s observations in 1811.⁷⁷¹ Hurd was fortunate, especially after 1815, to be able to

⁷⁶⁸ W.J. Ashworth, ‘John Herschel, George Airy, and the Roaming Eye of the State’, *History of Science* 36 (1998), 161.

⁷⁶⁹ UKHO, MB1 fos 162-6, Parry to Ogle, 1 March 1828. In this letter Parry requested positions for 66 places.

⁷⁷⁰ M.K. Barritt, *Eyes of the Admiralty. J.T. Serres an artist in the Channel Fleet 1799-1800* (Greenwich, 2008), 43, quoting from TNA, ADM1/3523.

⁷⁷¹ Dooley and Brown, *Matthew Flinders private journal*, 350, 354-5, 368, 370, 372, 374.

capitalise from a growing capacity of surveyors able to collect the high quality data that he yearned for. Men like Captain W.F.W. Owen, who set up his own 'Hydrographer's Office' at Kingston, Ontario in 1816 to which his minor savants, such as Becher, sent him their observations, that were ultimately forwarded on to Hurd in London.⁷⁷² Becher was a rising star in not only hydrography⁷⁷³ but in the field of astronomy. His interest in this subject can be seen in the journal he kept whilst on the *Leven* (from 1818) in which he drew up a detailed four page account headed 'Precepts for constructing an Ocultation [*sic*]' which set out his methodology for determining the position of celestial bodies. He also kept notes on the use of lines on Gunter's Scale,⁷⁷⁴ measuring the arc of a great circle, projections and many practical applications of related mathematical problems that were crucial to position fixing.⁷⁷⁵

During Hurd's period as Secretary to the Board of Longitude⁷⁷⁶ the Board was responsible for the *Nautical Almanac*. The *Almanac* was essential for navigation, as its content enabled mariners to calculate their position in relation to the heavenly bodies. The Hydrographer supplied copies of the *Almanac* to survey vessels and with its significance to navigation it is surprising he was not given full responsibility for its production. During Parry's last year as Hydrographer he was called upon by the Admiralty Board to consider questions raised concerning that publication by the Chancellor of the Exchequer and the Superintendent of the Nautical Almanac Office, Thomas Young. Those questions related to a Parliamentary enquiry⁷⁷⁷ and Parry was asked for any improvements that could be made to the publication,⁷⁷⁸ which he must have relished as he held a deep and long interest in astronomy having written a treatise on nautical astronomy.⁷⁷⁹ Parry made five significant observations on the *Almanac*, including a request for more occultations and the distances of the principal

⁷⁷² UKHO, MP30, Becher to Owen, 20 July 1816.

⁷⁷³ B. Vale, *A frigate of King George: life and duty on a British man-of-war 1807-1829* (London, 2001), 120.

⁷⁷⁴ Gunter's practical inventions included Gunter's scale, or Gunter's line, generally called the gunter by seamen, was a large plane scale with logarithmic divisions plotted on it. With the aid of a pair of compasses, it was used to multiply and divide. Gunter's scale was an important step in the development of the slide rule (<http://www.britannica.com/EBchecked/topic/249527/Edmund-Gunter>).

⁷⁷⁵ UKHO, OD513, Becher's journal H.M.S. *Leven*, 1818-1820 commanded by Capt. Bartholomew. Becher does not appear in the *Oxford Dictionary of National Biography* despite making a valuable contribution to British hydrography.

⁷⁷⁶ TNA, ADM1/3458, memorandum, 2 May 1810.

⁷⁷⁷ Board of Longitude, *Copy of any memorials or reports presented to Government since 1st January 1828, on the subject of the Nautical Almanack, or the Board of Longitude* (London, 1829).

⁷⁷⁸ UKHO, MB1 f.229, Admiralty Board to Parry, 15 February 1829.

⁷⁷⁹ J.K. Laughton, 'Parry, Sir (William) Edward (1790-1855)', rev. A.K. Parry, *ODNB* [accessed 11 June 2008].

planets from the Moon, an idea he obtained from the ephemeris published at Copenhagen.⁷⁸⁰ The *Almanac* was eventually reformed by the Royal Astronomical Society at the invitation of the Admiralty Board.⁷⁸¹

After the Board of Longitude had been abolished there was a function missing from Government that fell well within the capabilities of a navigational specialist such as the Hydrographer to the Admiralty. However, Parry was of the opinion that it was not within the remit of his position as Hydrographer to undertake the examination and trial of instruments, lamenting how ‘that duty occupies the whole of my time’.⁷⁸² Parry should have received some assistance from a committee of the Royal Society formed in October 1828 to advise the Admiralty on those very matters.⁷⁸³ Certainly on one occasion he had been instructed by Cockburn to spend £100 overseeing the trial of an artificial horizon sent to the Admiralty by Captain Phillips and it was trialed on the *Protector*.⁷⁸⁴ But not to discourage one applicant he suggested he should approach the

Astronomical Society of London, from the zeal displayed by that body for every thing connected with astronomical science, is more likely than any other to forward your present views.⁷⁸⁵

It is highly likely that by the 8th of May Parry knew he was going to be resigning and therefore had little enthusiasm for carrying out any further tests, even if they did involve a subject close to his heart.

Parry had a well-established background in astronomy and his view regarding the recording of longitudes using astronomical observations was achieved by taking

occultations of fixed stars by the moon; solar eclipses; eclipses of Jupiter’s satellites; and lunar distances; and these may be considered as capable of accuracy in the order in which they are here stated.⁷⁸⁶

⁷⁸⁰ UKHO, MB1 f.229, Parry to Admiralty Board, 25 February 1829.

⁷⁸¹ D.H. Sadler, ‘The bicentenary of the *Nautical Almanac*’, *The Journal of the Institute of Navigation* 21:1 (January 1968), 15. For the role of the Royal Society in that affair see Miller, ‘The Royal Society . . .’, 260-1, 297-9, 313-28.

⁷⁸² UKHO, MB1 f.233.

⁷⁸³ Reidy, ‘The flux and reflux of science . . .’, 134. An Order in Council of 2 October 1828 stipulated the offices of Superintendent of Chronometers and Superintendent of the *Nautical Almanac*, plus the Resident Committee were to ‘advise the Lord High Admiral on all questions of discoveries, inventions, calculations, and other scientific subjects’.

⁷⁸⁴ UKHO, MB1 f.233.

⁷⁸⁵ UKHO, LB2 f.303, Parry to Barnes, 8 May 1829. The *Astronomical Society* did not receive its royal charter until 1831.

⁷⁸⁶ UKHO, MB1 f.163, Parry to Ogle, 1 March 1828.

Once this had been done and the true position of the place identified the improvement for charting was obvious. Someone who shared Parry's interest was Captain Sabine of the Royal Artillery. Sabine had been recommended by the President (Banks) and Council of the Royal Society to serve on Parry's 1819 voyage, as he was 'a gentlemen well skilled in astronomy', who was specifically chosen to assist Parry in the 'advancement of science in general'.⁷⁸⁷ Through men such as this the connections to scientists like Alexander von Humboldt, as well as hydrographic specialists such as Rennell and Bauzá, were made.⁷⁸⁸ Through Humboldt (who met Krusenstern in 1827) the Admiralty could have made contact with those scientists who went on Krusenstern's scientific cruise, such as Johann Caspar Horner (1774-1834) a Swiss-born physical scientist and astronomer, Wilhelm Gottfried Tilesius (1769-1857) a naturalist from Leipzig and the German natural scientist Georg Heinrich von Langsdorff (1774-1852).⁷⁸⁹ Sadly such an opportunity to add to the great benefits to British science made in the 1820s was missed, as Parry was at times too focussed on hydrography and his own voyages of exploration.

Many scientists wanted a worldwide record of astronomical observations but it was not easily achieved, although through Parry's connection with Bauzá it took a significant step forward. Bauzá was invited to attend the annual visit to the Greenwich Observatory as a member of the examining board, where he met Sir John Herschel.⁷⁹⁰ The connection to Herschel was yet another link in Parry's scientific network⁷⁹¹ and this subsequently led to the Spanish astronomer, Sánchez Cerquero, visiting both Greenwich and the home of Captain Smyth.⁷⁹² The connections with the Royal Society brought Bauzá into contact with Humboldt, who subsequently introduced him to Jabbo Oltmanns, the astronomer who worked for Humboldt in Paris and Baron Franz Xaver von Zach at the Seeberg observatory.⁷⁹³ Bauzá's achievements in

⁷⁸⁷ Miller, 'The Revival', 118. Parry, *Journal of a voyage*, xxiv-xxv. See also Deacon, *Scientists and the sea*, 240 for details of Sabine's work for Sir Humphry Davy in 1822. See A.G.E. Jones, 'Sir John Ross and Sir John Barrow', *Notes and Queries* 19(8) (August 1972), 301 for information on the other Sabine who specialised in ornithology.

⁷⁸⁸ Deacon, *Scientists and the sea*, 237. See Chapter Three for the connection between Bauzá, Parry and Humboldt.

⁷⁸⁹ K.R. Benson and P.F. Rehbock (eds), *Oceanographic history the Pacific and beyond* (Seattle, 2002), 110.

⁷⁹⁰ Lamb, 'The London years of Felipe Bauzá', 324. The Admiralty accepted the administration of the Royal Observatory in 1818 (Day, *Hydrographic Service*, 33).

⁷⁹¹ Parry, *Parry of the Arctic*, 13, 30, 32; Royal Society, HS14.142, Matilda Parry to Herschel, 26 November 1822; *ibid*, HS13.217, Parry to Herschel, 9 April 1821.

⁷⁹² Lamb, 'The London years of Felipe Bauzá', 324.

⁷⁹³ Lamb, 'The London years of Felipe Bauzá', 329.

astronomy and hydrography were recognised by Smyth who named a number of features of a cluster of volcanic rocks (on the Spanish mainland) after Bauzá and his associates.⁷⁹⁴ This was a classic example of international collaboration through science.

Terrestrial positional data also came into the Hydrographic Office from less well-known individuals, from both merchant and military sources. The problem faced by the Hydrographer was establishing whether those positions were accurate enough to be acted upon, which for even experienced hydrographic specialists was occasionally problematic. The master of the *Lord Suffield* transport ship sent in what he thought was the correct position of Quebec to Parry in 1828, that was found to be 19' further westward than most of the other authorities. Unfortunately for Parry the observations by Commander Bayfield were not yet available for him to verify whether he could act on the data or not.⁷⁹⁵ Neither were the observations (ordered by the Lord High Admiral) being collected by the squadron under Admiral Sir Charles Ogle on the North American Station available.⁷⁹⁶ For naval officers the Admiralty had issued printed instructions for finding the latitude and the meridian altitude of a fixed star, the moon, or a planet, in 1818.⁷⁹⁷ This was a good baseline for naval observations and subsequently they should have been far more accurate than their merchant counterparts, especially as the latter was under no regulations for obtaining data to any specific guidelines or standard, even if it was in their interest to do so. Even so this still did not help Parry and the verification of unsolicited data still causes problems for hydrographic offices today.

Both Hurd and Parry were fortunate in having other surveyors who were not only interested in astronomy but had built up a reputation for excellence in this field of science. Men such as Smyth made contacts throughout the Mediterranean, with men like Marcet,⁷⁹⁸ and took occultations in Italy⁷⁹⁹ meeting the famous Italian

⁷⁹⁴ Lamb, 'The London years of Felipe Bauzá', 335. See Chapter Three for Bauzá's contribution to data acquisition.

⁷⁹⁵ UKHO, MP38, fos 185-8, Holton to Victualling Board, 19 November 1828.

⁷⁹⁶ UKHO, MB28 Observations made on the North American Station, pursuant to orders from His Royal Highness the Lord High Admiral in the years 1828, 1829, and 1830, to ascertain the latitudes, and longitudes of the various headlands &c thereon, for the purpose of improving the charts by the officers of the squadron under the direction of Rear Admiral Sir Charles Ogle, Bart, commander in chief. This also included observations for Bermuda.

⁷⁹⁷ TNA, ADM7/226.

⁷⁹⁸ Deacon, *Scientists and the sea*, 239.

⁷⁹⁹ Board of Longitude, *Copy of any memorials or reports presented to Government since 1st January 1828, on the subject of the Nautical Almanack, or the Board of Longitude* (London, 1829), 8.

astronomer Piazzi,⁸⁰⁰ after whom Smyth later named his son. Parry wrote to Sir Edward Owen on the Admiralty Board in April 1828 suggesting an approach be made to Smyth to prepare a hydrographical memoir of the Mediterranean. However, Parry was keen to point out how Smyth may have been too busy in his own observatory at Bedford making observations on the places of the fixed stars, a venture supported by the Astronomical Society, rather than compiling sailing directions for the Admiralty.⁸⁰¹ Beaufort wrote to Smyth lamenting ‘the kindness of royal admirals and plebeian secretaries’ in letting him work at Bedford rather than for the public benefit.⁸⁰² Like his fellow surveyors, Smyth had an ability to make precise measurements and systematic calculations that were fundamental to accurate astronomy and charting, although at that time sailing directions were more relevant to the Admiralty than newly collected astronomical observations.

The first quarter of the nineteenth century saw the foundation of numerous learned societies. Banks was against the foundation of the Astronomical Society and subsequently it found itself closely linked with the Geological Society⁸⁰³ rather than the Royal Society.⁸⁰⁴ Smyth became a fellow of the Astronomical Society in 1821 taking an active role⁸⁰⁵ and other hydrographic surveyors swelled the ranks of this

⁸⁰⁰ Smyth’s son was named Charles Piazzi Smyth after the Italian astronomer (J.K. Laughton, ‘Smyth, William Henry (1788–1865)’, rev. R.O. Morris, *ODNB* [accessed 12 June 2008]). From Piazzi’s Palermo Observatory he authored a catalogue of the places of 7646 stars in 1814 (A. Chapman, *Dividing the circle: the development of critical angular measurement in astronomy 1500–1850* (Chichester, 1990), 119).

⁸⁰¹ UKHO, MB1 f.179, Parry to Edward Owen, 8 April 1828.

⁸⁰² American Philosophical Society, BSm98, Beaufort to Smyth, November 1827. Smyth was also well connected with Herschel and Beaufort before the latter became Hydrographer (American Philosophical Society, BSm98, William Henry Smyth papers, Herschel to Smyth letters, 1827–31, also Beaufort to Smyth, 1827–9).

⁸⁰³ Geology was not totally unconnected with hydrography as Horsburgh suggest to Hurd in April 1814 that a geologist should be sent on one voyage and in August 1828 Parry suggested some geological specimens should be sent to the Geological Society in London as that was the ‘the only institution in London where they are likely to be beneficial to Science’ (BL, IOR MSS EUR F305/1 f.219 Horsburgh to Hurd, 18 April 1814; UKHO, MB1 f.204 Parry to Owen, 1 August 1828). Direct involvement with geology can be seen on one voyage when Lieutenant Edward Belcher made a geological survey of a bay whilst serving on H.M.S. *Blossom* (J. Richardson *et al*, *The zoology of Captain Beechey’s voyage; compiled from the collections and notes made by Captain Beechey...during a voyage to the Pacific and Behring’s Straits . . . in His Majesty’s Ship Blossom...* (London, 1839), plate 2 opposite 160).

⁸⁰⁴ W.J. Ashworth, ‘The calculating eye: Baily, Herschel, Babbage and the business of astronomy’, *British Journal for the History of Science* 27 (1994), 411–12. For the period 1820–1830 and the involvement between the Astronomical Society and the Royal Society see Miller, ‘The Royal Society . . .’, 206–18.

⁸⁰⁵ J.L.E. Dreyer and H.H. Turner (eds), *History of the Royal Astronomical Society volume 1 1820–1920* (London, 1923), 21. He also borrowed instruments from the Society in 1827 (*ibid*, 45) and 1828, as well as accepting medals on behalf of two professors in his capacity as Foreign Secretary of the Society (Astronomical Society, *Proceedings*, 115).

expanding society over the coming years.⁸⁰⁶ Others who were connected with hydrography included Clarence and members of the Admiralty Board,⁸⁰⁷ Cockburn and Melville, Horsburgh, Sir Charles Ogle and Edward Sabine. Notable amongst the missing names was Hurd's own, who possibly did not give his patronage to the Society because of his connection to Banks, which is all the more credible a theory as Colby of the Ordnance Survey did by becoming one of its first council members.⁸⁰⁸

The Society wasted no time in utilising its hydrographic membership with Hall announcing his forthcoming voyage and asking for 'instructions for nautical observations likely to be of value'; a committee was formed and a paper presented to Hall that was duplicated for Captain Owen's use in 1822.⁸⁰⁹ Smyth became Foreign Secretary of the Society and Lieutenant Stratford R.N. worked on new tables for computing the Aberration, Precession, and Nutation of 2881 principal fixed stars (with a catalogue) in 1827 for which he was awarded the Society's silver medal.⁸¹⁰ Similarly the data recorded by Captain Foster between 1828-31 on the *Chanticleer* was prepared for publication by the president of the Royal Astronomical Society and published at the expense of the Admiralty in 1834.⁸¹¹

Therefore, prior to the establishment of the Royal Geographical Society the Astronomical Society must have acted as an unofficial 'club' for hydrographic surveyors and it continued to attract Hydrographers into the twentieth century.⁸¹² But the Astronomical Society was not the only society to benefit from the membership of naval officers specialising in hydrography, as Commander Phillip Parker King on returning from his successful survey of Australia was made a Fellow of both the Linnaean and Royal Asiatic Societies.⁸¹³ From a scientific perspective there were many

⁸⁰⁶ Other men included Bayfield, Beaufort, Beechey, Becher, Belcher, Boteler, Foster, Franklin (who joined on his return from the Arctic), Graves, Miles, Mudge, three members of the Owen family (Edward, Richard and William), James and John Ross.

⁸⁰⁷ Dreyer, *History*, 46.

⁸⁰⁸ Dreyer, *History*, 7. Colby also presented the Society with some books (ibid, 12).

⁸⁰⁹ Dreyer, *History*, 12-13.

⁸¹⁰ Astronomical Society, *Monthly notices of the Astronomical Society of London, containing abstracts of papers, and reports of the proceedings of the Society from February 1827, to December 1830* (London, 1831), 2.

⁸¹¹ Savours, *Midshipman Kay*, 267.

⁸¹² Dreyer, *History*, 25. Admiral Sir H.E. Purye-Cust, Hydrographer of the Navy 1909-14 was a member during the 1920s, showing how hydrographic interest was present during the first century of the society's existence. Parry asked to meet Sir John Herschel there in 1821 to take up the offer of his election to that newly formed body (Royal Society, HS13.217, Parry to Herschel, 9 April 1821).

⁸¹³ Hordern, *King of the Australian coast*, 394. Between 1826 and 1830 Commander King oversaw the collection of latitudes and longitudes astronomically and chronometrically deduced, the dip and variation of the magnetic needle and meridian distances (UKHO, DB/MB30).

aspects of data collection that had no practical application in the early nineteenth century Navy but astronomical observations were quite the opposite. For every hydrographic specialist and navigator astronomical observations were a part of everyday life at sea.

Magnetism

The importance of magnetism to the Admiralty was twofold. First, because the variation caused by the iron in a ship affected compass readings (which were used to navigate)⁸¹⁴ and secondly, the naturally occurring magnetic variation in the earth which required compass bearings to be adjusted. It is not surprising that the Hydrographer was involved in both of these issues, just as much as he was with astronomy, playing a significant role in the ‘Magnetic Crusade’ of the early nineteenth century.

Foremost in the examination of the deviation of the needle due to the iron in ships was the hydrographic surveyor Flinders. He was not the first to recognise this problem and it was certainly more widely known after Joseph Whidbey, a master in the Navy, wrote of it in the *Naval Chronicle* of 1799. Flinders’ initial experiments were undertaken on the *Investigator* whilst on his survey of Australia at the turn of the century and on his return to England the opportunity arose, through the support of Hurd, to continue the work.⁸¹⁵ He recommenced the work in April 1812 at Sheerness, although the progress was slower than he would have liked,⁸¹⁶ but his findings were welcomed by fellow like-minded officers.⁸¹⁷ During experiments in May another hydrographic surveyor, Captain Peter Heywood, was involved at Portsmouth who was thought very highly of by Flinders⁸¹⁸ and even considered approaching him for a placement for a young man at the Naval College who wished to go to sea.⁸¹⁹ Flinders also wrote regularly to Hurd with his findings, consulted local men and published articles.⁸²⁰ Hurd viewed the discovery by Flinders as one ‘of the greatest importance

⁸¹⁴ See Reidy, ‘The flux and reflux of science . . .’, 114.

⁸¹⁵ For details of the experiments see A.J. Brown and G. Dooley (eds.), *Matthew Flinders private journal from 17 December 1803 at Isle of France to 10 July 1814 at London* (Adelaide, 2005).

⁸¹⁶ NMM, FLI/25 Matthew Flinders to Ann Flinders, 20 April 1812, 22 April 1812.

⁸¹⁷ NMM, FLI/25 Matthew Flinders to Ann Flinders, 23 April 1812.

⁸¹⁸ NMM, FLI/25 Matthew Flinders to Ann Flinders, 15 May 1812. Heywood served under Bligh and later became a prolific surveyor who narrowly missed out on being appointed as Hydrographer.

⁸¹⁹ NMM, FLI/25 Matthew Flinders to Ann Flinders, 17 May 1812.

⁸²⁰ NMM, FLI/25 Matthew Flinders to Ann Flinders, 24 May 1812.

to navigation⁸²¹ and the two men discussed the matter at the Admiralty on 30 May 1812.⁸²² The report Flinders prepared on that subject was with Hurd by 8 June,⁸²³ but undoubtedly due to the pressure of work Hurd did not have the time to read it by the 14th of July.⁸²⁴ Not happy with that state of affairs Flinders aired his grievance to Banks, who told him to tell the Admiralty that if they wanted his opinion on the subject he would give it. Flinders went immediately to see Hurd, rather than the Admiralty Board, to tell him this news, to which Hurd agreed to put the proposal to the Admiralty Board.⁸²⁵

As a result of the work undertaken by Flinders the Admiralty issued a three page pamphlet on the *General deductions from experiments, relating to the variation of the magnetic needle* in 1813. The instructions pointed out how iron on most ships, especially those with lots of iron and guns, affected the needle, going into some detail of the causes. The instructions pointed out how the compass should be placed ‘where the Needle being equally affected by the attractions forward and aft, remains true’.⁸²⁶ Flinders’ deductions had long lasting effects for every ship in the Navy that had enough iron to alter the needle. Others followed in Flinders’ footsteps such as William Bain, Master, R.N. who had *An essay on the variations of the compass showing how far it is influenced by a change in the direction of the ship’s head* published at Edinburgh in 1817. In that publication he recalled work undertaken during the seventeenth century and his own findings in the St Lawrence, comparing them to Flinders’ work. Clearly the interest in this field had been sparked throughout the Navy, including one lieutenant (W.E. Parry who later became Hydrographer) who in 1819 sent a diagram showing the magnetism of the *Hecla* to the Admiralty Board.⁸²⁷

⁸²¹ Browne and Dooley, *Flinders journal*, 405.

⁸²² Browne and Dooley, *Flinders journal*, 410.

⁸²³ Browne and Dooley, *Flinders journal*, 411.

⁸²⁴ Browne and Dooley, *Flinders journal*, 415.

⁸²⁵ Browne and Dooley, *Flinders journal*, 416.

⁸²⁶ TNA, ADM1/5122/2. Earlier experiments can be found as a 21-page appendix to his published account of his voyage to Australia (J.K. Laughton, ‘Flinders, Matthew (1774–1814)’, rev. A.C.F. David, *ODNB* [accessed 7 June 2008]).

⁸²⁷ CUL, RGO14/7, Confirmed minutes f.290, 3 June 1819.

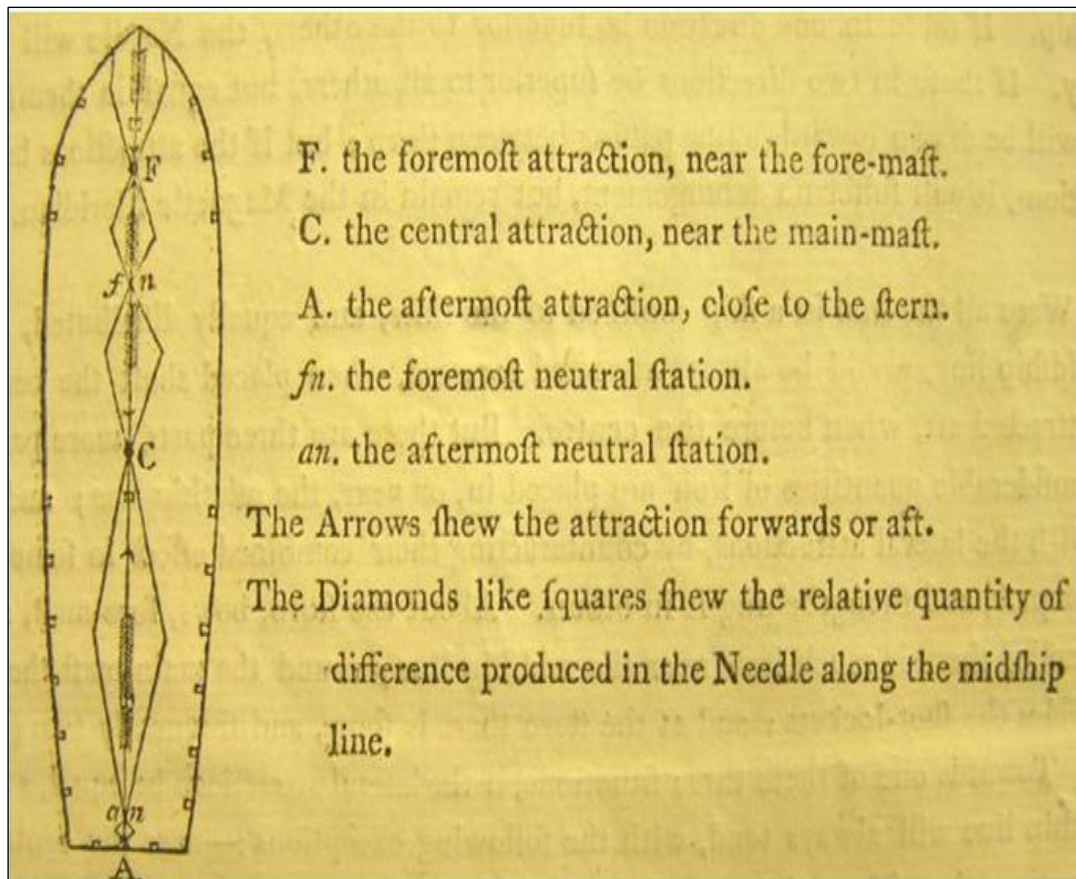


Illustration 4.10 Flinders' diagram from *General deductions from experiments, relating to the variation of the magnetic needle* showing the magnetism in ships (TNA, ADM1/5122/2)

One of Flinders' suggestions for overcoming the problem involved a vertical bar of soft iron being placed on the binnacle, that was introduced many years later as the Flinders bar. At the end of the period one writer looked back and considered that Professor Barlow (of the Royal Military Academy at Woolwich) had made the discovery of the local attraction of the magnet on ships, thus benefiting all mariners and hydrography,⁸²⁸ but Flinders with Hurd's support made a bigger contribution, especially for the Navy. Barlow had invented a magnetic plate⁸²⁹ that was trialled by

⁸²⁸ Pollock, *The United Service Journal*, part I, 81; Miller, 'The Revival', 128; Miller, 'The Royal Society . . .', 201 states how Barlow's investigations were begun in 1819.

⁸²⁹ For a drawing of his invention and some background information see A. McConnell, *Geomagnetic instruments before 1900. An illustrated account of their construction and use* (London, 1980), 22-3. An example was kept in the Museum at the Admiralty Compass Observatory in the 1930s and Lieutenant Alexander described it as having a 'conical socket which could be screwed to the side of a compass stand. A brass rod of about 1 foot long is screwed into the socket, and the plate is shipped on the rod and kept in any required position by means of a set screw. To fix the plate in position it was necessary to find from the deviation table the "line of no attraction" and then to fix the plate in this line, i.e., with the rod carrying the plate so aligned and the plate therefore at right angles to it. The proper position of the plate.' (Lieutenant G.H. Alexander, *A catalogue of the Admiralty collection of marine and air*

Foster on the *Conway* and Parry on the *Griper*; the findings were sent to the Board of Longitude in 1824. Foster vindicated Barlow's invention, but in a letter to Barrow stated it was even more useful if fixed in the correct position.⁸³⁰ Despite Foster's vindication Parry cast some doubt over the use of Barlow's plate in a letter to Herschel. The problem arose as Barlow delivered his plate the day before Parry sailed for the Arctic and Barlow only gave verbal instructions on how to use it to one of Parry's subordinates.⁸³¹

Other areas relating to magnetism that concerned the Hydrographer included the difference of 'True North' and 'Magnetic North', which although it had been well established by the time Hurd was in post still caused issues in the Navy. Azimuth compasses,⁸³² used for determining the variation of the needle, were ordered from 2 December 1813 to be put in charge of the master rather than the boatswain to try and avoid them being damaged.⁸³³ They were subsequently to be placed in the hands of the captain or commander of a ship when the master was replaced.⁸³⁴ However, not all officers appear to have been aware of the significance of those factors when collecting data. Hurd wrote to Captain Peak in 1817 explaining to him the significance of magnetic north and positioning the shoal he had discovered. The shoal was not marked on the charts and as Peak's ship H.M.S. *Rosario* had run onto it, therefore Hurd subsequently named the shoal after the vessel.⁸³⁵ Needless to say Peak was not alone in failing to signify whether the bearings he had taken were true or magnetic.⁸³⁶ The insistence by Hurd to establish whether the bearings were true or magnetic is a good example of a growing need for accuracy in scientific recording.

magnetic compasses, binnacles, cards and correcting appliances in the Museum of the Admiralty Compass Observatory at Ditton Park (Slough) (London, 1930), 34).

⁸³⁰ TNA, ADM1/3463, Foster to Barrow, 27 March 1824. Includes Foster's report written from on-board H.M.S. *Hecla*. It is worth noting that after the period of this study Barrow testified to the Select Committee on Shipwrecks concerning the problems of the magnetic compass having 'the most mischievous of consequences' (M.S. Reidy, *Tides of history. Ocean science and Her Majesty's Navy* (Chicago, 2008), 88).

⁸³¹ Parry wrote of its trial 'It will not be wondered at if, under the circumstances, occupied as I was by the immediate duties of my ship, the little insight I had gained into Mr. Barlow's plan, escaped me when an opportunity occurred of bringing it into practice – which was truly the case' (Royal Society, HS13 218, Parry to Herschel, 4 January 1824). Despite some doubt over Barlow's invention he identified how the small amount of magnetism in the steel parts of a chronometer could also cause an error in their rate, which was supported by P. Lecount Esquire (*The Annual Register, or a view of the History, Politics, and Literature, of the year 1823* (London, 1824), 299-300).

⁸³² For background on the azimuth compass see A.R.T. Jonkers, *North by northwest. Seafaring, science and the Earth's magnetic field (1600-1800)* (Amsterdam, 2000), 197-200.

⁸³³ TNA, ADM1/5122/2, Admiralty order 2 December 1813.

⁸³⁴ TNA, ADM7/226, Admiralty order 2 February 1814.

⁸³⁵ UKHO, LB1 f.110, Hurd to Peak, 21 June 1817.

⁸³⁶ See for example UKHO, LB1 f.320, Hurd to Birnie, 24 June 1820.

To establish magnetic north the curves of the earth's magnetic variation had to be ascertained. This meant the recording of magnetic variation on a global scale, but who had the capacity to undertake such a scheme? The Magnetic Crusade of the post-Peace era was something to which the Navy was a major contributor and one that involved the Hydrographer. Edmund Halley had drawn up a chart of the World showing isogonal lines in 1701 based upon work undertaken on a Royal Naval vessel and Christopher Hansteen (1784-1873), a Norwegian scientist and physicist, produced one covering the North Sea in 1826.⁸³⁷ There were many examples of ventures in recording magnetic variation data: Mr Thomas Thomson suggested to the H.E.I.C. in 1813 that they should make observations relating to the variation of the compass in India;⁸³⁸ numerous Admiralty surveying voyages were used to acquire magnetic observations, especially those to the Arctic;⁸³⁹ Captain McArthur Low compiled a register of magnetic variations in the Atlantic and Indian Oceans prior to 1822, that was later given to Captain Owen for his voyage to the east coast of Africa.⁸⁴⁰ In 1827 magnet bars were supplied to a voyage to South America (Captain Philip Parker King)⁸⁴¹ and the peak of magnetic work at that time occurred in 1828 when Foster took H.M.S. *Chanticleer* into the Atlantic Ocean. The main focus of his voyage was to record chronometrical measurements of principal points, but it also offered an opportunity for magnetic and meteorological observations. Although many observations had been made by 1829 it was not until after this period that Admiralty charts carried a magnetic variation statement as a matter of standard practice. Nevertheless the data recorded by the Navy at that time in this field was of growing importance, much more so than natural history.⁸⁴² Sadly what was achieved was piecemeal, although there was a considerable interest in this subject amongst hydrographers.⁸⁴³ Miller notes how there was no single institution to coordinate magnetic data⁸⁴⁴ and the Admiralty did not publish declination charts until 1858.⁸⁴⁵

⁸³⁷ McConnell, *Geomagnetic instruments*, 30-3.

⁸³⁸ IOR, L/MAR/1/24.

⁸³⁹ Parry, *Journal of a voyage*, cv-cxlii.

⁸⁴⁰ UKHO, LB1 f.452, Hurd to McArthur, 19 January 1822.

⁸⁴¹ UKHO, LB2 f.115, Parry to King, 25 March 1828.

⁸⁴² Miller, 'The Revival', 113.

⁸⁴³ Peter Barlow published a paper in the *Philosophical Transactions of the Royal Society of London* in 1833 (vol. 123, 667-73) which contained a statement that he used data from Captains Beechey, Owen, King and Biscoe, however a chart was not produced by the Hydrographic Office until 1859.

⁸⁴⁴ Miller, 'The Royal Society . . .', 205.

⁸⁴⁵ Jonkers, *North by northwest*, 85.

Oceanography and meteorology

The science of oceanography expanded during the Restoration⁸⁴⁶ but its identification as a discipline in its own right by the Admiralty did not materialise until the mid-nineteenth century; it was the Hydrographer Admiral Richards, addressing the British Association for the Advancement of Science in 1868, who stated how the physical geography of the ocean was ‘. . . becoming every day of more interest and importance in a practical point of view’.⁸⁴⁷ There were, however, numerous practitioners connected with hydrography prior to that point, such as Captain Cook, who gathered scattered oceanographic information.⁸⁴⁸ Dalrymple had produced a ‘complex form of chronometer log-keeping with tables of the gradations of wind and weather’, partly based upon John Smeaton’s calibration of windmill sails, which he passed to Beaufort.⁸⁴⁹ Other practitioners include Bligh who compiled a chart showing the route taken by the *Director* from England to St Helena, which had an accompanying two pages of remarks describing the wind and currents, published in 1800.⁸⁵⁰ Beaufort kept a daily weather log from 1790, corresponded with Parry over barometric matters and is more widely known for his scale of winds. But pure scientists who solely worked in the field of oceanography were much rarer and it was not until the 1840s that the Frenchmen Georges Aimé⁸⁵¹ and the American Matthew Fontaine Maury⁸⁵² put the subject on the map. Part of the problem of the lack of oceanographic information was the want of instruments and suitable men to record it. Officers had specifically to request specialist equipment such as thermometers for ascertaining the temperature at different depths and apparatus for bringing up salt water.⁸⁵³ The salt water samples were used to compare the amount of salt in the water at different depths, but in this period it had little practical benefit.

⁸⁴⁶ M. Deacon, ‘Founders of Marine Science in Britain: The Work of the Early Fellows of the Royal Society’ in *Notes and Records of the Royal Society of London*, Vol. 20, No. 1 (Jun., 1965), 28-50.

⁸⁴⁷ G.H. Richards, *Address to Section E, Geography and Ethnology, at the meeting of the British Association for the Advancement of Science, at Norwich, August 20th, 1868, by the President of the Section* (London, 1868). See also Day, *Hydrographic Service*, for numerous references to oceanography during the Beaufort years.

⁸⁴⁸ R.C. Cowen, *Frontiers of the sea. The story of oceanographic exploration* (New York, 1960), 23.

⁸⁴⁹ A.S. Cook, ‘Dalrymple, Alexander (1737–1808)’, *ODNB* [accessed 7 April 2009].

⁸⁵⁰ David, *The surveyors of the Bounty*, 11.

⁸⁵¹ M. Deacon, *Vice-Admiral T.A.B. Spratt and the development of oceanography in the Mediterranean 1841-1873* (Greenwich, 1979), 1.

⁸⁵² C.G. Hearn, *Tracks in the sea: Matthew Fontaine Maury and the mapping of the oceans* (Camden, Maine, 2002).

⁸⁵³ UKHO, LP1857 H1056, Hardy to Viscount Exmouth, 9 August 1819.

Other areas of oceanography included deep-sea soundings taken in more than 80 or 90 fathoms, although they were unusual,⁸⁵⁴ and were of little benefit for charting purposes. The reason was that the ability to measure such extreme depths (to ascertain their position) required extreme physical exertion and specialist equipment for making the measurement. Depths greater than 90 fathoms were of interest to the growing body of oceanographers. In 1817 William Scoresby junior attempted a sounding but when he got to 1,200 fathoms the line snapped and all the sounding gear was lost; he had successfully taken one of 761 fathoms in the same month.⁸⁵⁵ But Scoresby was eclipsed by John Ross in the *Isabella* who took a sounding of 1,050 fathoms in 1818 whilst in the Arctic.⁸⁵⁶

Despite there being no competition for finding the deepest depth, naval officers continued to push the limits, especially when it also involved temperature readings. Men like Commodore Hardy on the *Superb* who on 7 October 1819 took the opportunity to lower a Thornton's thermometer attached to 2,000 fathoms of whale line. He estimated the perpendicular of the line to have been a mile and two-thirds but when the majority of the crew tried to bring the line up it snapped, leaving only 500 fathoms of line and Hardy reporting the matter of the loss in a most humble fashion to Croker.⁸⁵⁷ Similarly Captain F.W. Beechey recorded two deep-sea temperature readings between 650 and 850 fathoms in the late 1820s.⁸⁵⁸ Those soundings were a bi-product of the interest in temperature readings and there were others such as Captain Prescott (between 1821 and 1825), Foster (1828-31) and Assistant Surveyor, John Fremby (1823-4) who also made similar observations.⁸⁵⁹ Another officer, Captain Robert Wauchope, used 1,435 fathoms of line to record temperatures in the southern hemisphere in 1816, although wisely corrected the depth due to the drift of the ship to around 1,000 fathoms.⁸⁶⁰ Those measurements were contributing to a growing body of data (in addition to temperature readings made in the Arctic), but it had little value to hydrography or the Navy. However, one of the benefits of such an interest in deep-sea sounding was the improvement made to the technology used to

⁸⁵⁴ E.W. Baker, 'Massey and Windham's Patent Perpetual Log, and Deep Sea Lead' in *Mechanics Magazine, Museum, Register, Journal, and Gazette*, no.753 (London, 1838), 244.

⁸⁵⁵ Scoresby, *An account of the Arctic regions*, vol 2, 187-8.

⁸⁵⁶ J. Ross, *A voyage of discovery . . . in His Majesty's Ships Isabella and Alexander for the purpose of exploring Baffin's Bay* (London, 1819), cxxxiv.

⁸⁵⁷ UKHO, MP54 fos 183-4, Hardy to Croker, 7 October 1819.

⁸⁵⁸ Deacon, *Scientists and the sea*, 231.

⁸⁵⁹ Deacon, *Scientists and the sea*, 233.

⁸⁶⁰ Deacon, *Scientists and the sea*, 233-4.

record them, which was more beneficial to the men who undertook the work on the lead rather than the scientists.⁸⁶¹

Although observations of the state of the weather were regularly kept in naval ships logs, more precise observations for particular fixed points were not systematically collected. The Royal Navy was behind its American counterparts, as American surgeons were ordered to keep weather diaries from 1814.⁸⁶² Royal Naval vessels on longer voyages involving some aspect of scientific work kept their own meteorological registers, such as that on H.M.S. *Blonde* between 28 November 1824 and 14 June 1825. Observations were made five times a day using the barometer, temperature of the air hygrometer, temperature of the sea, wind and any remarks. The register was sent to the Hydrographic Office with the rest of the ship's papers and examined by Parry, who found them to be of great credit to Lieutenant Malden.⁸⁶³ Smyth kept a daily meteorological log whilst in the Mediterranean (prior to 1825), in addition to recording information on tides, currents and taking deep-sea water samples.⁸⁶⁴ Major James Rennell, who was good friends with Smyth,⁸⁶⁵ built up a reputation as an expert on the subject of winds (as well as tides), attracting a visit in 1825 from the polymath Baron Humboldt.⁸⁶⁶ Rennell was also on good terms with Beaufort before he was Hydrographer, as the latter was very keen to survey the Gulf Stream, although when he was offered the chance in 1828 by Croker he declined.⁸⁶⁷ It is surprising that because meteorology had far more practical implications for naval planning and ships at sea more was not done to exploit those observations, despite the formation by the Royal Society of Edinburgh of the Committee for Promoting Meteorological Journals.⁸⁶⁸ The only way the Hydrographer found to disseminate meteorological information was through its inclusion in sailing directions issued to naval ships. It was not until the Board of Trade established a Meteorological Department in 1854 that a focussed attempt to organise the subject took place.

⁸⁶¹ UHKO, MB1, February 1831. It was hard work and Beaufort stated how the health of seamen would be preserved by using this technology.

⁸⁶² www.history.noaa.gov/legacy/time1800.html.

⁸⁶³ UKHO, MP55, fos 332-75; *ibid*, MB1 f.35, 25 March 1826.

⁸⁶⁴ David, 'British hydrography in the Mediterranean', 11.

⁸⁶⁵ R. Rodd, 'Major James Rennell. Born 3 December 1742. Died 20 March 1830', *The Geographical Journal* 75 (April 1930), 289.

⁸⁶⁶ Rodd, 'Major James Rennell', 298.

⁸⁶⁷ Friendly, *Beaufort*, 229.

⁸⁶⁸ J. Dennis, *Ample instructions for the barometer and thermometer; containing, particular directions for the marine and house barometers, or weather glasses . . .* (London, 1825), 36.

Anthropology

Another area of potential interest to planners with connections to hydrography was the subject of anthropology. Commander Pringle Stokes in his *Beagle* journal of 1827 devoted two pages of his surveyor's journal to an account of 'Intercourse of the sexes' and 'Children'. His research formed part of his duties in recording scientific information for use by the Admiralty that included historical information on previous voyages, chronometer readings, plans of the coastline, sketches of local inhabitants, canoes, arms, languages, religion, trading customs, meteorology and the obligatory sailing directions.⁸⁶⁹ It is doubtful whether Stokes' observations on the women who 'never once threw themselves in our way' despite the temptations of free knives, scissors and beads,⁸⁷⁰ had any practical advantage to the Admiralty, unless planning included the sexual needs of men, or the possibilities of developing Mercy Harbour into a naval base. Stokes was not alone in making anthropological observations as Captain Boteler of H.M.S. *Hecla* between 1828 and 1829 recorded in his journal a 'Native Vocabulary [of the] West Coast of Africa'; such a dictionary would have been vital to ships visiting the area. More importantly for his paymasters in London he wrote a paper on 'Reasons for the present falling off in the trade of Mogador communicated by Mr Willshire late consul there and Mr Chaillet the present one', in addition to the usual observations on currents, tides, meteorology, wooding and seasonal climatic changes.⁸⁷¹ These types of information all had their uses, especially if the British Government was going to capitalise on any trading or strategic opportunities in those areas.

⁸⁶⁹ UKHO, OD18, The journal of H.M.S. *Beagle* in the Straits of Magellan by Pringle Stokes, Commander R.N., 1827.

⁸⁷⁰ UKHO, OD18 f.32. Their approach towards the seamen was completely reversed when Stokes was away from the harbour when the female chief of the tribe prostituted the young women, rebuking any of them that did not comply, suggesting that the aboriginals' behaviour in the face of authority was totally different (UKHO, OD18 f.33).

⁸⁷¹ UKHO, OD445, Directions for Barbary and vicinity of The Canary Islands including the River Gambia, Sierra Leone, Anna Bon etc, West Coast of Africa, Captain Boteler, H.M.S. *Hecla*, 1828-29.

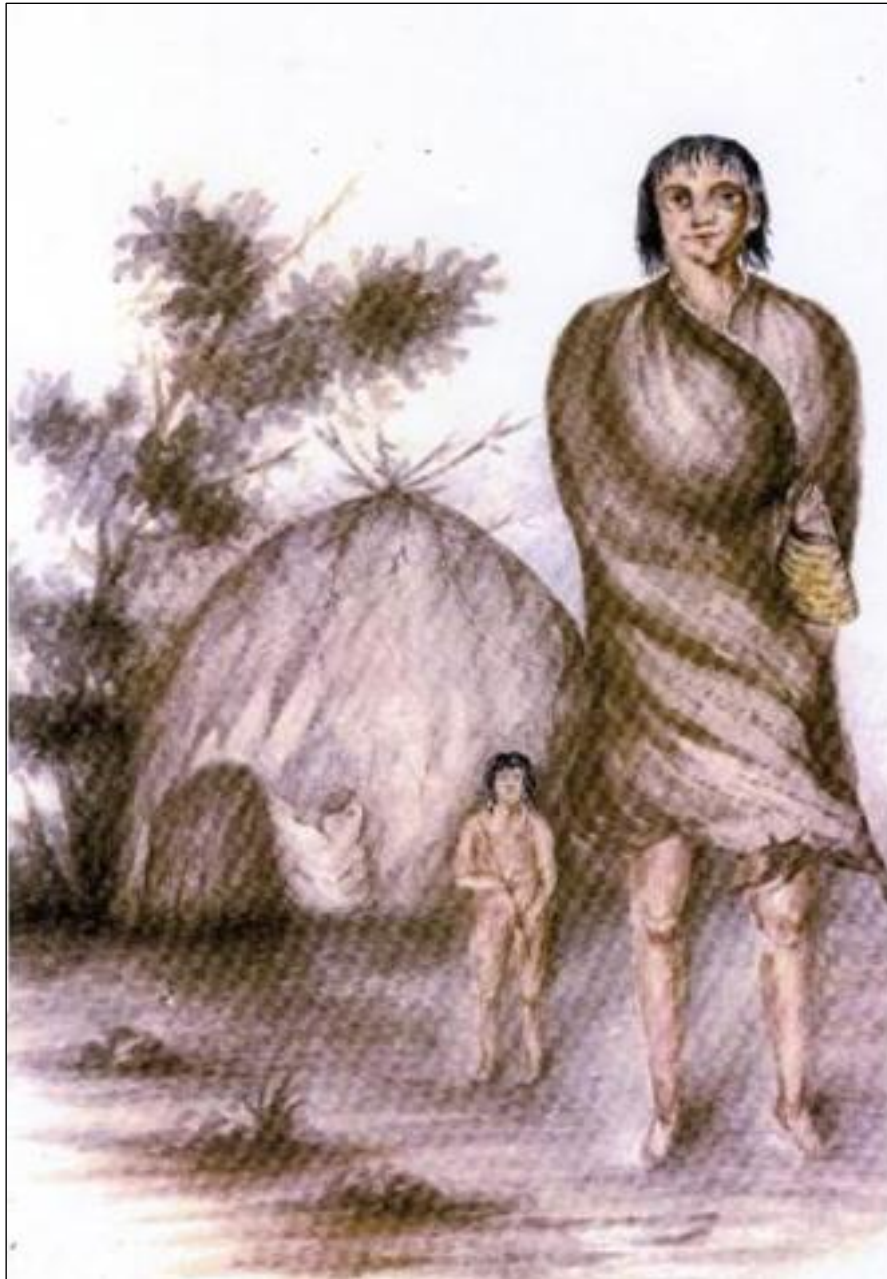


Illustration 4.11 Two Fuegian natives recorded by Captain Pringle Stokes R.N. (UKHO, OD18)

Although examples of anthropological recording were not unusual during this period (it was a subject that had been recorded since Captain Cook's time), by the late 1820s such observations were becoming commonplace. Midshipman James Mate's sketches of Eskimos offering trade goods and benefits to British trading interests⁸⁷² was one such example, although there was little to be gained financially for the British Government. This type of information that was of benefit if it was brought into

⁸⁷² J. Bockstoe, *Eskimos of Northwest Alaska in the early nineteenth century. Based on the Beechey and Belcher collections and the records compiled during the voyage of H.M.S. Blossom to Northwest Alaska in 1826 and 1827* (Oxford, 1977), 7, 12.

print in accounts that often appeared shortly after the voyage returned to Britain. Such volumes were very popular, as were the artefacts that were put on display, which also had an educational benefit. Although, like natural history material, there was little of interest to the advancement of hydrography, hydrographic surveyors found themselves with opportunities to cash in on the interest in the subject. Parry found in his Arctic voyages that dealings with native peoples were essential and in certain circumstances life saving, although they were extreme and rare examples.

Charts

Hurd wrote in 1809, during his first year as Hydrographer, that even charts ‘so totally out of the way of navigation . . . [were] for the benefit of science’,⁸⁷³ thus stating where the main focus of his activity in the Hydrographic Office sat in relation to the scientific world. As a result of the scientific data collection exercises that were planned through the Hydrographer, there was a great opportunity for the improvement of Admiralty charts. Principally charts had to be accurately laid down with the points recorded by chronometers and astronomical observations.⁸⁷⁴ Throughout the period of this study there were chronometers available to Royal Naval officers to undertake readings, but the take up of use by the Merchant Navy of this technology was not as great; Professor Inman of the Royal Naval College at Portsmouth thought this was due not to the expense of the instrument but due to the difficulty in obtaining a good rate.⁸⁷⁵ This left the Hydrographer facing the harsh reality that unless charts were produced using observations taken by chronometers then they were not particularly accurate. In addition to this he had to consider whether charts of the quality constructed by professional surveyors, such as White and Smyth, were to be the baseline to which other surveyors should aspire.

White certainly raised the standard of charting when he sent to the Admiralty Board his sailing directions for the English Channel for publication. In the introduction to that work (which had been in preparation for over a decade) his scientific credentials were laid bare, by showing to the reader the range of data and methods he had used for the production of his charts. Such information normally remained unpublished but he devoted 25 pages to his charting methodology,

⁸⁷³ TNA, ADM1/3523, Hurd to Rhodes, 17 January 1809.

⁸⁷⁴ UKHO, MB1 fos 162-4, Parry to Ogle, 1 March 1828.

⁸⁷⁵ TNA, ADM1/3466, Wauchope to Croker, London, 21 June 1827. It is not clear that this paper was seen by Parry but the information obviously was in the Admiralty.

describing everything from the use of the Sun's altitude to the 'Method of constituting the fundamental Base at Guernsey, for the particular Survey of the Channel Islands'.⁸⁷⁶ From a charting perspective his use of scientific data to compile his charts put him at the forefront of charting specialists; he combined measurements of the Sun's altitude, barometrical readings, variation of the compass, 14 contingencies for calculating his position when out of sight of land, allowances for heights of the observer's eye whilst taking readings on board the *Shamrock* (depending on where on board they were at the time), but more importantly he re-checked his original base measurements made in 1809 and verified every physical detail himself 'in company also with the midshipmen and seamen employed under my orders, unless otherwise specified'.⁸⁷⁷ By publishing his methodology for all to scrutinise he also brought into public view the extent of his surveying and scientific experience, which also reflected well on the Hydrographer.

After the Peace of 1815 a great opportunity arose to improve the charting of northern Europe. Hurd and the Admiralty grasped this opportunity, even though it involved a joint venture with France with whom they had been at war two years earlier. This was not the Admiralty's show but that of the Ordnance Survey who were extending the British arc of meridian, utilising Thomas and the *Investigator* to transport the scientific equipment, as well as the men, to the Shetlands. It was planned that the British arc of meridian would form part of the West European Arc which stretched from northern France into Spain. The French were represented by the geodesist M. Biot of the French Institute, but the whole exercise left Colby and Thomas on far better terms than the former had been with his French counterpart.⁸⁷⁸ The whole business of recording the data was unsatisfactory and Mudge, as head of the Ordnance Survey, was far from pleased with the outcome.⁸⁷⁹ As scientific ventures went, this was not the best example of international co-operation although it did show how the British were still supportive of such ventures despite years of conflict.

Conclusion

⁸⁷⁶ White, *Sailing directions for the English Channel*, 1-27.

⁸⁷⁷ White, *Sailing directions for the English Channel*, 27.

⁸⁷⁸ L.E. Tavener, 'George Thomas, Master, Royal Navy', *The Mariner's Mirror*, 36 (London, 1950), 117-21; Robinson, *Marine cartography*, 131.

⁸⁷⁹ T. Owen and E. Pilbeam, *Ordnance Survey. Map makers to Britain since 1791* (London, 1992), 24-5.

Hurd had established an unofficial scientific branch of the Admiralty, which he referred to as such to the Admiralty Board, which sat well within Reidy's view of the Admiralty's 'inchoate relationship' with science in the early nineteenth century.⁸⁸⁰ From his office there was definitely a scientific agenda but it did not extend to the publication of 'scientific' charts such as Pownall's *Hydraulic and nautical observations on the currents in the Atlantic Ocean*. However, Hurd did purchase £4 16s worth of variation charts in 1818, which he could have used to compare against similar data being collected by naval and civilian personnel that found its way into the Hydrographic Office.⁸⁸¹ Overall, during that period, chart publication in the Hydrographic Office was concentrated on accurate topographical content, with occasional references to magnetic variation. The mass of scientific observations which were collected by practitioners in the field were of varying degrees of usefulness, but proved how employing scientifically minded men was crucial to expansion in that area. This was a subject which grew in the Navy thanks to Hurd's agenda in selecting such men to work inside and outside of the Hydrographic Office. As early as 1811 Hurd thought his position was one that held the respect of men 'of talents and great scientific knowledge may hereafter look up to as an object worthy of their attainment',⁸⁸² years before opportunities opened up during the post-Peace world that let the Hydrographer and surveyors become involved in a host of scientific activities, to some degree or another.

There had been a growing interest in experiments and observations made at sea in the late eighteenth century,⁸⁸³ but this dwindled up until the Peace of 1815. Cock and Deacon correctly wrote how after the Peace 'the Navy came to assume an even bigger role in British science than they had enjoyed previously',⁸⁸⁴ which was definitely supported by the Hydrographer and the Admiralty Board sanctioning any activity that it saw would be beneficial. The Hydrographic Office certainly was heavily involved in many different scientific activities but was more a beneficiary of

⁸⁸⁰ Reidy, 'The flux and reflux of science . . .', 111.

⁸⁸¹ Other examples of charts known to have been purchased by Hurd include Rennell's 1793 *Observations on a current that often prevails to the westward of Scilly; endangering the safety of ships that approach the British Channel* with a chart, and Thomas Yeates' 1817 edition of a *Chart of the variation of the magnetic needle for all the known seas comprehended within sixty degrees of latitude north and south with a new and accurate delineation of the magnetic meridians accompanied with suitable remarks and illustrations* (TNA, ADM17/28).

⁸⁸² TNA, ADM1/3458, Hurd to Yorke, 14 April 1811.

⁸⁸³ Deacon, *Scientists and the sea*, 199.

⁸⁸⁴ R. Cock, 'Sir Francis Beaufort and the co-ordination of British scientific activity, 1829-55' (unpublished Ph.D thesis, University of Cambridge, 2003), 34; Deacon, *Scientists and the sea*, 220.

others inventiveness than its own creativity. After all of that scientific involvement the Hydrographic Office developed as a storehouse for scientific information, along similar lines to that housed by the Foreign Office and the Board of Trade.⁸⁸⁵

The irony of the situation was that there were plenty of men and ships available that could have been requested to collect specific types of data, especially after 1815 when the pressures of conflict and blockade dropped dramatically. A classic example of experimentation can be seen in the Admiralty's use of the 'message in a bottle' idea in the 1810s. Such an idea was theoretically available to all naval vessels but the survival rate of completed forms is exceptionally low.⁸⁸⁶ The form stated that 'Whoever finds this paper is requested to forward it to the Secretary of the Admiralty, London, with a note of the time and place at which it was found', that was repeated in French, Spanish, Dutch, Danish and German. Parry completed one that was thrown overboard on 29 May 1818 from H.M.S. *Alexander* (at 62° 05'N, 54° 00W) that was found at Innishowen Head, Ireland in August 1819.⁸⁸⁷ On 22 May 1819, whilst on his voyage to discover a north-west passage, he completed another which read

latitude 59° 4' N., longitude 6° 55' W., light breezes and fine weather, wind East, *Griper* in company. All well. Temperature of the air, 51°. Sea water, 48f.⁸⁸⁸

but was of little value to science, more of a curiosity to hydrographers. The benefit to the Hydrographer was therefore not scientific, but more to inform the Admiralty of the location of vessels in the days before telegraph and improved communications.⁸⁸⁹ There was some benefit for those interested in ocean currents, but the survival rate of bottles made any conclusion drawn of little value.

Here then was surely the kick-start oceanography, in its broadest sense, needed to become a recognised science by the Admiralty during the Beaufort years. It was not something that occurred overnight, but had a long gestation thanks to the support of both Hurd and Parry. Both men's scientific connections were (on the whole)

⁸⁸⁵ W.J. Ashworth, 'John Herschel, George Airy, and the Roaming Eye of the State', *History of Science* 36 (1998), 152.

⁸⁸⁶ Of those recorded in the popular press there were only three mentioned in the first half of the 19th century, of which see below.

⁸⁸⁷ *Trewman's Exeter Flying Post or Plymouth and Cornish Advertiser* (Exeter), 19 August 1819.

⁸⁸⁸ Parry, *Journal of a voyage*, 311.

⁸⁸⁹ F.L. M'Clintock, 'Narrative of the Expedition in Search of Sir John Franklin and His Party' in *Journal of the Royal Geographical Society of London*, 31 (1861), 1-13. The form was still in use in the 1840s.

capitalised through their position as Hydrographer to the long-term benefit of the Admiralty, even though Deacon states that there was a ‘turn away from marine science’ in the 1830s.⁸⁹⁰ Cock has shown in his thesis how that was not the case,⁸⁹¹ especially considering that the Admiralty established its own Scientific Branch in 1831 which included the Hydrographic Office only two years after Parry’s resignation.

It could be said that not starting a formal scientific branch until 1831 was a failing of the Admiralty, especially as it had so much expertise in the Admiralty buildings to form such a body for many years before. However, the ‘Scientific Branch’ was merely a name for a collection of scientific functions and the recognition that hydrography was one of them was testament to Hurd and Parry’s achievements in and outside of the office.⁸⁹² Key to this were the ships of the Royal Navy, that were (on occasions)⁸⁹³ the pseudo-scientific laboratories of data collection and hydrographic surveyors the pioneers of a growing interest in oceanography and geography. The latter subject was marked as a new branch of science when the Royal Geographical Society⁸⁹⁴ was established by many hydrographic surveyors who had developed their interest during the Hurd/Parry era. If it was Parry’s legacy of exploration, experimentation and scientific connections that really set the agenda for hydrography for decades to come, then it was Hurd’s legacy of recruiting scientifically minded officers which laid the foundations for it to become a reality.

⁸⁹⁰ Deacon, *Scientists and the sea*, 242.

⁸⁹¹ Cock, ‘Beaufort’, *passim*.

⁸⁹² Reidy quotes how ‘the Admiralty created a Committee on Science (1828), a scientific budget (1828), and a scientific branch (1831) within the Admiralty’ but does not discuss the work of the committee or how much the budget was (Reidy, ‘The flux and reflux of science . . .’, 156).

⁸⁹³ A.L. Rice, *British oceanographic vessels 1800-1950* (Godalming, 1986), 153. There is no mention in this volume of White or H.M.S. *Shamroc* but 21 vessels are listed between 1808 and 1829.

⁸⁹⁴ The precursor to the foundation of the RGS was the Raleigh Travellers’ Club formed in 1826, whose membership included Parry, Beaufort, Beechey, Smyth and Barrow (Day, *Hydrographic Service*, 46).

Chapter 5

International Relations

The over-riding factor that determined whether nations worked together was their status of conflict towards each other;⁸⁹⁵ hydrography and the navigational scenario of safety of life at sea were strange partners with that world of conflict. Putting life at sea before the gains of war was not uncommon and was something that had a mutual benefit to opposing states. One event occurred during the building of the Eddystone lighthouse when a French privateer captured the men working on its construction and took them, along with their tools, to France. As Britain was at war with France this appeared to be a legitimate act, but due to the nature of the project the men were working upon, *i.e.* a lighthouse that would benefit both English and French shipping, Louis XIV ordered the men to be returned to complete the project.⁸⁹⁶ More specific to hydrography, when the American ‘Hydrographer’ found himself in England at the time the war of 1812 was declared, far from being treated harshly as a foreign national, he was granted a passport with the caveat that ‘the British government makes no wars on science’.⁸⁹⁷

After the Peace of 1815 as the situation was very different, so the Admiralty Board instructed one surveyor (for his voyage to the Pacific), that he was excluded from any conflict and to assist ‘any foreign power you may fall in with’.⁸⁹⁸ Such then were the terms of engagement between most nations when it came to hydrography, whereby safety and science were often put before war, on more occasions than not, with Flinders being unfortunate to have been incarcerated whilst undertaking such duties. For the Pacific was one of many areas that saw navies of many nations undertaking cruises, including the French, Spanish and Russians, although the political will of the French and the capacity of its Navy meant they only managed one expedition to the Pacific during the period of this study.⁸⁹⁹

⁸⁹⁵ For an account of the post peace situation of navies see Lambert, *The last sailing battlefleet*. For background information on British foreign policy see C.R. Middleton, *The administration of British foreign policy, 1782-1846* (Durham N.C., 1977).

⁸⁹⁶ This is taken from a manuscript in the author’s collection.

⁸⁹⁷ <http://www.lib.noaa.gov/noaainfo/heritage/coastsurveyvol1/HASSLER1.html> (accessed 23 August 2008).

⁸⁹⁸ F.W. Beechey, *Narrative of a voyage to the Pacific and Beering’s Strait. To co-operate with the Polar expeditions: performed in His Majesty’s Ship Blossom, under the command of Captain F.W. Beechey, R.N. in the years 1825, 26, 27, 28 2 vols* (repr. London, 1968), vol.1, xii.

⁸⁹⁹ J. Dunmore, *French explorers in the Pacific in the nineteenth century* (Oxford, 1969), 4-8.

As Britain was viewed as the predominant naval power,⁹⁰⁰ this may have been another factor at least that encouraged foreign Hydrographers to interact with Hurd, Parry and their colleagues. The involvement at a higher governmental level between states had to be conducted through official channels, such as the consular services, which in turn opened up further avenues of communication. But those involved at the grass roots of hydrography and exploration managed to find ways around officialdom when it suited them. One event on this theme occurred in 1796 during Dalrymple's term as Hydrographer, which contributed to the future unwritten policy and administration of the Hydrographic Office. Élisabeth-Paul-Édouard de Rossel⁹⁰¹ (1765-1829), a French assistant in possession of Bruni D'Entrecasteaux's (1739-1793) surveys, was captured by the British on his return to France in a Dutch vessel. He ended up with those valuable documents in London where he met Dalrymple. The information he held turned out to be of great strategic value as it contained the latest surveys of parts of Australia, New Guinea and the surrounding areas.

Rossel was held in Britain and engaged in calculating astronomical observations, eventually returning to France to become its Hydrographer, but the use of D'Entrecasteaux's data got Dalrymple into trouble. When the Chart Committee came to examine the data in the Hydrographic Office they wanted to see D'Entrecasteaux's surveys, but Dalrymple refused access to them due to the grounds under which they had been acquired by the French, *i.e.* in the name of science. Dalrymple thought that copies could only be made of them for safety's sake in case the originals got lost and not put to any other use. Dalrymple was willing to put the unwritten agreement of defending scientific interests first by not supplying and publishing data (that was not his) without the owner's permission.⁹⁰² The French summed up that ethos, according to the words of the covering letter for the release of Flinders after seven years captivity, being 'in a spirit of pure magnanimity, the Government grants Captain Flinders his freedom and restitution of his vessel'.⁹⁰³ However, Dalrymple's connections to the scientific world, through the Royal Society and his international contacts through the H.E.I.C., established the whole genre of

⁹⁰⁰ Lambert, *The last sailing battlefleet*, 1; Rodger, *Command of the ocean*, 608.

⁹⁰¹ Day incorrectly cites his name as 'Ropel', quoting from Rupert Gould's research into the history of the Hydrographic Office (Day, *Hydrographic Service*, 32; UKHO, MLP4).

⁹⁰² Fry, *Dalrymple*, 261-4.

⁹⁰³ Dooley and Brown, *Matthew Flinders private journal*, 422.

British Admiralty hydrographic activity as one that sat well in the spirit of magnanimity and science.

Hurd came into that world being far more aware of its sensitivities and conflicts than Parry. Hurd's experience on Bermuda included threats from the French, Spanish and American nations that loomed large over the islands at various times during the 1790s. Plans by the Americans and the French to invade Bermuda were real enough and after France had declared war on Britain on 1 February 1793 Hurd wrote a lengthy letter to the First Lord, the Earl of Chatham, not on surveying but upon recent maritime intelligence. The French Fleet, supported by the Americans (who had strong support amongst the Islanders), never materialised but the lessons learnt at that time would help Hurd play a cautious diplomatic game in years to come.⁹⁰⁴ He also met two Russian hydrographers whilst on Bermuda in 1795, which combined with his later experience was a useful grounding for his term as Hydrographer when dealing with international matters.⁹⁰⁵

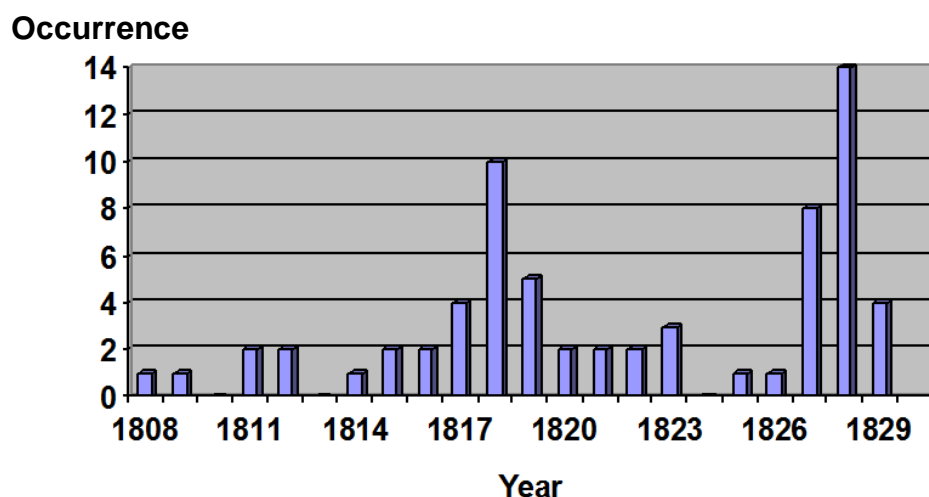
The day-to-day work of British Hydrographic administration occasionally brought its Hydrographer into contact with matters of an international nature. The Admiralty Digests show that on average he dealt with such matters once every three to four months (see Figure 5.1). Exceptions to this occurred in 1818, 1827 and 1828 when it was almost once a month; however if the massive increase due to the Lord High Admiral's influence in 1827 and 1828 is removed, then Hurd stands out far above Parry as having dealt with a higher percentage of international matters. The range of work, for example, saw Hurd dealing with the receipt of charts that belonged to someone who had served in the Russian service in 1808 and one from a consul in 1811, arranging the employment of a Frenchman in 1812, as well as sending charts to the Crown Prince of Sweden in 1814.⁹⁰⁶ Although not earth-shattering activity on the international circuit, the involvement with Sweden at least was essential for the improvement of relationships between countries with a hydrographic capability controlled by its government.

⁹⁰⁴ TNA, CO37/44/27, Hamilton to Dundas, 14 July 1793; *ibid*, ADM1/1925, Hurd to Nepean, 17 August 1801; *ibid*, PRO30/8/367, Hurd to Chatham, 18 July 1793; *ibid*, CO37/44/34, Durnford to Dundas, 24 November 1793.

⁹⁰⁵ See under the sections for Russia and France for further details on these subjects.

⁹⁰⁶ TNA, ADM12/133, 146, 155, 167.

Figure 5.1 The occurrences of international matters in the Admiralty Digests, 1808-1829



Source: TNA, ADM12 section 57.

Not surprisingly the brave new world after 1815 meant different things for different nations. Contemporaneously Barrow wrote in 1818 how the ‘blessings of peace’ effectively revived the spirit of discovery,⁹⁰⁷ whereas Lyon and Winfield recently stated that ‘after 1815 Britain had no need of more territory, or any wish to fight a major war’.⁹⁰⁸ But expansion of British interests by stealth in establishing new trading links from a hydrographic perspective offered an in-road for international relations on a more peaceful footing, rather than one of aggression.⁹⁰⁹ The following sections examine those relationships country by country, concentrating on the interactions and implications by and for the Admiralty’s hydrographic function. Although predominantly based in Europe, the administration of international government hydrography examines the relationships with other such organisations all over the World, rather than different countries’ interests in every foreign land and territorial waters across the globe.

France

France was unique, as not only did it possess the longest standing government hydrographic office, established in 1720, but it also had the longest stretch of

⁹⁰⁷ Barrow, *Chronological History*, 357.

⁹⁰⁸ Lyon and Winfield, *The Sail & Steam Navy List*, 16.

⁹⁰⁹ C.J. Bartlett, *Defence and diplomacy. Britain and the great powers 1815-1914* (Manchester, 1993), chapter one – consolidation and adjustments, 1815-1838.

coastline nearest to the British Isles. Combined with its numerous conflicts with Great Britain, its relationship⁹¹⁰ and position in international hydrographic affairs was the most interesting, both before and after the Peace of 1815. The French Dépôt des Cartes, Plans, Journaux et Mémoires Relatifs à la Navigation (later known as the Dépôt de la Marine) was well established as a fully functioning hydrographic service by the time Hurd became Hydrographer. From such an organisation Hurd and others were able to draw inspiration, as that organisation supplied every French naval vessel with virtually all the charts they needed,⁹¹¹ a concept that only became a reality for their English equivalents in 1808. The relationship the British Hydrographic Office had with Frenchmen interested in hydrography was a long but not always fruitful one. Dalrymple (who was truly an international player) was one of the first three people in England to receive the Dépôt's volume of charts titled *Neptune Americo-septentrional*,⁹¹² but that was obtained through William Faden the London map seller. His experience over the Rossel affair (concerning D'Entrecasteaux's charts) most likely cost him his job, but despite that Dalrymple was all for collusion and collaboration to benefit science and hydrography. Hurd on the other hand was very different as his naval career had been dominated by conflict with the French. Prior to his appointment as Hydrographer he had been involved in operations against the French at sea, but also, and of more relevance, was the survey of the Bay of Brest he had undertaken (from 1804). In that survey the full strategic value of surveying and its use to operational planning was paramount, as at that time the confidential nature of his findings was essential.

Other men who had made a name for themselves as hydrographic surveyors also had experience of conflict with the French. Men such as W.F.W. Owen had fought with Admiral Howe on the 'Glorious First of June' and later found himself a prisoner-of-war with Flinders on Mauritius, and Bayfield had served under Cochrane in the attack on the French in the Basque Roads for which he received a medal.⁹¹³ Also a strange dichotomy occurred in 1812. Hurd tried to employ a French lieutenant, St Amand, who proposed a new method for constructing charts in high latitudes that was beneficial to the British Hydrographic Office. Here was another example of

⁹¹⁰ Lambert, *The last sailing battlefleet*, 1.

⁹¹¹ Quoted in Barritt, *Eyes of the Admiralty*, 44.

⁹¹² M. Pedley, *The commerce of cartography: making and marketing maps in eighteenth century France and England* (Chicago, 2005), 152.

⁹¹³ Dawson, *Memoirs*, 57, 73.

putting hydrography before international interests, but Croker would not have a Frenchman working in the Admiralty on this project, only for the Admiralty. Thus Britain benefited from a Frenchman at a time the two powers were at war with each other.⁹¹⁴ The position prior to the Peace of 1815 was thus a strange one for naval hydrography, that on the one hand saw collaboration by Dalrymple and the employment of a Frenchman by Hurd, but on the other saw many British hydrographic surveyors in conflict and incarcerated. Subsequently those surveyors who were not able to find work surveying were involved with operations against the French and the Peace of 1815 was an opportunity to start afresh. The peace also allowed the Secretary of State in 1817 to seek the restoration of the charts and journals taken from Flinders whilst in Mauritius.⁹¹⁵

Little time was wasted after the Peace before collaboration between the two nations was under way. In the field, whilst Smyth was on Malta in 1816 he found that a French naval captain had arrived on the island with the intention to measure meridian distances. As Smyth was only a commander and the work the French captain was undertaking was part of a much larger framework, whereby surveys were being laid down to a grid across the whole of the Mediterranean, this could have led to difficulties. However, as there was a known need to compare any meridian distances (to obtain as accurate a geographic picture as possible of the true position of major features), it was in both countries' interests to co-operate. Smyth offered Captain Gauttier every assistance and even showed him the spot he had used to obtain his own observations, hoping the Frenchmen would use the same place so their data could be compared. Their collaboration was a seminal moment in the history of relationships between the two countries' surveying officers, as the two men went on to meet up in the following years exchanging and comparing further information. This also had a benefit for the Hydrographer's planning of future surveys. As time progressed and the collaboration was becoming stronger so the French could be relied upon to co-operate, to such an extent that Smyth was able to suggest how both time and resources could be saved if the two countries avoided surveying the same areas. Subsequently Melville sent Smyth to Paris to sort out future surveying arrangements, when the

⁹¹⁴ TNA, ADM1/3458, Hurd to Croker, 10 April 1812; William L. Clements Library, St Amand to Yorke, 18 October 1823; *ibid*, Yorke to St Amand, 3 November 1823.

⁹¹⁵ TNA, ADM12/184.

French agreed to concentrate on the Greek Archipelago leaving Smyth to work in the western Mediterranean and the north coast of Africa.⁹¹⁶

In northern waters there was an equal amount of co-operation, although the relationships between those involved was not as long-lasting as those forged in the Mediterranean. In Chapter Four the arrangement between the French and the British to extend the West European Arc, which stretched from northern France into Spain, was placed into context. The resulting data was unsatisfactory, as was the relationship with the French geodesist,⁹¹⁷ which proved not to be the best example of international co-operation from a scientific perspective. Despite this, charts were acquired by Hurd from France from 1818, including two packages obtained by Croker and some from Beautemps-Beaupré (1766-1852)⁹¹⁸ that arrived in the Hydrographic Office in 1826 and 1827.⁹¹⁹ Beaupré also had his work brought to a wider naval and maritime audience after his manual on nautical surveying was translated into English by Captain Copeland and published by Laurie in 1823. Copeland went on to survey part of the Greek Islands on H.M.S. *Mastiff*, staying in the Mediterranean until 1830.⁹²⁰

Despite what would appear a position of great maritime strength, Britain still had to follow what was the official way of undertaking business in foreign lands, *i.e.* asking for permission to enter and survey foreign territory. France was no exception to this, as White found out in 1826. As he thought it necessary to land on the French coast to undertake part of his survey of the English Channel, he sought counsel through Parry from the Admiralty Board. Rather than approach the French for permission Melville was happy to wait, as White had been directed to survey in the Bristol Channel during that year.⁹²¹ White's diplomacy and surveying skills were held in high esteem by the French, being presented with a copy of the *Pilote Francais*,

⁹¹⁶ Dawson, *Memoirs*, 53-4, 72; A.C.F. David, 'The emergence of the Admiralty chart in the nineteenth century' in *Proceedings of the Symposium of the Commission on the History of Cartography in the 19th and 20th centuries, Portsmouth University, United Kingdom, 10-12 September 2008* (Pretoria, 2009). The French were thought by Parry to have been working in the Archipelago in 1825 (UKHO, LB2 f.54, Parry to Copeland, 23 December 1825).

⁹¹⁷ L.E. Tavener, 'George Thomas, Master, Royal Navy', *The Mariner's Mirror*, 36 (London, 1950), 117-21; Robinson, *Marine cartography*, 131; T. Owen and E. Pilbeam, *Ordnance Survey. Map makers to Britain since 1791* (London, 1992), 24-5.

⁹¹⁸ For details of his career see É. de Beaumont, *Éloge historique de C.-F. Beautemps-Beaupré* (Paris, 1860) and O. Chapuis, 'L'émergence des nouvelles cartes marines: l'oeuvre de Beautemps-Beaupré à la fin du XVIII^{ème} et au début du XIX^{ème} siècle', *Imago Mundi* 44 (1992), 90-8 and his *A la mer comme au ciel. Beautemps-Beaupré & la naissance de l'hydrographie moderne (1700-1850)* (Paris, 1999).

⁹¹⁹ TNA, ADM17/28; UKHO, Accession ledger book 1, entries during 1826 and 1827. See Dawson, *Memoirs*, 29-31 for some background information on his career.

⁹²⁰ UKHO, LB1 f.54, Parry to Copeland, 23 December 1825; Dawson, *Memoirs*, 116.

⁹²¹ UKHO, MB1 f.34, Parry to Melville, 10 April 1826. See also UKHO, MB1 fos 32-4.

Environs de Brest that he gave to the British Hydrographic Office.⁹²² In the following year the treaty with France and Russia (as well as the Battle of Navarino)⁹²³ placed Britain's relationship with her neighbour on a much firmer footing and one that led to even greater hydrographic collaboration.

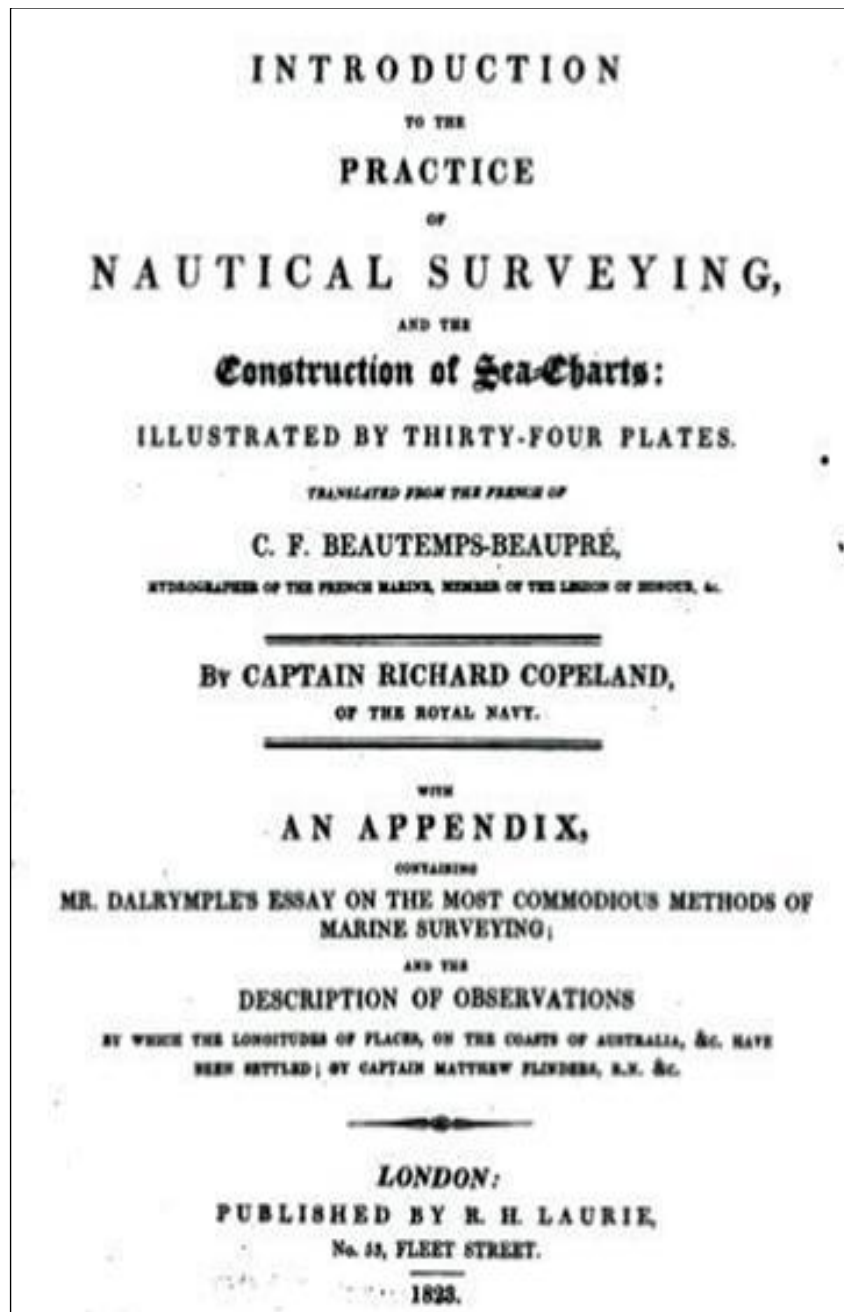


Illustration 5.1 The title page of Copeland's translation of the Frenchman Beautemps-Beaupré's *Practice of Nautical Surveying* (London, 1823)

⁹²² UKHO, Accession ledger book 1, entry E506.

⁹²³ J. Cable, *The political influence of naval force in history* (London, 1998), 57.

In 1828 the relationship with Rossel, Director-General of the *Depôt*, was strengthened through the preparations Parry made for Foster's voyage on H.M.S. *Chanticleer*.⁹²⁴ Interactions between the two offices were already in place as charts were being supplied through the French Minister of Marine; with the prospect of the *Chanticleer's* voyage obtaining such a vast number of observations the two men hit on another subject that was mutually beneficial. When Parry asked Rossel⁹²⁵ for any longitudinal observations that he held in his office, he replied with 'eagerness'⁹²⁶ but pointed out that most of the observations had been published and even included in the *Nautical Almanac*, which could well have been the end of the matter. However, Rossel clearly saw the advantages of collaboration and despite its easy accessibility he desired to give Parry all the information he could. Rossel was also keen to promote the work of Captain Gauttier and his assiduous observations made in the Mediterranean, Adriatic, the Archipelago of the Sea of Marmara and the Black Sea. Despite having so many items that Parry thought he needed, which were probably already in the Admiralty buildings in London, Rossel sent what was predominantly the fruits of French Government sponsored observations since the Peace of 1815. The impressive inventory of observations Rossel supplied also reflects how French hydrography (like Britain's) benefited from 1815 onwards and would also have been enhanced even further by that spirit of *entente cordial*. This was all despite differences in some of the geographical positions the two men had exchanged, which Rossel determined were only negligible and the product of better chronometrical readings.⁹²⁷

Parry encouraged international co-operation by promoting Rossel's gifts when he lay them before the Council of H.R.H. the Lord High Admiral. In return the Council ordered that a complete copy of the survey of the coasts of Africa and Madagascar, containing two atlases, should be sent to France. This action was also keenly promoted by Parry as his French counterpart had sent him some charts for his personal use. Parry wrote to Rossel stating:

how much satisfaction it will afford me to maintain between our respective
Departments a constant communication, which cannot fail to be equally

⁹²⁴ See Chapter Four for Parry's involvement in the administrative affairs of that voyage. See also J.N. Pasquay, *La coopération Franco-Britannique en hydrographie* (Brest, 1996), 1-4 for a very brief and selected account of relations involving Rossel and others with the Admiralty.

⁹²⁵ For Parry's letter to Rossel see UKHO, LB2 fos 88-9, 11 January 1828.

⁹²⁶ UKHO, LP1857 M481, Rossel to Parry, 23 February 1828.

⁹²⁷ UKHO, LP1857 M481, Rossel to Parry, 23 February 1828.

beneficial to both, which it tends to the promotion and improvement of that department of science to which we more particularly belong.⁹²⁸

Rossel replied with a lengthy and impressive letter, which accompanied a two-sheet chart of the Archipelago based on Gauttier's work. The chart was more than just a polite gesture, as Rossel referred to the collaboration with the English and the accuracy of the work. He explained to Parry the problems in constructing the chart, but he was concerned for the safety of mariners that it should be issued with as few delays as possible. He also gave Parry an account of the further work undertaken by Gauttier (including work in the Dardenelles and Bosphorus), as well as other current and recent surveys with examples of the products of those investigations. Rossel finished his letter by laying down the terms under which he was instructed in his duties, like Parry, by royal command:

I am very flattered, Sir, that the communications maintained by the two establishments that we run have the suffrage of an authority so respectable. Myself, I only execute the kind intentions of His Majesty the King of France whose care extends not only to his subjects but to the sailors and navigators of all nations.⁹²⁹

What started in 1808 as a difficult situation, as Britain was at war with France, ended in 1829 with the two old foes as firm allies in hydrographic matters. White, who had spent a great deal of the time surveying within the geographical limits of the English Channel, ended up being honoured by the French when they included his name on the title page of their atlas of charts issued to their own Fleet.⁹³⁰ The British learned a great deal from across the English Channel, not only adopting the idea of forming a Hydrographic Office from the French, but they also copied the idea for a corps of hydrographic specialists and a 'Society of Geography'. In 1814 the French formed a corps of Ingénieurs Hydrographes under the Dépôt that undertook the technical aspects of hydrography. A year later Owen and Hurd wrote to the Admiralty Board asking for a similar function in principal, but not in name, to be established in Britain. It took years for the Hydrographic Office to hold all the strings relating to the technicalities of hydrography within the Navy, but Hurd's efforts to improve

⁹²⁸ UKHO, LB2 fos 129-32, Parry to Rossel, 19 April 1828.

⁹²⁹ UKHO, LP1857, M480 Rossel to Parry, 8 August 1828.

⁹³⁰ Dawson, *Memoirs*, 53.

education and technical knowledge were a step in the right direction.⁹³¹ The Geographical Society established in England in 1830 by Barrow, Beaufort and others connected with hydrography and the Admiralty, was also several years behind its French counterpart. There must have been those who read *The Times* of 28 December 1827 and who saw the report of that society's meeting in Paris, and thought that Britain should keep up with its neighbours.⁹³² Nevertheless the French kept an interest in many areas that the British had charted and would continue to be a world power in charting terms for many decades to come.

Denmark

There had been a long interest in official hydrography in Denmark and the Danish Navigation School had undertaken surveys in the seventeenth century. The Director of Navigation in 1769 was not only responsible for surveying but also obtained a license for publishing charts, thus carrying out the majority of duties of a hydrographic office prior to an official establishment of one in 1784.⁹³³ Fortunately the Danish Hydrographic Office, or what was properly known as the Royal Danish Sea Chart Office, was in the capable hands of Rear Admiral Poul Löwenörn from 1784 to 1826. Löwenörn had served in the French Navy from 1776 to 1782 and was inspired by the organisation of the French Dépôt to establish a similar one in his own country.⁹³⁴ Löwenörn was a forward thinking officer whose country benefited from his management of their hydrographic function. His works included sailing directions for the Kattegat published in English at Copenhagen in 1800,⁹³⁵ a *Memoir to accompany the Chart of the Skagerak or the Sleeve* and *The Iceland Coasting Pilot* (both produced in 1820) and many others that were presented to the Hydrographic Office.⁹³⁶ He also produced numerous charts, including ones for the east coast of Great Britain, the Shetlands (published in 1787) and the coast of Jutland.

⁹³¹ See Chapter Two for a detailed account of those letters. See also the anonymous 'History of the French Hydrographic Service' (UKHO, Ritchie Papers box P).

⁹³² *The Times*, 28 December 1827, 4.

⁹³³ H. Ravn, *Det Kongelige Danske Søkort-Arkiv 1784 to 1934* (Copenhagen, 1934), 8.

⁹³⁴ A.P. Niblack, 'Det Kongelige Søkort-arkiv (The Danish Royal Hydrographic Office)', *Hydrographic Review* (1927), 21; Ravn, *Kongelige Danske Søkort-Arkiv*, 9.

⁹³⁵ T.R. Adams and D.W. Waters, *English maritime books printed before 1801 relating to ships, their construction and their operation at sea. Including articles in the Philosophical Transactions of the Royal Society and the Transactions of the American Philosophical Society* (Greenwich, 1995), 557.

⁹³⁶ See items in the Admiralty Library catalogue with the pressmark 'UB.D' that relate to sailing directions with Löwenörn as the author.

Like Hurd and Parry, Löwenörn was a man with all the right hydrographic experience in both science and navigation, being responsible for erecting numerous lighthouses on the Danish coast, backing a proposal for a portable log watch and involved with the Royal Society of Sciences at Copenhagen, amongst other things.⁹³⁷ Like the British the activities of Denmark's hydrographic specialists were extremely limited because of the war of 1807-14, when there were no surveys carried out in Danish waters.⁹³⁸ However, after that time in early 1817 Hurd knew of Löwenörn's observations on lights on the east coast of England, courtesy of the Danish consul writing to the Admiralty Board. Hurd had to refer the matter to Trinity House,⁹³⁹ which also included information for the safety of the navigation of the Cattegat and Baltic. Löwenörn also involved himself with a similar arrangement to the British Admiralty's Chart Committee of 1807, when in 1821 a committee was formed to identify the safest charts for Danish ship owners to use, whose main purpose prevented inferior Dutch and English charts of Danish waters being used by its own ships.⁹⁴⁰

Towards the end of 1819 Hurd put into place a more formal system of international co-operation.⁹⁴¹ Inevitably this had an Eurocentric bias but it was in line with Castlereagh's foreign policy.⁹⁴² He managed through assistance from the British Ambassador at the Court of Denmark to open up communications with the Danish royal family.⁹⁴³ His thinking behind this can be seen in his obtaining from the Admiralty Board permission for a mutual exchange of sea charts and 'useful maritime knowledge'. He wrote to Löwenörn stating:

Ever since the year 1808, in which I succeeded the late Mr. Dalrymple in this office, my increasing endeavours has been exerted to accomplish so desirable and liberal an object as an interchange of Hydrographical charts and knowledge with all the maritime nations in Europe – and I cannot but offer you my very sincere congratulations on the success attendant on our joint efforts towards the producing this effect between Denmark and Great Britain.⁹⁴⁴

⁹³⁷ *The Annals of Philosophy*, new series 1 (January-June 1821), 113-15. That society was also involved with cartography (Ravn, *Kongelige Danske Søkort-Arkiv*, 18).

⁹³⁸ Ravn, *Kongelige Danske Søkort-Arkiv*, 19.

⁹³⁹ UKHO, LB1 fos 79-81, Hurd to Cotton, 12 February 1817.

⁹⁴⁰ Ravn, *Kongelige Danske Søkort-Arkiv*, 19.

⁹⁴¹ Day incorrectly states how the 'first' interchange between foreign hydrographic offices was with Denmark in 1822 (Day, *Hydrographic Service*, 42).

⁹⁴² UKHO, LB1 fos 261-2 Hurd to Löwenörn, 30 December 1819; Bartlett, *Defence and diplomacy*, 14-15.

⁹⁴³ UKHO, MB1 f.6, Schifter to the Admiralty Board, 4 January 1826.

⁹⁴⁴ UKHO, LB1 fos 261-2 Hurd to Löwenörn, 30 December 1819.

Why Hurd left it until 1819 was most likely due to the pressure of war upon his office, preparations for the Arctic voyages and the opportunity of peace that had only materialised during the last few years. Nevertheless an important ally and source of maritime information was quickly established. To seal what was most likely Hurd's first bilateral arrangement he sent Löwenörn a copy of every chart he had published, but not before pointing out the shortcomings of many other charts published outside the Admiralty in England.



Illustration 5.2 Poul Löwenörn (1751-1826) the Danish Hydrographer who entered into a bilateral agreement with Hurd in 1819 (H.C. Bjerg, *Poul Löwenörn 1751-1826* (Kobenhavn, 1984))

Subsequently two packages of charts arrived from Copenhagen in 1820 and another in June the following year.⁹⁴⁵ Another consignment of charts (under Hurd's mutual exchange system) was sent to the Danish court in 1822,⁹⁴⁶ but after his death the arrangement stagnated. A communication was made between Lieutenant Graah of the Danish Navy and Parry, whilst he was on the *Hecla*, in July 1824 concerning a

⁹⁴⁵ TNA, ADM17/28.

⁹⁴⁶ UKHO, LB1 f.488, Hurd to Spencer, 30 April 1822.

dangerous rock,⁹⁴⁷ but there appears to have been little else until Löwenörn used the British consular service to supply charts to the Admiralty in 1825.⁹⁴⁸ By January the following year the system had almost totally broken down as Captain Schifter of the Danish Navy, on behalf of Löwenörn, wrote to the Secretary of the Admiralty pointing out that nothing had been sent to Copenhagen since 1822. Parry was instructed by the Board to look into the matter and ‘after a diligent inquiry’ Captain Schifter was of course found to be correct,⁹⁴⁹ showing how the transition between the two British Hydrographers’ administrations was not as smooth as it could have been, causing some embarrassment for the British. It also shows how international arrangements were not high on Parry’s agenda, despite the efforts Hurd put into opening up such opportunities. With the arrangement soon back on track the Danes requested that the charts be sent through John Mitchell & Co., of Old Broadstreet, which were eagerly expected at the Royal Danish Sea Chart Archives.⁹⁵⁰ By the time they arrived two and a half months later Löwenörn had passed away and his temporary replacement, Commodore Fabricius, wrote informing Parry (who the latter thought very highly of).⁹⁵¹ Fabricius was also very conducive towards the reciprocal arrangement entered into by his predecessor and what the Admiralty received from the Danes Parry found especially worthy of further supply to the Fleet.⁹⁵² Such was the quality of Danish charts that their reputation led the head of the Ordnance Survey to ask Parry for one of their charts in preference to one of the Admiralty’s making!⁹⁵³ Also, their chart of the North Sea caused the Swedes and the Russians to completely revise their own versions,⁹⁵⁴ showing how quality was more important than quantity.

The interaction between the two offices extended further than the mere supply of charts, as correspondence was entered into during 1827 over the precise positions of features on the east coast of Britain. Here Parry was in a good position to be able to refer to Captain Hewett’s and Mr George Thomas’s recent observations, but openly

⁹⁴⁷ *London Gazette*, 7 August 1824.

⁹⁴⁸ UKHO, LP1857 L396, Löwenörn to Parry, 19 December 1825.

⁹⁴⁹ UKHO, MB1 fos 8-9, minutes 4-7 January 1826.

⁹⁵⁰ UKHO, LP1857 F239, Fabricius to Parry, 15 March 1826.

⁹⁵¹ Fabricius wrote ‘It is not without the most sensible regret, that at the same time I have to mention the decease of our highly deserving and respectable Admiral Löwenörn, who departed this life the 16th of March. I have nothing to add to the kind praises, where with you have been pleased to speak of a man whose death may be said to be a loss not only to his family and friends, but to the whole country whose ornament he was’ (UKHO, LP1857 F240, Fabricius to Parry, 17 June 1826).

⁹⁵² UKHO, MLP5/3ii f.9, Report on the Hydrographic Office by Parry, 1 February 1827.

⁹⁵³ UKHO, MB1 f.108, minute 31 May 1827.

⁹⁵⁴ Ravn, *Kongelige Danske Søkort-Arkiv*, 23.

admitted that one of his own positions was incorrect due to his chronometer rate having changed for the worse.⁹⁵⁵ Further correspondence on the correct position of a sea mark was entered into in 1828⁹⁵⁶ and by March 1829 multiple copies of Danish charts were being supplied to ships on the South American Station.⁹⁵⁷ Clearly Parry had resurrected the bilateral agreement between the two countries that was functioning well by the time he resigned, with the Hydrographic Office also incorporating Danish hydrography into charts of their own production.⁹⁵⁸

Spain⁹⁵⁹

The Spanish like the French were for many years great rivals with Britain, not only as maritime powers but also in the world of exploration. This did not stop Alejandro Malaspina collaborating with Dalrymple and Banks in 1789, and this collaboration lasted for many years. During that era a Spanish naval officer, Captain José Mendoza y Rios, also became associated with Banks and ended up marrying, as well as living, in England until his death in 1816. Rios published *A complete collection of tables for navigation and nautical astronomy* in 1805 that was recommended by the Chart Committee (including Hurd) for use by the Navy two years later.⁹⁶⁰ In 1813, whilst Hurd was secretary to the Board of Longitude, that body approved the method of working lunar observations published by Mr Mendoza Rios accompanied with his Tables to be a ‘very convenient and advantageous practical method and therefore meriting their attention and support’.⁹⁶¹ The Lords Commissioners of the Admiralty permitted Mendoza’s Tables to be added to all the chart boxes issued, but by 1816 the tables had to be requested by application to the Navy Board as the Hydrographic Office had nothing to do with their distribution, causing a small amount of additional

⁹⁵⁵ UKHO, LB2 f.95, Parry to the Danish Hydrographer, 26 January 1828.

⁹⁵⁶ UKHO, LB2 f.177, Parry to Zahrtmann, 16 August 1828.

⁹⁵⁷ UKHO, LB2 f.269, Parry to Fleeming, 3 March 1829.

⁹⁵⁸ Löwenörn’s chart of the Cattegat was adopted into the Admiralty series (including some of Klint’s work) as Admiralty chart no. 128.

⁹⁵⁹ For the history of Spanish hydrography in the 19th century see L. Martín-Merás, *La Dirección de Trabajos Hidrográficos (1797-1908)* (Madrid, 2003).

⁹⁶⁰ A.C.F. David, ‘Anglo-Spanish cooperation in hydrography, navigation and nautical astronomy, 1788-1834’ in L. Martín-Merás (ed.), *Navigarre necesse est estudios de historia marítima en honor de Lola Higuera* (Gijón, 2008), 153-6.

⁹⁶¹ TNA, ADM1/3458, Hurd to Croker, 6 December 1813.

administrative work for the Hydrographer passing on paper work to the correct office.⁹⁶²

With Hurd hoping to get as many charts into print as possible there was an active reworking of many Spanish charts. One of his first tasks as Hydrographer involved the acquisition of maps and charts from Spain, which included six copies of the latest editions covering the Mediterranean. The acquisition was made through Lord Collingwood as commander-in-chief of the Mediterranean Station, as by the 12 July 1808 Hurd knew that ‘the communication with Spain’ was open.⁹⁶³ As Spain was a major charting nation there were many charts available to be reproduced at that time; thus between 1817 and 1819 Hurd published eight charts of South American waters,⁹⁶⁴ as well as having a further four at proof stage by the end of that year.⁹⁶⁵ To undertake such a task Hurd needed charts and surveys to work from, therefore in 1817 he sent a collection of 42 Admiralty charts to the Depósito Hidrográfico⁹⁶⁶ in an attempt to open up a reciprocal arrangement for the mutual supply of charts.

The adoption of Spanish charts was not without problems, especially when it came to South American waters. In 1814 it was known that

the Eastern side of the South American shores from Cape St Mary, near the entrance of the River Plate, to Trinidad, one of the West India Islands, . . . is erroneously laid down in the Charts and Maps of that Country and therefore want rectifying.⁹⁶⁷

This was in part due to the positions on the charts being based on old information and with the widespread use of chronometers Hurd was able to compare the old against the new highlighting such errors. There were also problems where Spanish surveys ended and there was no reliable data to continue coverage to the high standard Hurd wanted. Another issue concerned obtaining Spanish charts. Hurd wrote in 1819 to one officer who had sent in some Spanish surveys that were already in his possession, offering encouraging words for the further supply of information, as such materials

⁹⁶² UKHO, LB1 f.69, Hurd to Lake, 4 December 1816; *ibid.*, f.192 Nares to Willoughby, 13 January 1819.

⁹⁶³ TNA, ADM1/3423, Hurd to Pole, 12 July 1808; C.H.H. Owen, ‘Collingwood, Cuthbert, Baron Collingwood (1748–1810)’, *ODNB* [accessed 10 Aug 2008].

⁹⁶⁴ David, ‘Anglo-Spanish cooperation’, 161.

⁹⁶⁵ UKHO, LB1 fos 276-7, Report on the state and progress of surveys, 31 December 1819.

⁹⁶⁶ David, ‘Anglo-Spanish cooperation’, 161; Museo Naval, Madrid, MN, A-10395. The majority of the 42 charts are ones published by Hurd of the Americas and Africa, except for three published by Dalrymple.

⁹⁶⁷ TNA, ADM1/3459, Hurd to the Admiralty Board, 7 May 1814.

were still officially required by the Admiralty's Hydrographer.⁹⁶⁸ In 1822 another officer had a valuable small Spanish atlas of ports which Hurd needed to borrow on two occasions, going out of his way to 'send for it wherever Capt. Gordon may point out or will gladly receive it as a package from any distance'.⁹⁶⁹ Such was Hurd's desire to obtain as much data as possible.

The acquisition of Spanish data vastly improved when Bauzá came to England, especially for the Mediterranean, West Indies, and South America. The two countries collaborated from the start, as Bauzá wrote in 1824 that 'with the return of Captain Parry, we shall make progress in establishing a correspondence between the Madrid Office and this one . . .'.⁹⁷⁰ Parry wrote glowingly in praise of his Spanish counterpart that he had 'given us several, and but (for copying) a great number of the best Spanish surveys, and has been very attentive and obliging in immediately communicating any recent information of this nature'.⁹⁷¹ Like Rossel, Bauzá found himself in receipt of a set of the latest Admiralty charts in return for his benevolent act. Also like Rossel, Bauzá was keen to let Parry have details of astronomical observations made on voyages of exploration, presenting a copy of Espinosa's *Memorias sobre las observaciones astronómicas, hechas po los navegantes Españoles en distintos lugares del globo* (published in 1809) to the Hydrographic Office in November 1826.⁹⁷² Bauzá also arranged for a large number of charts to be sent to Clarence⁹⁷³ during his appointment as Lord High Admiral, thus making every effort to put in place the firm foundations of internationalism.

The quality of Spanish charts was on a par with the Danes. This reflected Spain's well organised surveying service, which had even established a hydrographic office at Havana to supply charts to the Americas. But like the other countries there were differences between different nations' charts, such was (and still is) the nature of charting, of which Spain was no exception. Differences were brought to Parry's attention in 1828,⁹⁷⁴ when part of the problem rested on the fact that the old pre-chronometric surveys were to blame, which was an issue common to all charting

⁹⁶⁸ UKHO, LB1 f.240, Hurd to Woolcombe, 24 August 1819.

⁹⁶⁹ UKHO, LB1 f.511, Hydrographic Office to Gordon, 15 November 1822.

⁹⁷⁰ Lamb, 'London years', 324.

⁹⁷¹ UKHO, MB1 f.42 Hurd to the Admiralty Board, 31 May 1826. See also Chapter Three for details of his supply of data to Parry.

⁹⁷² David, 'Anglo-Spanish cooperation', 162.

⁹⁷³ Lamb, 'London years', 326.

⁹⁷⁴ UKHO, LP1857 F196, Fleeming to Parry, 15 May 1828.

nations. Even though the Spanish had surveyed vast areas of South America and the Caribbean there were still some gaps that Parry knew could be filled by British surveyors.⁹⁷⁵ Nevertheless relationships between the two nations grew stronger thanks to Bauzá's and Parry's efforts.

Portugal

The Portuguese were for many centuries one of the most prominent nations of maritime explorers,⁹⁷⁶ but despite such a position by the time of this study they had virtually no interaction with the British Hydrographic Office. Their office that oversaw hydrographic matters in Brazilian waters was dispersed in 1807⁹⁷⁷ and the Admiralty possessed numerous Portuguese manuscript charts of African waters that were eventually incorporated as Admiralty charts.⁹⁷⁸ Hurd reported to the Admiralty how any vessels on official Portuguese business were supplied with manuscript charts because of the secrecy surrounding their content.⁹⁷⁹ Their own home waters had been charted by Tofiño de San Miguel, Director of the Spanish Naval Academy and by 1811 Hurd had incorporated Tofiño's charts of the coast of Portugal in the *Channel Atlas* issued by the Hydrographical Office;⁹⁸⁰ those charts were amended before publication as a result of a complaint by The Honourable Vice Admiral Berkeley.⁹⁸¹ There were also plenty of privately published charts of their own waters available in London and Arrowsmith supplied 400 copies of Marino Miguel Franzini's charts of the coast of Portugal to Hurd in 1812, who subsequently passed on 200 to Admiral Berkeley for use by his squadron.⁹⁸² Parry knew from Smyth that those plans by Franzini were 'extremely good'⁹⁸³ and when the *Spanish Coasting Pilot* by Tofiño was first published by Faden (in English in 1818), there was good coverage of both land and sea available for supply to the Navy. Tofiño's work was subsequently re-published by the Hydrographic Office and it contained charts of Portuguese waters

⁹⁷⁵ UKHO, LP1857 F196, Fleeming to Parry, 15 May 1828; IBID, F198 Fleeming to Parry, 17 July 1828; ibid, MB1 fos 225-6, Parry to Fleeming, 20 February 1829.

⁹⁷⁶ <http://www.hidrografico.pt/cronologia.php> (accessed 15 August 2008).

⁹⁷⁷ UKHO, Ritchie Papers box Q, A. Teixeira de Mota, 'Some notes on the organization of hydrographical services in Portugal until the beginning of the 19th century' (undated typescript).

⁹⁷⁸ [Hydrographic Office], *A catalogue of charts . . . 1825*, 24.

⁹⁷⁹ TNA, ADM1/3523 Hurd to Pole, 7 July 1809.

⁹⁸⁰ Admiralty Library, Vy10.

⁹⁸¹ TNA, ADM1/3523 Hurd to Pole, 7 July 1809.

⁹⁸² ADM12/155.

⁹⁸³ UKHO, MLP183/3 f.34, Survey of World charting by Parry, 1826. For a brief biography of Franzini see <http://www.arqnet.pt/exercito/franzini.html> (accessed 25 October 2009).

that were clearly suitable, otherwise they would not have been issued to the Fleet. Such a comprehensive cover of readily available material suggests that due to the state of the charting of their own waters there was no great need to raise any correspondence with Portugal.

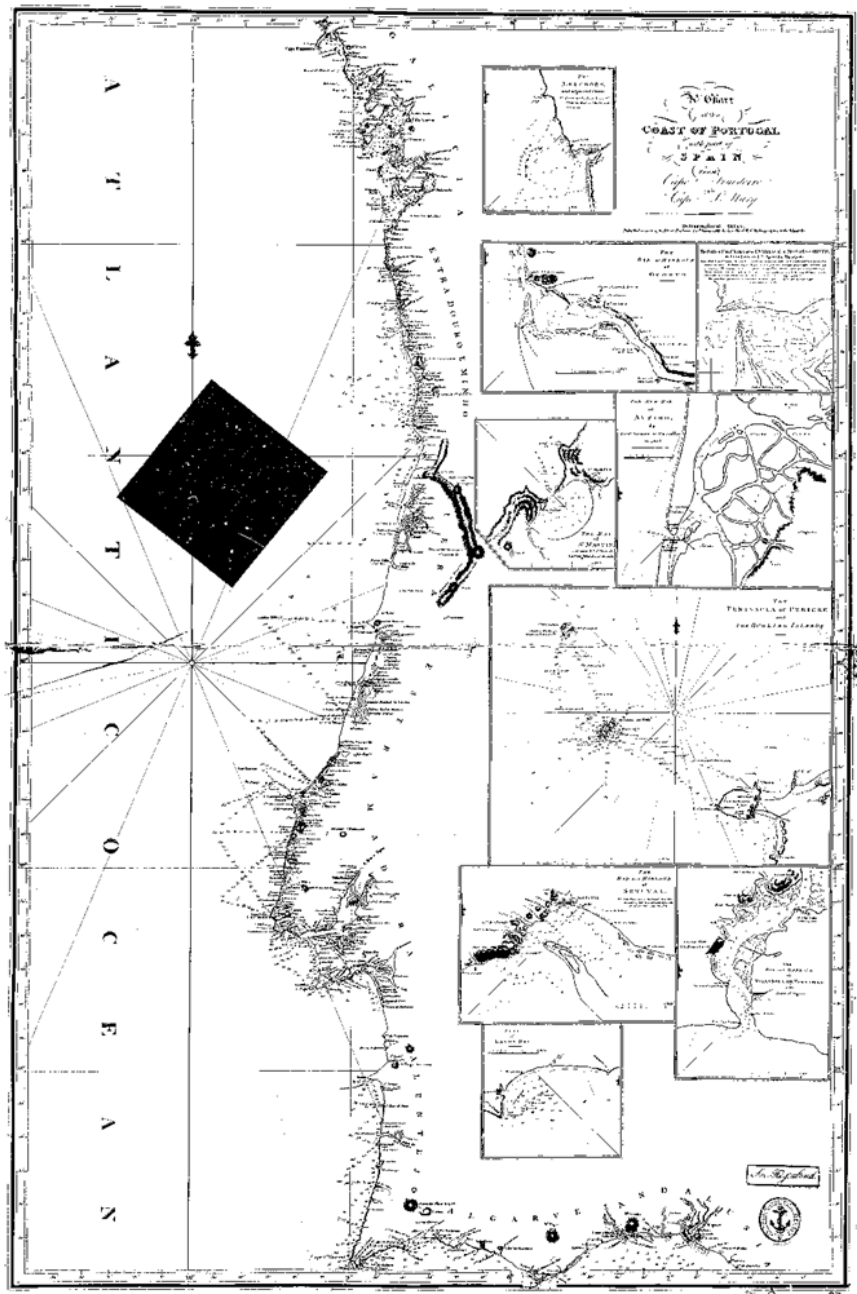


Illustration 5.3 A Hydrographic Office chart of the coast of Portugal published by Hurd (UKHO, OCB 87)

Italy

During the period of this study there was no nation of Italy and any 'official' organisation along the lines of the French model was undertaken by individual states.

Ritchie states how the Istituto Cartografico Napolitano ‘was the first Italian institute to prepare charts’, publishing them from 1825; however the War Office of the Kingdom of Italy in Milan was active from 1808.⁹⁸⁴ There was also the Scuola di Cartografia in Milan, that owed its development to the Austrians that produced a chart of the Adriatic based upon French, Italian and British sources, between 1822 and 1825.⁹⁸⁵ There were other nations who had an interest in charting the waters of modern day Italy including the French and British. There were also stretches of coastline, such as the Adriatic where more than one country had an interest in the safe navigation of those waters; prior to 1815 the French had charted the area but after 1815 there was a requirement by the British to resurvey it because of the poor quality of the existing charts.⁹⁸⁶ There were also several plans and coastal charts published in London (by Faden, Laurie and Whittle, and Steel), based on the work of Joseph Dessiou who was highly praised for his charting abilities, with the others by Rizzi Zaroni and Giovanni Grubas a pilot of the Venetian Marine.⁹⁸⁷

The task of British resurveying fell to Smyth and the international connections he fostered are worth exploring. The Austrians proposed a joint survey of the Adriatic and Smyth went to Naples in 1818 to undertake negotiations with the Austrian and Neapolitan governments. Consequently four Austrian surveyors were attached to Smyth’s survey vessel, *Aid*, and the Austrian sloop *Velox* was put under his direct command.⁹⁸⁸ One of the reasons for the joint venture was due to the respect the Ottomans had for the British, which allowed the latter to survey their waters. The survey was completed relatively quickly as Smyth returned to London in 1819. During that period Smyth corresponded with Baron von Zach (1754-1832) the German astronomer and became great friends with Colonel Visconti, Director of the Officio Topografico of Naples (which produced exceptionally detailed topographic maps containing some small amounts of hydrography based on surveys between 1817 and 1819). He also met Marshall Koller (an Austrian general and diplomat), Count

⁹⁸⁴ E. Valerio, ‘Landscapes and Charting in the 19th Century. Neapolitan-Austrian and English cooperation in the Adriatic Sea’ in *Mappæ Antiquæ. Liber Amicorum Günter Schilder* (2007), 470-2.

⁹⁸⁵ G.S. Ritchie, ‘Italy’s contribution to World hydrography’, *The International Hydrographic Review* 50:2 (July 1973), 22-3.

⁹⁸⁶ Valerio, ‘Landscapes’, 470.

⁹⁸⁷ TNA, ADM1/3522, Survey of charts available in London in 1807.

⁹⁸⁸ Dawson, *Memoirs*, 54.

Nugent (Commander-in-Chief of the Bourbon army) and Baron Poiter (of the Austrian staff).⁹⁸⁹

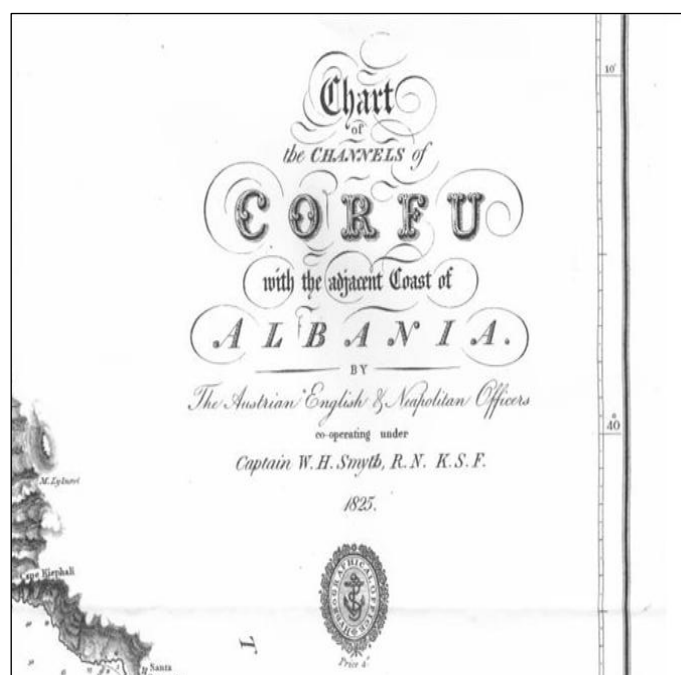


Illustration 5.4 An extract from a Hydrographic Office chart of Corfu containing an acknowledgement of the joint co-operation of the British, Austrian and Neapolitan officers (UKHO, OCB206 A1 published 10 June 1825)

Russia

The Russian Hydrographic Office was officially established in 1827,⁹⁹⁰ but prior to that it could put a good case forward (thanks to support from the Crown) of having the second oldest government hydrographic office in the world. It had its own naval press that was printing charts in 1752 and although it changed its make up over the years, the Russian Admiralty still had various organised hydrographic functions to one degree or another before 1827.⁹⁹¹ Like many nations it did not always have all the geographic information that it needed and used its diplomatic connections to obtain cartographic information from London, at least since the 1760s.⁹⁹² However, the connections between Britain and Russia in maritime terms were very friendly, with

⁹⁸⁹ Valerio, 'Landscapes', 469-70, 472-3.

⁹⁹⁰ V. Akhmatov, 'The Hydrographic Office – Leningrad', *The Hydrographic Review* (1928), 67.

⁹⁹¹ J. de Schokalsky, 'A short account of the Russian Hydrographic survey', *The Geographical Journal* 29:6 (June, 1907), 626-7.

⁹⁹² V.E. Bulatov, C.D. Smith and F. Herbert, 'Andrew Dury's Map of the present seat of war, between the Russians, Poles, and Turks (1769)', *Imago Mundi* 53 (2001), 72.

many Russians having served in the British Navy. Many served before 1815⁹⁹³ (and vice versa)⁹⁹⁴ including Lieutenants Yurey Lisianskii⁹⁹⁵ and (later Admiral) Adam John de Krusenstern in the 1790s,⁹⁹⁶ when both men most likely met Hurd on Bermuda in the year Britain established her own Hydrographic Office.⁹⁹⁷

Although Dawson does not mention any involvement with hydrography in the field after 1809, Lisianskii's and Krusenstern's accounts of the first Russian circumnavigation were a landmark in their country's hydrography.⁹⁹⁸ The voyage was so important that editions of the work were published in German, English, Russian, Dutch and French within 12 years, as well as in Swedish and Italian.⁹⁹⁹ Russian colonial aspirations on the west coast of North America, their interests in Europe and the Mediterranean both before and after 1815, left them in a particularly threatening position towards Britain;¹⁰⁰⁰ this may account for the lack of interaction with the British Hydrographer. What was more important for Russia was the development of their hydrographic capability, in particular Krusenstern's activities after his circumnavigation. As he was a progressive officer he took great interest in other hydrographic offices, such as the Spanish to which he looked for ideas relating to the training of surveyors.¹⁰⁰¹ He also included some of Bauzá's charts in his atlas,¹⁰⁰² and was known for his recording of air and sea temperatures¹⁰⁰³ that contributed to his

⁹⁹³ One example was Alexander Pavlovich Avinov (1786-1854) served as a petty officer from 1804-1807, taking part in the Battle of Trafalgar. Served between 1812 and 1814 on Russian frigates off the coasts of Britain and the Netherlands and fought at the Battle of Navarino (UKHO, Ritchie Papers box P, 'Well-known Russian navigators' by I.P. Magidovich (undated typescript).

⁹⁹⁴ Rodger, *Command of the ocean*, 383.

⁹⁹⁵ G.R.deV. Barratt, 'A Russian view of Philadelphia, 1795-96: from the journal of Lieutenant Iurii Lisianskii', *Pennsylvania History* 65 (Winter 1998), 62-86.

⁹⁹⁶ Dawson, *Memoirs*, 40-1.

⁹⁹⁷ Lisianskii and Krusenstern served on the frigate *L'Oiseau* under Murray in North America in 1794 and 1795, spending two weeks at Hamilton, Bermuda (Barratt, 'A Russian view', 71, 85 n.63). That two week period was most likely when the two men met (Ibid, 62), or possibly on the *Cleopatra* that was commanded by Penrose, as Hurd met Penrose on Bermuda in 1795 (TNA, ADM1/493, Penrose to Murray, 24 March 1795; ibid, Penrose to Murray, 25 May 1795). According to his biography Krusenstern definitely visited Bermuda before his return to England in 1796 (Sir John Ross (ed), *Memoir of the celebrated Admiral Adam John de Krusenstern, the first Russian circumnavigator, translated from the German by his daughter Madame Charlotte Bernhardi* (London, 1856), 13; quoted in Dawson, *Memoirs*, 41).

⁹⁹⁸ *A voyage round the world, in the years 1803, 4, 5, & 6; performed, by order of his Imperial Majesty Alexander the First, emperor of Russia in the ship Neva*, published in London in 1814.

⁹⁹⁹ Dawson, *Memoirs*, 41. A chart of Lisianskii's was published at St Petersburg in 1805 (Elmer E. Rasmuson Library, University of Alaska Fairbanks, Alaska and Polar Regions Collections G4372 K632 1805 L57).

¹⁰⁰⁰ Bartlett, *Defence and diplomacy*, 12-13.

¹⁰⁰¹ Lamb, 'London years', 326.

¹⁰⁰² Ibid, 332.

¹⁰⁰³ J. Dennis, *Ample instructions for the barometer and thermometer; containing, particular directions for the marine and house barometers, or weather glasses . . .* (London, 1825), 20.

involvement in a scientific voyage to Bering Strait. He visited England in 1814 and drew many comparisons between the Russian and British nations,¹⁰⁰⁴ although his direct involvement with British hydrography is surprisingly absent from the letter and minute books kept by Hurd and Parry.¹⁰⁰⁵



Illustration 5.5 The two Russian hydrographic specialists who met Hurd on Bermuda. (Left) Lieutenant Urey Lisiansky. (Right) Admiral Adam John de Krusenstern.

Krusenstern was therefore in all but name the Russian Admiralty's Hydrographer and although not officially established until 1827, its make up resembled that of the British Hydrographic Office.¹⁰⁰⁶ It certainly could boast numerous eighteenth century surveys across a wide geographical area that was on a par with the work of other nations, such as France and Spain.¹⁰⁰⁷ One writer thought of its eighteenth century work that the 'surveys carried out by the Russian Navy along the coasts of various seas and oceans came to play a prominent role in world hydrography'.¹⁰⁰⁸ That role in the early nineteenth century European hydrographic community (which effectively dominated world hydrography with the H.E.I.C.), was inconspicuous but nevertheless effective enough to lay the foundations as a major player for decades to come through its decision to chart the World, rather than (exclusively) its achievements in the eighteenth century.

¹⁰⁰⁴ Dawson, *Memoirs*, 41.

¹⁰⁰⁵ UKHO, LB1, LB2 and MB1.

¹⁰⁰⁶ Akhmatov, 'The Hydrographic Office – Leningrad', 70.

¹⁰⁰⁷ Schokalsky, 'A short account', 626-39.

¹⁰⁰⁸ A. Postnikov, 'The Russian Navy as chartmaker in the eighteenth century', *Imago Mundi* 52 (2000), 80.

There was one charting incident involving the two nations during this period in 1814 when Mr Lash, a master in the Navy, purchased some charts of the Baltic from Russia.¹⁰⁰⁹ The matter was brought before Hurd in 1822 to pay for the charts purchased in 1814, when he wrote to the Foreign Office:

I do not understand the value of the Rouble or the difference of exchange I have only to state that the sum credited in the office books on account of these charts is twenty guineas or twenty one pounds sterling money of Great Britain.¹⁰¹⁰

That statement and the lack of other correspondence strongly suggests how that one-off payment might well have been the only involvement Hurd had with the Russians over hydrographic matters whilst he was Hydrographer. Matters barely improved until 1828 under Parry, despite the Duke of Wellington's diplomatic mission of 1825,¹⁰¹¹ a treaty being signed between the two nations in 1827 and the combined operations during the Battle of Navarino.¹⁰¹² A lack of British interaction with Krusenstern, as well as his successor circumnavigator Captain Bellinghausen (1778-1852),¹⁰¹³ was an opportunity well and truly missed, especially because he had many scientific contacts in Germany and Denmark that may have been useful to the Admiralty.¹⁰¹⁴

Sweden

Although the Swedish Hydrographic Office was not established until 1956, it was another country that had a long history of hydrographic work, having set up their Coast Survey Corps in 1808. The Corps was run by Colonel Schultén a Finlander, who was a scientist and a mathematician, but it was abolished in 1824 and a year later the 'Chart Archives' was established under the administration of the Navy.¹⁰¹⁵ Hurd sent some charts of the Baltic to the Crown Prince of Sweden in 1814,¹⁰¹⁶ but other associations are less obvious. Foremost in the editing of Swedish charts throughout

¹⁰⁰⁹ UKHO, LB1 f.516, Hurd to Bayley, 30 November 1822. Lash had made a survey in 1801 that was published by the Admiralty (with other sources) of Carlshamn, Matvik, and Jarnik Harbours, Hanno Sound and Carlsrona Entrance (Admiralty chart no.137). See also page 161 of Voelcker's *Admiral Saumarez versus Napoleon. The Baltic, 1807-12* (Woodbridge, rep 2009) for an extract of Lash's chart of Hano and for the context of Baltic operations.

¹⁰¹⁰ UKHO, LB1 f.516, Hurd to Bayley, 30 November 1822.

¹⁰¹¹ Middleton, *British foreign policy*, 220.

¹⁰¹² Cable, *Political influence*, 57.

¹⁰¹³ A.G.E. Jones, *Polar portraits. Collected papers* (Whitby, 1992), 37-8. Like Krusenstern, Bellinghausen's instruments were also purchased in London.

¹⁰¹⁴ Benson and Rehbock, *Oceanographic history*, 100-111.

¹⁰¹⁵ R.H. Dahlgren, 'Swedish hydrography 1644-1944. The nautical chart of Sweden. Contributions to the history of Swedish hydrography', *International Hydrographic Journal* (1947), 1-12.

¹⁰¹⁶ TNA, ADM12/167.

that period was Admiral Gustaf Klint (1771-1840), a contemporary of both Hurd and Parry, who by his own actions was involved with international collaboration. Klint's father, Eric (1732-1812), was also a hydrographer and they published charts at Carlscrona and Stockholm between 1795 and 1820.¹⁰¹⁷ He published at his own expense (under contract from the Swedish government) between 1797 and 1820 the *Sveriges sjöatlas*, or the 'Swedish Sea Atlas'.¹⁰¹⁸ By 1852 it contained 98 general and 35 special maps when its publication was taken over by the Swedish Government.¹⁰¹⁹ Klint, like Krusenstern, was effectively his nation's Hydrographer and when an official approach was made by Britain to Sweden in 1828 it was (not surprisingly) made to Klint.¹⁰²⁰ The mutual exchange was supported by both countries consular services¹⁰²¹ and the liaison lasted for many years with the Admiralty publishing a new chart based on his surveys covering a stretch of Norwegian waters from The Naze to Karmo in 1854.¹⁰²²

Netherlands

The Netherlands were the predominant charting nation in the sixteenth and seventeenth centuries, and in 1787 set up a Committee for the determination of longitude at sea and for the improvement of nautical charts. The position in the Netherlands after the demise of the Vereenigde Oost-Indische Compagnie (V.O.C.) surprisingly saw only one communication with the British Hydrographic Office; this was due to the major political and international changes from 1808-26. Up until 1813 its naval and hydrographic functions were run from Paris and after 1813 it took the Dutch Government some time to organise itself. Dutch naval officers did undertake surveys of their waters after the French (under Beautemps-Beaupré) had ceased to do so, but co-ordination with those men and the Department of Roads who were also carrying out hydrographic surveys did not appear to have happened. The publication of Dutch charts fell unto a private company during that period and the official

¹⁰¹⁷ Scott, *Tooley's Dictionary of Mapmakers*, vol.3, 41.

¹⁰¹⁸ http://www.abc.se/~pa/uwa/birg_jarl.htm (accessed 4 June 2008).

¹⁰¹⁹ *The Journal of The Royal Geographical Society* vol. 22 (London, 1852), xcvi. Dahlgren says it was taken over in 1849 and consisted of 64 charts (Dahlgren, 'Swedish hydrography', 12).

¹⁰²⁰ UKHO, LB2 f.162, Parry to Tottie, 4 July 1828.

¹⁰²¹ TNA, ADM12/254.

¹⁰²² W. Foster, *The mercantile marine magazine and nautical record vol.1 January-December, 1854* (London, 1854), 320.

hydrographic office was not established until 1874.¹⁰²³ Although Dutch dominance of the world of maritime charting was over by the early nineteenth century, there was something to be gained through contacting the King of the Netherlands in 1828.

Other European nations

Due to the position of Swedish control over Finland, the Swedish Admiralty published the 'Nordenanckar Atlas' between 1782 and 1797 that contained charts of all of the coast of Finland. Klint's work replaced that atlas and with additional surveys of the Gulf of Finland carried out by the Russians one historian felt that unfortunately it 'did not satisfy even the navigation of those times'.¹⁰²⁴ By relying on Sweden for its charting Finland was in a similar position to Germany, who had no formal hydrographic office and relied on foreigners to chart its waters. There were communications with Smyth, the Royal Astronomical Society in London and two German professors who received Society medals courtesy of Smyth in 1829.¹⁰²⁵ However, correspondence of a purely hydrographic nature in 1828 showed there were virtually no hydrographical publications, except for a chart of the coast and harbour of Carlsrona.¹⁰²⁶ A similar situation existed in Norway, however after 1814 when it became separated from Denmark, all the charts of those waters were handed over by the Danes.¹⁰²⁷ Parry was given a Norwegian chart of Alten in Finmarken whilst he was at Hammerfest which he deposited in the Hydrographic Office archive,¹⁰²⁸ but any correspondence is wanting.

Countries in southern Europe such as Turkey were happy for Britain to chart their waters, with Beaufort surveying the coastline of Karamania in 1811 and 1812, requiring a certain degree of diplomatic awareness due to the situation between Britain, France and Russia. Here the Foreign Office's involvement saw Beaufort supported by a former shipmate, William Hamilton, who was then serving as Under

¹⁰²³ Anon, *Catalogue of the exhibition 'With lead and line'* (Rotterdam, 1974), 37-46; de Vries, et al, *The Van Keulen cartography Amsterdam 1680-1885* (Alphen aan den Rijn, 2005), 65-9.

¹⁰²⁴ M. Suomessa, 'Surveys carried out in coastal waters before 1918. At the time of Swedish rule' (typescript, Helsinki, 1947), 12-13.

¹⁰²⁵ Royal Astronomical Society, *Monthly notices of the Astronomical Society of London, containing abstracts of papers, and reports of the proceedings of the Society from February 1827, to December 1830* (London, 1831), 115.

¹⁰²⁶ UKHO, LB1 f.174, Parry to Owen, 25 March 1828.

¹⁰²⁷ Ravn, *Kongelige Danske Søkort-Arkiv*, 20.

¹⁰²⁸ UKHO, Accession ledger book 1, E555.

Secretary of State for Foreign Affairs.¹⁰²⁹ On the surface the difficult situation between Turkey, Greece and the Ottoman Empire was not conducive for British charting interests,¹⁰³⁰ but Greece had eight charts of its coastline published at the Hydrographic Office by 1825¹⁰³¹ and the Venetian Empire's spread into the Ionian Islands saw it take responsibility for charting that myriad of islands until 1797 when they were ceded to France.¹⁰³² Outside of this the situation for other countries was far less organised relying on other more developed and industrialised nations to chart their waters.

This was also the case for South America and Africa but there was an organisation that complemented those European hydrographic offices and that was the H.E.I.C.. The vast coverage of charts produced by the H.E.I.C. was something that during the period of this study the British Admiralty initially could only aspire to. Ironically the foundations had been laid by Dalrymple for such a large geographical coverage that spread from Africa to Japan (but also included some charts of Brazil), which after his death in 1808 was continued by Horsburgh. Further to the south, including Australasia, the story was very different but there were no great international relations to be formed, more colonial agreements to try and fill in the many blanks in the existing work of Flinders in Australia, by King, the French and others.

North America

After Britain lost her American colonies, Morrison and Hansen considered that there was little incentive for the English to improve their charts of American waters. Although a detailed analysis of this issue is out of the scope of this work, the reason for a lack of British charting of American waters was due to two factors. First, the fact that British survey vessels would have needed American approval to survey in American waters. Secondly, there was still a demand for accurate charts of American waters from the British merchant fleet, but it was not until the 1790s that the newly formed nation had the capacity to produce their own charts.¹⁰³³ The war of 1812 did nothing to help 'not particularly good' relations between the newly formed

¹⁰²⁹ Courtney, *Gale Force 10*, 162.

¹⁰³⁰ Bartlett, *Defence and diplomacy*, 24.

¹⁰³¹ Hydrographic Office, *Catalogue of charts, 1825* (London, 1825).

¹⁰³² Ex inf Professor G. Harlaftis, 2007.

¹⁰³³ R Morrison and R. Hansen, *Charting the Chesapeake* (Annapolis, MD, 1990), 42, 49.

hydrographic function in the United States and their former colonial masters.¹⁰³⁴ But during Hurd's term as Hydrographer there were other factors that did not help to foster any sort of relationship. This was in part due to Hurd's experience on Bermuda¹⁰³⁵ and the refusal of the Admiralty Board to let him publish his survey of those islands in 1808.¹⁰³⁶ Such was the threat from the Americans that it was believed as late as 1827 by Parry that '... Captain Hurd objected to publishing this survey [of Bermuda], lest it should fall into the hands of the Americans'.¹⁰³⁷ There were also other charts that were not offered for sale to the public after 1821 because of their value to the Americans, such as those of the Canadian Lakes which were only supplied to Royal Naval ships.¹⁰³⁸ Therefore the interaction with the Americans was very different to that with the European Hydrographic Offices.

The Americans were belligerent in their publication of other countries' charts; paying little regard for the copyright held by other countries they pirated works without even giving an acknowledgement of the originator.¹⁰³⁹ Their entry into the official world of government hydrography occurred in 1807 when the 'Survey of the Coast' was established by President Thomas Jefferson, who accepted Ferdinand Hassler's plan as the most beneficial way forward since it was based upon scientific principles. Progress was slow because Hassler (a mathematician and astronomer of Swiss birth) had to come to England to purchase books and instruments for the surveyors to use. Whilst in England the war of 1812 was declared, thus delaying his progress and the first piece of fieldwork was not undertaken until 1816. Despite the office being rejuvenated by Congress no work was undertaken between 1818 and 1832, partly due to politics and the fact he was not an American,¹⁰⁴⁰ thus references to contact with the British Hydrographic are rare indeed. However, Hassler did meet Dr John Pond, the Astronomer Royal, and Edward Troughton the instrument maker, both of whom were known to Hurd.

Two other facts are worth considering. Firstly, it is fair to say that during the period in question the British Government knew and held enough information

¹⁰³⁴ Middleton, *British foreign policy*, 38. See also Bartlett, *Defence and diplomacy*, 13-14 for the measured approach to American interests.

¹⁰³⁵ See the introduction to this chapter for a synopsis of his experience.

¹⁰³⁶ TNA, ADM1/3523, Hurd to Pole, 18 June 1808.

¹⁰³⁷ UKHO, MB1 f.100, entry dated 16 February 1827.

¹⁰³⁸ Ex inf Dr Andrew Cook.

¹⁰³⁹ Lamb, 'London years', 330.

¹⁰⁴⁰ <http://www.lib.noaa.gov/noaainfo/heritage/coastsurveyvol1/HASSLER1.html> (accessed 10 August 2008); <http://www.history.noaa.gov/legacy/time1800.html> (accessed 9 November 2007).

concerning the charting of America to manage without material being supplied from an American equivalent. Secondly, Hurd was certainly more than aware of the problems with the American surveys Des Barres had published in the *Atlantic Neptune*¹⁰⁴¹ and it was easy enough to purchase any commercially published American charts, such as Blunt's *The American Coast Pilot* (first issued in 1796).¹⁰⁴² Therefore there was no great incentive to contact an office that had nothing to offer in return, especially one whose naval power was viewed as a threat throughout the period rather than an opportunity for an alliance.¹⁰⁴³

One avenue of communication did arise in 1827 when the subject of erecting lighthouses on the British side of the channel between the Bahama Banks and Florida, was dealt with by Mr. Albert Gallatin, Minister of the United States, through the Foreign Office. This was a long-winded process and eventually John Walker obtained a report from DeMayne, master of the *Kangaroo*, based on the latter's 12 years experience in surveying the Bahama Islands. DeMayne suggested four places for a lighthouse to be built, boldly stating how one of them would 'be fully sufficient in my opinion to answer every purpose for navigation through the Gulf of Florida' and the matter, along with a chart, was placed in the hands of Cockburn.¹⁰⁴⁴ Hassler's communications with European Hydrographers were not abundant and his talents were better appreciated by Krusenstern in Russia than they were by some factions in America.¹⁰⁴⁵ During this period America relied almost exclusively on Des Barres, the private chart trade at home and abroad for charts of their own waters, until the Admiralty started selling their own charts in 1821.

South America

Further to the south the picture was dominated by Spanish, Portuguese and French colonial interests. Prior to 1815 vessels on the South American Station were ideally placed to obtain hydrographic information, especially of Rio de Janeiro. On the east coast Brazil held the longest stretch of coastline and their hydrographic capability was

¹⁰⁴¹ UKHO, LB1 f.26, Hurd to Lockwood, 9 May 1815.

¹⁰⁴² A 'Bill for American Charts' of £3 6s for the Hydrographic Office was entered in the office contingent expenses in 1823 (TNA, ADM17/28).

¹⁰⁴³ Middleton, *British foreign policy*, 39.

¹⁰⁴⁴ UKHO, MB1 fos 180-4, Bahama Bank minutes, 1827. The Bahama Banks had been surveyed through the private initiative of Edmund Blunt of New York in 1820 (*The Times*, 16 September 1820).

¹⁰⁴⁵ <http://www.lib.noaa.gov/noaainfo/heritage/coastsurveyvol1/HASSLER2.html> (accessed 10 August 2008).

based in Portugal. The Sociedade Real Marítima was all but a hydrographic office in name as it contained the capacity to undertake the work of such an office, even though it was based in Portugal; the French invasion of Portugal in 1807 put an end to this function and the men and records were dispersed.¹⁰⁴⁶ Subsequently, when Faden published a chart in 1818 (with accompanying sailing directions) that swept up most of the important Royal Naval surveys of Brazilian waters, to a certain extent the pressure was taken off the Admiralty to produce any charts for that coast.

With the collapse of the Spanish Empire in South America there opened up an opportunity for the British Government to send a survey vessel to gather as much intelligence as possible from the coastal strip, rather than the piecemeal approach that had hitherto existed. Subsequently specialist hydrographic surveyors administered by the Hydrographic Office in London, such as those on H.M.S. *Beagle*, were sent to survey the area from Buenos Aires to Santiago; that vessel was joined by Captain P.P. King in the *Adventure* from 1825. However, South America saw less British surveying voyages than the Arctic or Africa after 1815,¹⁰⁴⁷ reflecting the interest the Admiralty had in Polar exploration, rather than opportunities in the Americas. There was also another source of information from British officers who found employment in the Chilean, La Plata and Brazilian navies, when they were building up their naval capacity in the years after the demise of the Spanish empire.¹⁰⁴⁸

On the west coast virtually the whole coastline was dominated by Chile but she did not have any hydrographic capability until 1834.¹⁰⁴⁹ Therefore there was no single hydrographic office who took responsibility for South America, but obtaining hydrographic materials from the former Spanish colonies was achieved in Britain through its exiled Hydrographer Bauzá.¹⁰⁵⁰ Parry was keen to reciprocate with Bauzá, as were the Admiralty Board who supported him.¹⁰⁵¹ Bauzá wrote to Parry in July 1826 after receiving a box of charts

¹⁰⁴⁶ UKHO, Ritchie Papers box Q, 'Some notes on the organization of hydrographical services in Portugal until the beginning of the 19th century' by A. Teixeira de Mota (undated typescript).

¹⁰⁴⁷ Tizard, *Preliminary chronological list*, 11-14.

¹⁰⁴⁸ For further reading see Brian Vale's three works, *Independence or death: British sailors and Brazilian independence* (London, 1996), *War betwixt Englishmen: Brazil against Argentina on the River Plate* (London, 2000) and *A frigate of King George* (London, 2001).

¹⁰⁴⁹ Servicio Hidrografico Y Oceanografico, *The Hydrographic and Oceanographic Service of the Chilean Navy. History, prestige and development for a safe navigation* (n.d.).

¹⁰⁵⁰ See Chapter Three.

¹⁰⁵¹ UKHO, MB1 f.42, Parry to the Admiralty Board, 31 May 1826. Minuted 1 June approving of the gift of charts.

The marks of esteem with which the Lord Commissioners distinguish me it is the more satisfactory than I am to deserve it. Please Sir to accept my best thanks for the concern you take in my satisfaction, and I hope in a very short time to contribute with some labour to that establishment which is nevertheless under your direction.¹⁰⁵²

Such a gesture strengthened relations between the two countries Hydrographic Services, even at a time when governmental exchanges were strained and Spain's Hydrographer was resident in London. Such actions by the Hydrographer appear to have been sufficient to cover his requirements in South America, especially at a time that saw the number of British diplomatic missions rise in an effort to increase Britain's allies to counter the threat from America.¹⁰⁵³



Illustration 5.6 The exiled Spanish Hydrographer, Felipe Bauzá, who provided an invaluable link to Spanish hydrography during the 1820s (http://es.wikipedia.org/wiki/Archivo:Retrato_Bauz%C3%A1_An%C3%B3nimo_1880.jpg)

Lord High Admiral

The appointment of Clarence brought not only a change in administration but also a change in approach when dealing with international relations. In 1828 Parry wrote to the Lord High Admiral suggesting a huge step forward in the formal relationships between international government hydrographic functions. Despite Parry taking over

¹⁰⁵² UKHO, LP1857 B911, Bauzá to Parry, 19 July 1826.

¹⁰⁵³ Middleton, *British foreign policy*, 38-9, 215.

four years to undertake such a course of action, even though he had a prompt from the Danes two years earlier, and Hurd's efforts in the years after the Peace, this was a much larger scale proposal. The problem to be resolved was due to the 'limited and irregular' supply of charts from the other governments and the fact that chart sellers had better supply arrangements than the Admiralty. Therefore Parry proposed a

complete exchange of all those published by each department during the last (seven?) years; and, at the same time come to some decided and explicit understanding, as to a similar exchange being made in future, at regular stated intervals, (say at the end of every half year).¹⁰⁵⁴

His scheme was limited to the major players in the world of government hydrography from the French, Spanish, Russian, Danish, Swedish and Neapolitan nations. He even included with his proposals a pro-forma letter when he sent this to the Board on 18 January 1828, in which he further suggested that exchanges should be made every six months; he did not stipulate that it should only be new or amended publications that should be exchanged, rather than a complete package of everything once every six months.¹⁰⁵⁵ However, Parry's proposal was not taken up and he suggested to Croker that the King of the Netherlands should be included along with the other nations. This second proposal was accepted but then stopped and on 14 February Clarence commanded him to reconsider, as it came to light that the problem was the concept of reciprocal exchange and the method of approach to the foreign countries. His revised scheme involved the use of the Foreign Office, who would use the appropriate ambassador or consul to obtain catalogues of charts and sailing directions published by government hydrographic departments, as well as any by private chart sellers. The Hydrographer would then use those catalogues to identify any he needed, then order the ambassadors to purchase them, also checking once a quarter for any new catalogues. This revised proposal was taken up following a letter of 6th of March¹⁰⁵⁶ and by the 28th some 24 works had been identified by Parry.¹⁰⁵⁷ In July 1828 charts

¹⁰⁵⁴ UKHO, MB1 fos 130-1, Parry to the Admiralty Board, 18 January 1828. There were other charts that remained unpublished, which the Admiralty and its Hydrographer did not wish to fall into the hands of their enemies, but they were predominantly of interest to operations in or adjacent to American waters.

¹⁰⁵⁵ UKHO, MB1 fos 130-2, Parry to the Admiralty Board, 18 January 1828.

¹⁰⁵⁶ UKHO, MB1 fos 140-1, Parry to the Admiralty Board, 14 February 1828.

¹⁰⁵⁷ UKHO, MB1 f.190, Parry to Owen, 28 May 1828.

from the consuls at Hamburg and Elsinore arrived at the Admiralty,¹⁰⁵⁸ and in October a chart from Krusenstern as well as Klint's atlas, were received.¹⁰⁵⁹

Foreign and Colonial Offices

It is not surprising that the expansion of hydrographic contacts is related to Britain's diplomatic interaction with foreign states. However, there was a big difference between the concept of joint operations (such as at Navarino), whereby two or more nations contributed ships to a specific cause, and on the other hand agreeing to work together in an agreement where one nation had all, if not the majority, of the cost forced upon them. The latter was the position in 1820 and 1821 when the British were able to co-operate with the Americans concerning anti-slaving operations on the west coast of Africa, although this was a vast area to police and there were never enough resources to undertake it efficiently.¹⁰⁶⁰ Nevertheless such an operation was a foot in the door when it came to wider relations with the Americans and overall the British gained more ground than they lost in diplomatic terms. Similarly when Britain signed right-of-search treaties with the Netherlands, Sweden and Brazil in 1822, 1824 and 1826 respectively¹⁰⁶¹ that was another step towards improved international relations fringing on hydrography. The way the world of international relations changed after 1815, opened up many more opportunities for the Hydrographer to expand his contacts and increase the numbers of charts that were acquired for chart production and supply. Prior to Parry and Clarence's efforts of 1828 there was a small amount of interaction between the Foreign Office and the Hydrographer. In 1822 the British Consul General at St Petersburg was used regarding charts purchased in 1814,¹⁰⁶² but that was as an intermediary rather than initiating anything to benefit the Hydrographic Office.

Other involvement was sparse. Joseph Planta was involved from 1825 to 1827 in an intermediary capacity passing navigational information to the Admiralty and asking for six copies of a chart of the River Gambia. On another occasion he asked for permission for Dr Tiarks to continue borrowing some of the Admiralty's sextants, as well as concerning the issue of lighthouses between the Bahama Banks and

¹⁰⁵⁸ UKHO, Accession ledger book 1, E626-E631.

¹⁰⁵⁹ UKHO, Accession ledger book 1, after E637, E734.

¹⁰⁶⁰ M.C. Hunter, *Policing the seas: Anglo-American relations and the Equatorial Atlantic, 1819-1865* (St John's, 2008), 99-102.

¹⁰⁶¹ *Ibid.*, 61.

¹⁰⁶² UKHO, LB1 f.516, Hurd to Bayley, 30 November 1822.

Florida.¹⁰⁶³ Another despatch came via the Foreign Office in 1829 regarding the availability of Bayfield's charts, which was one of the last issues Parry dealt with as Hydrographer.¹⁰⁶⁴ Hardly ground-breaking efforts to promote the work of the Hydrographic Office, but the Foreign Office's contribution to the 1828 negotiations was notable, even if they did not manage to achieve Parry's first objective.¹⁰⁶⁵ It is fair to say that men in the field, such as Smyth in the Adriatic and Mediterranean, played a greater diplomatic game for the Hydrographic Office than the Foreign Office had done outside of being instructed to by the Lord High Admiral.

Interaction with the Colonial Office was on a different level to that of the Foreign Office. In 1823 Hurd applied through the Admiralty Board for permission to examine surveys held by them that were potentially of use to the Hydrographic Office.¹⁰⁶⁶ Three years later the Colonial Office asked the Hydrographic Office to supply them with Owen's African surveys,¹⁰⁶⁷ having already supported them by supplying a Colonial brig with a chronometer in 1818.¹⁰⁶⁸ When compared to the connections through science¹⁰⁶⁹ and the advantages to the Hydrographic Office that were brought by that channel, then science was far more beneficial than the Colonial and Foreign Offices put together.

Middleton wrote how 'Consuls exercised little initiative but they were excellent sources of information about the commercial and industrial affairs of other states'.¹⁰⁷⁰ It was exactly on such an understanding that hydrography benefited from the Consular Service who supplied them with maritime intelligence, arranged the procurement of charts and passed on information to the correct individuals in the countries they were working in. However, the lack of initiative in not opening up avenues of contact was a setback for hydrography, at least, and one that supported Middleton's findings. It also suggests how the emergence of the Hydrographic Office was one that clearly was of little significance to the British government and virtually unknown to many consuls during that period. Although the 'Diplomatic Service' was

¹⁰⁶³ UKHO, LP1857 P308 Planta to Croker, 30 March 1825; *ibid*, P297 Planta to Barrow, 22 November 1826; *ibid*, P296 Planta to Croker 26 January 1826; *ibid*, MB1 f.180, minutes 3 January – 24 April 1827.

¹⁰⁶⁴ UKHO, MB1 f.234 Minute dated 19 May 1829.

¹⁰⁶⁵ See above for the involvement of the Lord High Admiral, Parry and the Foreign Office.

¹⁰⁶⁶ TNA, ADM1/3459, Hurd to Croker, 8 May 1816.

¹⁰⁶⁷ UKHO, MB1 f.93, Colonial Office to Hydrographic Office, 2 December 1826.

¹⁰⁶⁸ UKHO, LB2 f.17, Parry to Pond, 18 December 1823; *ibid*, MB1 fos 126-8, Lord High Admiral's minute, no date but after 25 May 1827.

¹⁰⁶⁹ See Chapter Four.

¹⁰⁷⁰ Middleton, *British foreign policy*, 253.

thought to have performed adequately¹⁰⁷¹ during that period it was not totally true from the Hydrographer's perspective.

Conclusion

The advantage that Britain's position in world politics brought was felt very strongly in the Hydrographic Office, with the position that Parry found himself in when he resigned in 1829 being vastly different from that of Hurd in 1808. The post-Peace situation opened avenues for contact with former European enemies who were now far more amenable to British interests, including the French and Danish Governments. More favourable relationships meant large gains when it came to data collecting, such as those by Smyth who suggested to Lord Melville how considerable savings could be made in the Mediterranean if the French and English did not survey the same areas.¹⁰⁷² The advantages to the administration of the Hydrographic Office did not always stem from the drive of its Hydrographer, owing something to the initiative of men in the field. Here the Hydrographer owed a great debt to such men as they held a local knowledge and contacts with all the right people to quickly build large amounts of data, utilising surveys and observations that had been acquired by their foreign counterparts. Thus the Admiralty benefited from other government hydrographic services, in various guises, ranging from established offices to individual men working virtually on their own to further the cause of international hydrography, who selflessly freely shared their findings with other likeminded men.

On the back of those activities the benefit should have been the wide-ranging official bilateral arrangements for the mutual exchange of products. The Admiralty Board failed to establish such a scheme, even though Dalrymple had suggested to them in 1807 utilising 'Our Ministers and Consuls in Foreign parts',¹⁰⁷³ and Hurd had paved the way with Denmark in 1819. When finally asked to do so by Parry, a huge opportunity had already been missed that hindsight shows would have benefited British and World hydrography, which could have been in place 20 years earlier. The Hydrographer and the surveyors in the field did however give the British Government an inroad into international relations; the reason being the mutually beneficial subject of safer navigation and safety of life and commerce at sea. Such were the initiatives of

¹⁰⁷¹ Middleton, *British foreign policy*, 243.

¹⁰⁷² David, 'British hydrography in the Mediterranean', 8.

¹⁰⁷³ ADM1/3522, Dalrymple to Pole, 10 October 1807.

Hurd and Parry in their formation of solid links between the major charting nations of Europe, that when the time came to put such links on a formal status with the formation of the International Hydrographic Bureau (1929), Britain was clearly years ahead of such a scheme. When the International Maritime Conference was held at Washington in 1889, it was, ironically, the Americans who led the way¹⁰⁷⁴ with this gesture, who in the years of this study played virtually no significant role whatsoever.

¹⁰⁷⁴ 'Final Act of the International Marine Conference held at Washington, October 16 to December 31, 1889' in *The American Journal of International Law*, 5:1, Supplement: Official Documents (Jan., 1911), 42-73.

Chapter 6

Publications

Unquestionably the main focus of the work of the Hydrographer and his staff was that of chart production coupled with the logistics of their supply.¹⁰⁷⁵ From the beginning of Hurd's employment it was clear that he had to produce charts and sailing directions from the manuscripts which had lain (greatly underused) in the Admiralty's cupboards and attics. To undertake this he had the advantage of a well established and disciplined production system, the rules for which Dalrymple had formally laid down in 1807.¹⁰⁷⁶ This chapter focuses on the stages in the production process from the planning of which charts to publish, a brief comment on their quality, the issues surrounding their compilation and reproduction, through to their binding. A similar methodology can be found for sailing directions, which also includes an examination of the way translations were dealt with, as well as the production of notices to mariners containing corrections to charts.

The position regarding production in 1808 compared to 1829 was in many respects vastly different. In 1808 Dalrymple was 'impracticable and obstinate',¹⁰⁷⁷ whereas Hurd and Parry had to be practical and flexible in their approach to chart publication. These qualities were a prerequisite for a post which required an exceptional effort, especially during times of war, to meet the demands of the Fleet, which saw the draughtsmen working 'early and late' as well as on Sundays;¹⁰⁷⁸ wartime demand was a theme by which Parry was not really troubled. Thus when Sir George Warrender stood in the House of Commons on 4 May 1821 explaining the Navy estimates, his statement concerning the ease with which surveys were taken in peacetime rather than during that of war, was equally true of chart production.¹⁰⁷⁹ But for Hurd his biggest challenge was to be able to produce and supply enough charts

¹⁰⁷⁵ For the supply of charts, sailing directions and notices to mariners see Chapter Seven.

¹⁰⁷⁶ TNA, ADM1/3522 'Rules and regulations to be observed by persons employed under the Hydrographer of the Admiralty', undated printed sheet.

¹⁰⁷⁷ Barrow, *An auto-biographical memoir*, 138-9.

¹⁰⁷⁸ Richards, *Memoir*, 4.

¹⁰⁷⁹ Anon, *The parliamentary debates: forming a continuation of the work entitled "The parliamentary history of England from the earliest period to the year 1803 . . ."* (London, 1822), 522.

during those times of war. It was even a problem in the 1850s during the Crimean War, when the numbers of staff were twice as great as in 1810.¹⁰⁸⁰

Fortunately Hurd inherited an office which under Dalrymple had become well acquainted with chart production. Undoubtedly Dalrymple had achieved what he was asked to undertake, or as a contemporary biographer put it:

. . . the purposes of the institution were fully effected, to the extent of the plan laid down. Many plates were engraved toward forming a complete collection of charts for the use of the royal navy; and several memorials were presented by him, suggesting measures of improvement.¹⁰⁸¹

Dalrymple and the Chart Committee had collectively left the appropriate records which charts and surveys should be engraved and issued to the Navy. However, for Hurd the amount of work he had to undertake compared to Dalrymple was greatly different. Dalrymple had been Hydrographer to two maritime institutions and not required to supply naval vessels with all the charts and sailing directions they required. Conversely Hurd was occupied full time at the Admiralty and required to supply naval vessels with all the charts and sailing directions they needed. With demands on the office growing, Hurd was able partially to offset them by purchasing the best available charts and sailing directions from the chart trade to make up for the deficiencies in the Admiralty's own publication programme. With more and more materials being received, in the form of nautical publications, space within the office soon became an issue. That issue was raised in the naval estimates for 1811 when consideration was given to appropriating a house for 'an enlargement of the Paper and Hydrographer's Offices'.¹⁰⁸² Despite issues of supply and space, key to the production of those charts throughout the period was Mr John Walker, a man who held all the technical expertise required for the Hydrographer to be able to place into his hands the responsibility of producing charts (*i.e.* drawing, engraving and printing) under the Admiralty.¹⁰⁸³

¹⁰⁸⁰ Day, *Hydrographic Service*, 348. The pressure of war later in the 19th century meant drawing work was sent out of the Admiralty to be undertaken by the firm of Malby & Son (Committee to enquire into the Hydrographic Department, *Report of the Committee to enquire into the Hydrographic Department (with evidence and appendices)* (London, 1906), 10).

¹⁰⁸¹ Anon, *The Asiatic Journal and monthly register for British India and its dependencies vol.1 from January to June 1816* (London, 1816), 423.

¹⁰⁸² House of Commons, *The ordinary estimate of His Majesty's Navy for the year 1811* (London, 1811), 37.

¹⁰⁸³ Dawson, *Memoirs*, 103.

Planning

The concept of production planning in the modern sense was not a rigorous process as it is in today's Hydrographic Office, and the decisions concerning which charts should be printed fell mainly to the Hydrographer to decide. Whereas the collection of survey data was more systematic after 1815 when Hurd became more closely involved, the publication of charts was more a case of once they were drawn they were usually (but not always) sent for engraving. Subsequently it could take months before all the charts forming a particular series actually came into print, whereas others, like Beaufort's Karamania and Smyth's Mediterranean work, were issued in atlas form and thus overcame that problem. As a hangover from the pre-Hurd years some charts were inevitably prepared outside of the office and their coverage decided upon by the surveyor who captured the survey data. For example, Flinders decided on the scale and number of charts he produced with Aaron Arrowsmith in 1811, without consultation with Hurd. This may have been due to the fact that the charts were not being published by the Admiralty and so Flinders felt he did not need to consult the Hydrographer. Shortly after that Flinders was in negotiations with Hurd about the use of his plates by the Hydrographer for supply to the Navy.¹⁰⁸⁴

Nevertheless the Hydrographer played a significant role in planning survey work and scheming the resulting chart coverage.¹⁰⁸⁵ The surveyors in the field would receive instructions for the areas to be surveyed from the Admiralty Board (usually after consultation with the Hydrographer), but not always stipulating the scale at which the charts were to be drawn, or how much overlap was needed in their compilation;¹⁰⁸⁶ a pre-defined scale for charts to be drawn at was first laid down on 28

¹⁰⁸⁴ Brown and Dooley, *Flinders private journal*, 342, 349. One of the plates of views issued by Hurd is at the Admiralty Library, Portsmouth.

¹⁰⁸⁵ The term 'scheming' is used here in the context of planning the publication of a series of charts of a particular geographical area. This had to be undertaken to make sure that charts were going to cover all of the area without leaving any gaps between sheets, or for that matter overlapping too much. For further information on the rationale behind chart scheming see D.W. Newson and A. Richardson, 'The international scheme of medium and large scale charts of the north-eastern Atlantic area', *The International Hydrographic Review* (January, 1975), 87-98 and International Hydrographic Organisation, *Guidance for regional coordinators of INT chart schemes*, serial publication no. 48 (Monaco, 1985).

¹⁰⁸⁶ Captain W.F.W. Owen, *Narrative of voyages, to explore the shores of Africa, Arabia, and Madagascar performed in H.M. Ships Leven and Barracouta under the direction of Captain W.F.W. Owen, R.N. by command of the Lords Commissioners of the Admiralty I* (London, 1833), vi-xv. The subject of scale was not formalised until the late 1820s and then it was not universally successful (UKHO, MLP77, Board minute, 7 June 1827).

June 1828.¹⁰⁸⁷ When John Walker was away from the office in 1818 Hurd found he had little time for this, only ‘scarcely sufficient at my command merely to acknowledge the receipt of the various letters daily addressed to me’.¹⁰⁸⁸ Hurd was known to have schemed charts covering the whole of the east coast of America and Canada,¹⁰⁸⁹ however, he was not always kept fully in the picture regarding what had been completed, as he wrote to one lieutenant who was seeking his advice as to where to survey.¹⁰⁹⁰ Reports were sent to the Admiralty Board on the progress of production, but they were not regular during Hurd’s time, suggesting the Board had a significant amount of faith in their Hydrographer to be left alone to plan the office work without too much interference. One such report in 1819 listed 14 finished charts and 11 unfinished proofs, of which two were in hand and not proved,¹⁰⁹¹ from which the Board would have been able to draw few conclusions.

In the office the management of the work in hand was very different as although the number of surveyors at sea steadily grew the same cannot be said for the number of draughtsmen in the office processing surveys. Subsequently by the end of 1826 the lack of resources caused delays in engraving. After Parry had examined ‘with great care every chart in the office’ a conclusion was drawn that publishing what was in the office ‘derived from good materials, or very shortly about to be received’ would take seven or eight years.¹⁰⁹² There was also a problem, which Parry failed to explicitly mention, concerning the Walker family’s monopoly on production. Bauzá stated that between the three Walkers they drew, engraved and printed the charts, which accounted for ‘the small output’, as well as John Walker having to ‘look after everything’ in Parry’s absence ‘from nine to four’.¹⁰⁹³ After that time the Admiralty

¹⁰⁸⁷ Day, *Hydrographic Service*, 39 quoting from Admiralty circular letters. A copy of the circular letter issued under the command of the Lord High Admiral was printed using lithography and stipulated general charts to be drawn at 1½ inches to a degree of longitude, portions of coast at a ¼ or ½ an inch and ‘particular plans’ at 1½ or 3 inches.

¹⁰⁸⁸ UKHO, LB1 fos 168-9, Hurd to Hewett, 21 August 1818.

¹⁰⁸⁹ UKHO, LB3 f.162, Beaufort to S.P. Hurd, 18 May 1831.

¹⁰⁹⁰ Hurd wrote ‘that not having any of your works before me to mark what progress may have been made in the survey entrusted to your execution, it is impossible for me to advise how to act, whether to continue on that part of the coast, where you now are ‘till all is finish’d or remove to any other . . . In all these cases you have but to remember that as all the praise due to your labours will rest on your own shoulders, so will whatever errors may be committed in the execution of them’ (UKHO, LB1 fos 168-9, Hurd to Hewett, 21 August 1818).

¹⁰⁹¹ UKHO, LB1 fos 276-7, Report on the state and progress of surveys, 31 December 1819.

¹⁰⁹² UKHO, MB1 f.76, Remarks on the probable time of completing work in hand or expected, October 1826 by Captain Parry.

¹⁰⁹³ Lamb, ‘Felipe Bauzá’, 325. Although they engraved the charts Richards stated in 1868 how at that time ‘all the engraving work was sent outside to be executed at the firm of Messrs. Walker – a practice which has prevailed up to the present time’ (Richards, *Memoir*, 4).

Board took a closer eye on planning work, as, for example, when it was decided to engrave the Canadian Lakes that was stopped in preference to completing Commander Hewett's charts of Lynn and Boston Deeps and the coast of Norfolk. The decision being made by Sir Edward Owen in June 1828 also shows how at that time it was Owen, not Croker, who was taking a directorial role over the Hydrographic Office,¹⁰⁹⁴ with priority being given to Home Waters charting rather than overseas.

In 1828 and 1829, when Parry had to justify the engraving of each chart, some insight can be gained into the thinking behind publishing particular charts. White's Dartmouth Harbour had been in the office 'some time' and as it had been reduced to a 'convenient' scale it was deemed ready for engraving. Like charts of the north-west coast of America (from the *Blossom's* voyage) both were, as Parry wrote, 'so different from any chart published' that this was justification alone for the expense of producing them quickly. Other charts really did not need any justification for publication as they were from planned survey voyages, whose main purpose was to collect new information for publication by the Hydrographic Office! Such was the case with Commander Hewett's plan of the River Humber and Thomas's work on the east coast of the Shetland Islands. Similarly charts that formed part of a series, such as those for the coast of Brazil that were gradually brought into print, could be classified in the same manner, as once approval had been given for one to be published what was the point of not publishing the rest of the series?¹⁰⁹⁵ It was also in 1829 that Parry had to make weekly progress reports of the work in the Hydrographic Office. In his penultimate week in charge of affairs Parry oversaw four draughtsmen, Mr Walker senior, his two sons Michael and Thomas, as well as Mr Higgins whose duties were all listed in detail. The report also included a list of drawings completed and the work in progress by the engravers. This weekly report, although only brief, was a useful way for the Admiralty Board to keep an eye on progress, especially if they were eagerly awaiting the completion of a particular chart.¹⁰⁹⁶

¹⁰⁹⁴ UKHO, LP1857 H512, Herbert to Parry, 27 June 1828.

¹⁰⁹⁵ UKHO, MLP3/5 Engraving estimates, 1828-9.

¹⁰⁹⁶ UKHO, ADM1/3470 Parry to Barrow, received 13 May 1829.

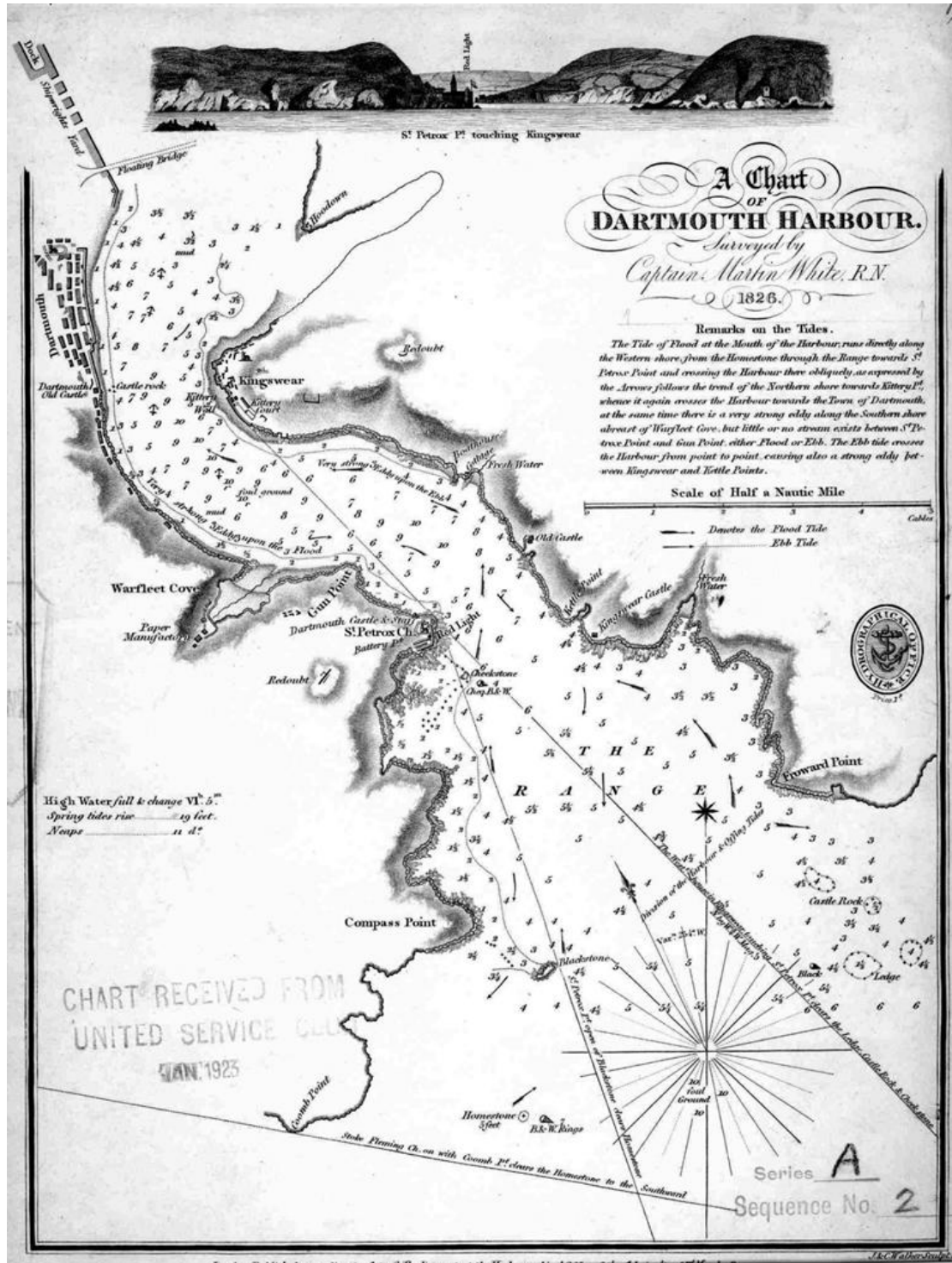


Illustration 6.1 Captain White's chart of Dartmouth Harbour published by Parry in 1828 (UKHO, OCB 29 A1)

Quality

The quality of charts in circulation in the first 30 years of the nineteenth century was variable and deficiencies, errors and omissions were not unknown. The poor state of charting (including that of the English Channel) was a factor in the office, right from

the moment Hurd took over from Dalrymple.¹⁰⁹⁷ If the English Channel, the most important sea-lane in Home Waters, was charted to such a poor standard, what therefore was the state of charting of other areas used by naval vessels? Interspersed between substantial reports concerning charting were letters to the Hydrographer or the Admiralty Board pointing out deficiencies in surveying and charting. One by Captain W.F.W. Owen to Lord Melville in May 1814 pointed out the benefits of surveying ‘the great Eastern Sea from Kamscatchka to Van Dieman’s Land to the Islands on the West coast of Sumatra’ because they were vastly under surveyed.¹⁰⁹⁸ Rear Admiral Fleeming wrote privately to Parry concerning South America, which could be viewed as a dressing down of Parry’s whole operation, as Fleeming suggested widespread changes from data collection through to production. Faults with charts were common and efforts to replace them from a naval perspective fell at the feet of the Hydrographer.

The problem the Hydrographer faced with so many charts needing revision or replacement, was which ones he should choose first. Vice Admiral Sir Edward Codrington wrote from Gibraltar Bay in 1827 to Parry reporting a disagreement between a chart and a book furnished by the Admiralty. The difference was an important one regarding the depth of water laid down in the North, or Little Passage into Lisbon. Both works were from different authorities (Portuguese and British) and Parry thought the best way it could be resolved was

by sending a boat out from the Tagus for that purpose. If there be no political objection the opportunity would be a good one for the commander in chief to employ some well qualified officer in making a regular survey of the whole of the entrance and anchorage of the Tagus – his attention being particularly directed to the disagreement now alluded to by Sir Edward Codrington.¹⁰⁹⁹

This was not an isolated case but it highlighted the limitations of Parry’s administration and resources in resolving such problems.

It was not just the charts that were at fault, as the supporting information on tides, lights and sailing directions were lacking in many areas. Hurd wrote of one

¹⁰⁹⁷ For example, in 1816 the known state of charting in the English Channel, one of the most busy of shipping lanes, was ‘so incorrectly laid down in all the charts with regard to the soundings, that the Hydrographer strongly recommends the employment of one or two scientific officers on this service – particularly from the first depths out of the Ocean to the interior of the Channel, that the navigator, in thick weather, may enter it with confidence’ (UKHO, MLP 70 Undated account of surveys needed and being undertaken, c.1816).

¹⁰⁹⁸ Scottish Record Office, GD51/2/517, Owen to Melville, 1814.

¹⁰⁹⁹ UKHO, MB1 f.102, Parry to Codrington, 5 March 1827.

skilful navigator who ‘being cast by a gale of wind near this shore, was in great Distress; he discovered lights on the coast, but not being able to determine which of these he had in view, he had a very narrow escape’.¹¹⁰⁰ Such a report prompted Hurd to obtain details of lights along that particular stretch of coast, so that there was no confusion as to which lights were being identified in relation to the chart. He found some of the lighthouses were marked on some charts and not on others and nobody knew which ones to rely on.¹¹⁰¹ He also identified how there was no single reference work detailing the navigational lights in Home Waters for him to refer to; it was not until 1827 that Parry issued a list of lighthouses but that was for the coast of the United States of America. It could be looked upon as a shortcoming of both Hurd and Parry that neither had put something more organised in place much earlier. Mariners, both naval and merchant, had to rely upon publications produced by the chart trade, foreign governments or lighthouse authorities for specific information in this area.

With complaints concerning the poor state of charting coming into the Admiralty it was not easy to take those charts out of circulation without having more suitable items to replace them with. Although different terminology relating to the state of a chart can be seen during this period, such as ‘proof’ (for a pre-publication chart),¹¹⁰² ‘new edition’, ‘current’ (for a published chart in circulation) and ‘cancelled’ (for a chart withdrawn from circulation), the use of the term withdrawn does not appear to have been used, if at all. Charts were withdrawn but it is not always clear why, although in 1826 when a ‘set of Plans of Harbours &c in the Mediterranean bound in large folio’ was cancelled it was due to the publication of Smyth’s *Atlas*.¹¹⁰³ Other reasons for cancellation included a chart published by Bouchette of the St Lawrence River that was not only ‘incorrect in several particulars’ but also turned out to be a duplicate of a chart by a different author which was also issued to the same ships. Not only did Bouchette’s chart lack a title for Parry to refer to it, but it also had no number, added either by the author or the Hydrographic Office when it was supplied, which was clearly not a particularly efficient way of keeping track of items.¹¹⁰⁴ There was even an instance of an office correction being cancelled and a replacement sent out to the Mediterranean, caused by Mr Walker having laid down the

¹¹⁰⁰ UKHO, LB1 fos 79-81, Hurd to Cotton, 12 February 1817.

¹¹⁰¹ UKHO, LB1 fos 79-81, Hurd to Cotton, 12 February 1817.

¹¹⁰² A.C.F. David, ‘Is it Hurd’s or Dalrymple’s Channel Atlas?’, *The Map Collector* (September, 1995), 20-4.

¹¹⁰³ UKHO, LB2 f.72, Parry to Kingdom, 1 April 1826.

¹¹⁰⁴ UKHO, LB2 f.241, Parry to Ogle, 3 January 1829.

correction in the wrong position.¹¹⁰⁵ As time progressed many charts were naturally replaced by more recent information and by the time charts were being numbered with a unique identifier (in 1839), at least 190 plates of charts and views had been withdrawn since 1800.

Chart compilation and reproduction

In the Admiralty the concept of chart compilation was work that involved a draughtsman in something more than purely copying an existing chart, or reducing a survey for reproduction purposes. It was John Walker the Chief Draughtsman's responsibility to

construct charts, often out of conflicting materials, and to reconcile longitudes which even some of our most skilful travellers and surveyors are too apt to leave in a state of uncertainty.¹¹⁰⁶

Thus in May 1829 Michael Walker referred to himself as having compiled a chart of the coast of Brazil from Penambuco to Espirito Santo and his brother, Thomas, as having 'completed the construction of a plan'.¹¹⁰⁷ This was more skilled than simple copying, but their salaries did not reflect this extra level of responsibility. Two days after Parry left the office of Hydrographer for the last time he prepared a memorandum on the salaries of the draughtsmen. That document highlighted the disparity between the pay earned by clerks and draughtsmen, which may have been one of the reasons for the Walkers' dislike of Croker and his fellow administrators.¹¹⁰⁸ There was a great difference in skills and experience, as not only did draughtsmen and compilers have to possess a good mathematical knowledge to be able to calculate reduction percentages, costs of engraving and drawing, they also needed an artistic capability that was not high on the list of attributes needed for a clerk. In 1809 Hurd requested the use of such a clerk to assist him with any correspondence, in addition to the services of John Walker, stating when the clerk was not letter writing he was required to undertake chart drawing. Thus Michael Walker was appointed as a supernumerary clerk, who needed two sets of skills but received only one salary, eventually being paid as a draughtsman in 1816. Another person was then employed

¹¹⁰⁵ UKHO, MB1 f.87, Parry to the Admiralty Board, 10 November 1826.

¹¹⁰⁶ R.I. Murchison, 'Address to the Royal Geographical Society of London' in *Proceedings of the Royal Geographical Society of London*, 5:4 (1860-1), 178.

¹¹⁰⁷ UKHO, ADM1/3470 Parry to Barrow, received 13 May 1829.

¹¹⁰⁸ UKHO, MB1 f. 172, memorandum by Parry, 21 May 1829; TNA, ADM1/3470.

as a clerk, who was also employed making up chart boxes.¹¹⁰⁹ The transference of skills was necessary but not rewarded.

In those early years there were many practices undertaken which were fundamental to establishing a sound methodology of compilation best practice. Hurd refused to publish a chart containing 'Southampton River' until he obtained precise information on the position of the buoyage.¹¹¹⁰ A much larger list of queries was sent to Trinity House in October 1808 concerning a wider range of navigational factors¹¹¹¹ and Hurd requested that a gun brig be used to resolve numerous queries in Home Waters before his new chart of the English Channel could be completed.¹¹¹² Parry was just as fastidious, which can be seen in his handling of the assessment for the scheming of Owen's surveys of Africa. After going over every part of Owen's work 'with great care' he came to the conclusion 'that six general charts will be required in order to include the whole on a proper scale'.¹¹¹³ Thus a new agenda was put in place whereby quality was all important, rather than simple copying or extracting sections from surveys as had been commonplace in Dalrymple's time, with both Hurd and Parry not being prepared to publish material until they were satisfied it was fit for the purpose it was intended.

The subject of pure compilation where a draughtsman used multiple sources to prepare one or more charts in a series, was therefore not an alien concept in the office. Hurd compiled a new chart of the Bay of Brest in 1815, using his own survey, topography supplemented from the mapping of Cassini, including 'Mr Sibley's observation and remarks, as well as from other officers, who have contributed their mite of information'.¹¹¹⁴ The use of topographic mapping was becoming increasingly more prevalent, especially for charts in Home Waters where the Hydrographer was able to utilise Ordnance Survey land data. Thus as the Ordnance Survey progressed around the coast so the inclusion of their data on Admiralty charts became commonplace,¹¹¹⁵ saving time and money, as well as adding a useful source to verify the hydrographic surveyor's work against. From a quality perspective this was a big

¹¹⁰⁹ TNA, ADM1/3470, Parry memorandum 21 May 1829.

¹¹¹⁰ TNA, ADM1/3523, Hurd to Pole, 24 September 1808.

¹¹¹¹ TNA, ADM1/3523, Hurd to Trinity House, 22 October 1808.

¹¹¹² TNA, ADM1/3523, Hurd to Pole, 13 June 1809.

¹¹¹³ UKHO, MB1 f.60, Hydrographic Office to the Admiralty Board, 6 October 1826.

¹¹¹⁴ UKHO, LB1 fos 13-14, Hurd to Hallowell, 19 May 1815.

¹¹¹⁵ Defining the coastline using Ordnance mapping became normal practice (UKHO, LB1 fos 428-9, Hurd to Fitzmaurice, 27 August 1821).

step forward that gave Admiralty charts in Home Waters a far greater accuracy and reliability.

Once these materials had been obtained, joining multiple sources into a product was not always easy. This was a common problem throughout the period and made even worse when one surveyor returned two versions of a survey of the same area that did not agree with each other. They also did not agree with two adjacent surveys by two different surveyors¹¹¹⁶ and hence such problems were good enough reasons for Hurd to want to recruit more competent, well trained, men into the ranks of the surveying specialism. Another incident occurred when John Walker reported to Croker how, when he reduced one chart to try and incorporate it into the existing Admiralty chart, it differed ‘so much in the contour of the coast, that we cannot satisfactorily introduce the soundings into it’.¹¹¹⁷ Other factors, such as the use of astronomical observations had to be taken into consideration. Becher’s chart of South America was combined with the best English and Spanish surveys available in the office and then adjusted by the latest astronomical observations, before it could be published on 4 November 1824.¹¹¹⁸ Those examples were just a few of the many technical issues which faced the Hydrographer, Walker and numerous draughtsmen, when compiling charts during those formative years. At the end of the period Sheringham summed up the problems of compilation, how draughtsmen had difficulty in making surveys ‘unite’, even if they were from the same source. Including any new data was often even more difficult and he quoted how as many as twenty different authorities might be included on one chart. But the advantages to the mariner in having an Admiralty chart updated with the latest information from a variety of sources was arguably the best and most logical way forward.¹¹¹⁹

The Walkers were not the only draughtsmen in the office as in 1818 £1,010 2s was spent on the monthly pay for draughtsmen. During 1818 Hurd incurred numerous expenses resulting from additional drawing work for the Polar expeditions and of the North American coast, when he employed Lieutenant Bushnan (again in 1819) and Nares on that task. Also employed was Anthony Lockwood in drawing charts of Nova Scotia and those three men were paid separately from the salaried staff, showing

¹¹¹⁶ Cook, ‘Alexander Dalrymple’, 203.

¹¹¹⁷ UKHO, MLP 77, Walker to Croker, 16 June 1827.

¹¹¹⁸ UKHO, OCB527 A1, General chart of South America published 4 November 1824.

¹¹¹⁹ UKHO, MLP 62/1/iv, Suggestions for altering the appointment of chart agents by Lieutenant Sheringham, 12 January 1829. It was often the case, but not exclusively, that small scale charts were compiled from multiple sources.

how Hurd used the imprest system to acquire additional manpower.¹¹²⁰ From 1820 to 1822 Hurd had eight draughtsmen on his pay roll, R. Baily, T. Walker, M. Walker, the Frenchman St Amand, J. Higgins, W. Nares, W. Brown and J. Walker,¹¹²¹ although all of them did not spend their time compiling. In July 1824 ten people were employed by the office, six of them were there ‘during the day’ and served as compilers and draughtsmen, two of whom were engravers as well.¹¹²² By the end of 1826 there were only four draughtsmen, one of whom did not understand compiling but was able to copy documents ‘tolerably well’. However, demands in other areas meant that the tolerable copyist was not always working as a draughtsman.¹¹²³ To support all of that activity, specialist drawing instruments were purchased in 1805 (costing £3 9s),¹¹²⁴ a steel pen in 1819 (10s),¹¹²⁵ 500 Goose and 500 Crow pens in 1821¹¹²⁶ suggesting that the draughtsmen were not required to supply all of their own equipment.

Hurd’s labour relations with the office draughtsmen were precarious due to the fluctuations in the amount of work. As they were all paid weekly (except for John and Michael Walker), they were under no obligation to serve any longer than they had to as there were no contracts involved. Hurd tempted them with his scheme to sell charts to the public that would (and did) increase the output of the office in 1821, but at that time there were clearly problems with their salaries as he pointed out to Croker. The fact that by that time there were two printing presses (and possibly a lithographic press) being run in the office meant it was in the Admiralty Board’s interest to keep them fully occupied, as Croker had instructed some ten years previously, thus providing full utilisation of those resources.¹¹²⁷ After Hurd’s death it took several years for the amount of work to overtake the resources in the Hydrographic Office allocated to deal with them and for output to increase above average.¹¹²⁸

The maximum utilisation of resources was close to Croker’s heart and drawing was a laborious process before the use of equipment for speeding up the process of

¹¹²⁰ TNA, ADM17/28, Hydrographic Office accounts, 1818-23. The imprest system was the main method of accounting used by the Hydrographer.

¹¹²¹ TNA, ADM17/28, Hydrographic Office accounts, 1818-23.

¹¹²² Lamb, ‘Felipe Bauzá’, 325.

¹¹²³ UKHO, MB1 f.76, Remarks on the probable time of completing work in hand or expected, October 1826 by Captain Parry.

¹¹²⁴ TNA, ADM17/8, Admiralty accounts, 1805.

¹¹²⁵ TNA, ADM17/28, Hydrographic Office accounts, 1818-23.

¹¹²⁶ UKHO, LB1 f.374, Stationary wanted for the use of the Hydrographical Office, 26 February 1821. It is possible that some of the items may have been supplied for the use of surveyors.

¹¹²⁷ UKHO, LB1 f.410, Hurd to Croker, 28 June 1821.

¹¹²⁸ UKHO, MB1 f.158, minute 18 February 1828 is one example of how the increase caused Parry additional problems.

reduction. When John Walker had to reduce Hurd's massive survey of Bermuda,¹¹²⁹ measuring 17 feet by 8 feet in total (in two halves), just to record the basic outline of the coast, rocks and edges of the reefs took an estimated week or eight days. Walker had to draw grids of squares on the original and then select the most important features for copying onto one small single sheet of paper measuring 40 x 27 inches. Although it was actually reduced to a smaller size than that specified by Becher,¹¹³⁰ it was still a lengthy but important task. To try and alleviate some of the need for reductions the Advisory Board issued a minute in June 1827 instructing surveyors to send their surveys into the office in 'such a size and in such a state as to be fit to place at once in the engraver's hands'.¹¹³¹ This was in addition to depositing their fair sheets but they were left up to their own devices to decide what scale was the best to have the reductions printed. Hardly satisfactory and some indication of the lack of understanding of the problem, which also highlighted a lack of standard instructions to surveyors with regard to capturing the data in the first place.



Illustration 6.2 (Left) A section of Hurd's survey of Bermuda before reduction, being approximately 1/16th of the whole chart on the right (UKHO, A124/1-2)

¹¹²⁹ UKHO, A124/1-2, Hurd's survey of Bermuda, 1788-97.

¹¹³⁰ UKHO, MB1 f.106-7, Minutes on the reduction of Hurd's survey of Bermuda, May 1827; for the printed version of the survey see UKHO, OCB 360 A1.

¹¹³¹ UKHO, MLP77, Board minute, 7 June 1827.

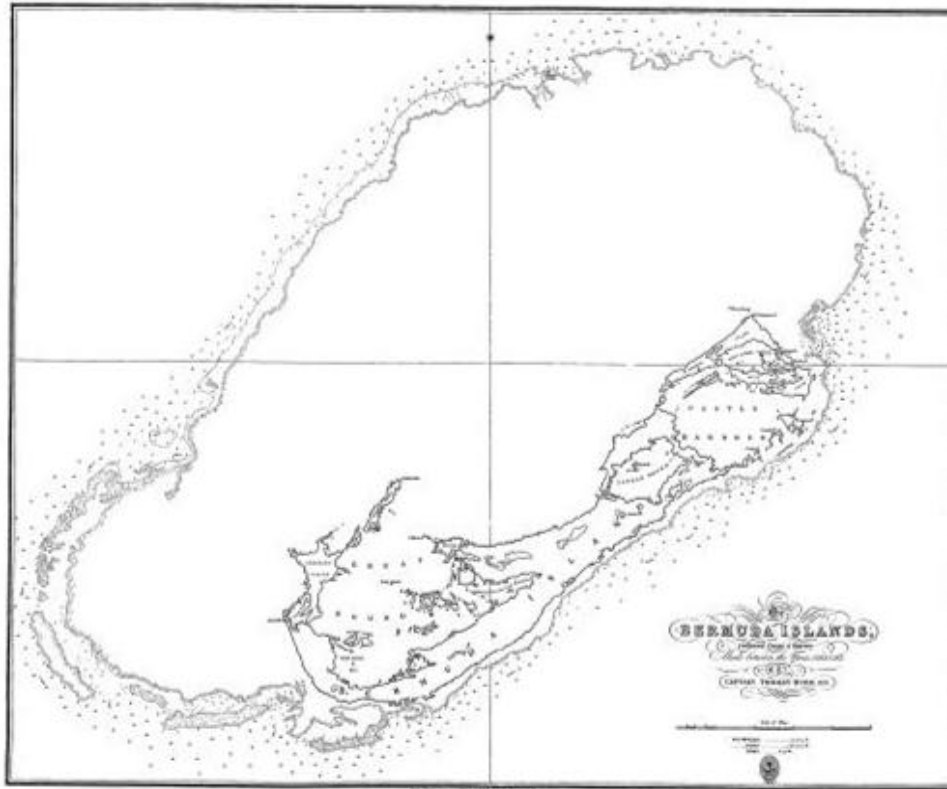


Illustration 6.3 Hurd's survey after being reduced, lacking detail due to the security concerns over the publication of this survey (UKHO, OCB360 A1)

That lack of standardisation was equally evident in the charts that were produced in the office. The majority of the charts produced from one surveyor had tendencies towards a uniform style, in that their borders, symbology, scales and overall design were similar, but any thoughts of a standard style across the whole Admiralty series was a long way off. A random sample of charts published during the period of this study shows how designs of chart borders varied through at least 16 different styles and although many charts used similar symbols there was no standard template for surveyors or draughtsmen to use, with many using Mackenzie's *Treatise on Nautical Surveying* as a guide for symbology. This lack of standardisation was a hang up from the centuries of common practice whereby surveys were virtually all engraved from the designs of the surveyor in the field, without much thought for standardisation, graticule, latitude and longitude, compass variation, datums, contouring, lights, symbology and many other factors that if introduced would have made the charts easier to use for the mariner.¹¹³²

¹¹³² For details of symbology see M.G. Clawson, 'The evolution of symbols on nautical charts prior to 1800' (unpublished M.A. thesis, University of Maryland, 1979).

Engraving

Hurd and Parry were fortunate in that Dalrymple had established a reliable person in the form of John Walker senior to take charge of the office engraving, therefore all such matters could be left to him when it came to the business of transferring the draughtsman's fair copy to the copper.¹¹³³ Whether it was engraving charts or views, there appears to have been no technical problems relating to this process, although the artistic skills required for view work were sometimes costed separately.¹¹³⁴ The use of engravers in London by the Admiralty was well tested by 1808, as for example they had used eight different men in engraving the plates for Vancouver's voyages.¹¹³⁵ In June 1809 Hurd presented a bill to the Admiralty Board of £51 15s for engraving work that had been carried on outside of his office, some of which had occurred during Dalrymple's time. The Board authorised an imprest for the payment of those sums¹¹³⁶ and the bill contained 14 entries, including engraving of plans, the cost of purchasing the copper, alterations and additions to a plate of the coast of France, adding shading to a chart of Bass Strait and engraving five plates of marks for shoals in the Bay of Brest.¹¹³⁷ According to Richards (writing in the 1860s) all the engraving work was done outside of the Admiralty by the Walkers.¹¹³⁸

The amount of engraving had vastly increased by 1818 when Hurd claimed £257 for one bill,¹¹³⁹ reflecting the large increase in production since his appointment. Unspecified bills in 1819 cost Hurd £55 9s and £105 which rose to a massive £360 4s and £535 18s in 1820. Although it dropped to £355 13s in 1821 and £186 14s to January 1822, there appears to have been an irregularity with his accounting, as the £105 he paid in 1819 did not appear in his yearly account but in the summaries produced every two months. In 1822 the office engraving bill came to £1,838 1s 6d, which did not include January as it had been accounted for in the previous year, thus placing 1822 as the most expensive year for new engraving work.¹¹⁴⁰ The cost of copper plate engraving in 1820 came to just under a quarter of the total contingent

¹¹³³ TNA, ADM17/8, Admiralty accounts 1800-1801 show Walker as having responsibility for paying the office disbursements.

¹¹³⁴ UKHO, MLP62/3.

¹¹³⁵ TNA, ADM1/5122/20.

¹¹³⁶ TNA, ADM1/3523, Hurd to Pole, 7 June 1809 and minute by Pole, 8 June 1809.

¹¹³⁷ TNA, ADM1/3523, Bill sent to Mr Walker, dated London, 26 May 1809.

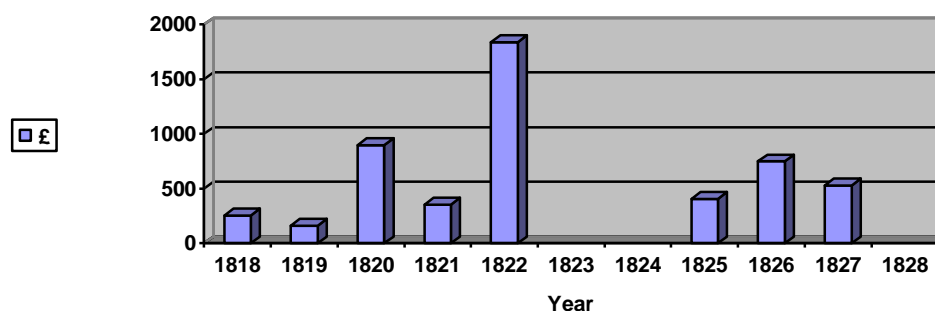
¹¹³⁸ Richards, *Memoir*, 4.

¹¹³⁹ TNA, ADM17/28, Hydrographic Office accounts, 1818-1823.

¹¹⁴⁰ TNA, ADM17/28, Hydrographic Office accounts, 1818-1823.

expenditure of the whole office, with the printing of charts and proofs, mounting them on linen and repairing them, binding atlases and the cost of paper for printing, accounting for another quarter of the £3,010 14s spent.¹¹⁴¹ Thus the cost of engraving was always expensive, but the early Parry years were not as prolific as Hurd's. Parry declared to the Admiralty Board in 1827 that £407 14s was spent on engraving in 1825 and £749 6d in 1826, averaging £578 7s 3d.¹¹⁴² Overall those amounts were trifling compared to other Admiralty expenditure.

Figure 6.1 Costs of engraving, 1818-22, 1825-27



Source: TNA, ADM17/28; UKHO, MLP 5/5B, Hydrographic Office accounts, 1818-1823, 25-7

In February 1827, after the delays in publishing Owen's Africa surveys came to light,¹¹⁴³ Parry reported to the Admiralty Board that on the one hand the delay in their publication had not 'arisen from neglect, or inefficiency of means', as it was common practise that 'as soon as a chart is prepared for the engraver, it is always put in hand, and executed without delay'. He gave the Board the answer to the problem being that the number of engravers employed was usually eight or nine, but 'double that number could easily be set to work, if the draftsmen would furnish occupation for them'.¹¹⁴⁴ Subsequently the Lord High Admiral authorised the employment of six extra draughtsmen to be hired (and paid weekly) to work on charts to be made ready for engraving. The responsibility fell on John Walker who had to employ them from 10 until 5 o'clock, but in return Parry had to provide a weekly report of their progress

¹¹⁴¹ House of Commons, *A return in detail of £3,000; charged in the Navy estimates for 1820, for contingencies relating to the service whereon the Hydrographer is employed* (London, 1821). The remaining money, approximately half, was spent on instruments supply and repair.

¹¹⁴² UKHO, MLP 5/3ii, Notice respecting the establishment &c of the Hydrographic Office 1 February 1827 by Captain Parry.

¹¹⁴³ See in this chapter under 'Lithography'.

¹¹⁴⁴ UKHO, MLP 5/3ii, Notice respecting the establishment &c of the Hydrographic Office 1 February 1827 by Captain Parry.

and a monthly one of work ready for and completed by the engravers.¹¹⁴⁵ One weekly report in 1829 showed that in one week the engravers had corrected and added new surveys to two charts and completed six others.¹¹⁴⁶ Those hours kept by the weekly paid staff were slight in comparison to those kept by John Walker, who was known in the 1820s to have worked until dusk on his ‘geographic’ work.¹¹⁴⁷

When Parry approached the Admiralty Board in 1828 and 1829 for permission to engrave charts, plans and views, the process had been simplified. Parry would either write or ask for an estimate for the cost of engraving, which in the few surviving examples was obtained from John Walker junior. On receiving the estimate Parry would then endorse it with the reason for having the chart or view published before sending it to the Admiralty Board, who would then approve it and return the estimate to Parry. This was on the whole a rubber stamping exercise and comments from the Board were virtually non-existent.¹¹⁴⁸ Although this interaction between the Hydrographer and the Admiralty Board was brief it showed how accountability was still important to the Board.

Having to employ skilled men meant the cost of engraving a full double elephant size chart was a relatively expensive undertaking and apart from the cost of purchasing chronometers was one of the highest of one-off costs; for a list of costs see Table 6.1 (below). This issue, and the monopoly the Walkers had in engraving for the Hydrographer, was tested by Parry in January 1828. He found by comparing the charges presented by John Walker for all the engraving undertaken in 1827 against the costs which could have been charged by Mr Wyld (Faden’s successor), there was a saving of £200.¹¹⁴⁹ Therefore Walker was justified in his monopoly and the Advisory Council were getting value for money, even if every quote was not tendered for by more than one party. The costs for engraving individual charts varied depending upon their size (*i.e.* their dimensions, for which see Appendix 13) and their content. In 1829 the cost of engraving a DE/4 size chart varied from £13 3s up to £18 due to the content of the two items. The cheaper price was for a chart of the *Plan of the*

¹¹⁴⁵ UKHO, MLP77, Board minute, 7 June 1827.

¹¹⁴⁶ UKHO, ADM1/3470 Parry to Barrow, received 13 May 1829.

¹¹⁴⁷ Lamb, ‘Felipe Bauzá’, 323.

¹¹⁴⁸ UKHO, MLP3/5 Engraving estimates, 1828-9. Another estimate prepared by John Walker junior survives containing the cost of engraving 153 charts of Africa. Although this is undated it was probably prepared for Parry in 1827 or 1828 as he quoted £1149 13s for the engraving, £300 for the copper and £130 for of making any reductions (UKHO, MLP183/2).

¹¹⁴⁹ UKHO, MB1 f.130 Parry to Douglas, 16 January 1828.

Anchorage of the N.W. side of the Island Santa Catharina on the coast of Brazil, whereas the more expensive one covered Carlingford Lough. When the content of the two are compared there is approximately one third more topography and two thirds more hydrography on the Carlingford chart than the one for Santa Catharina.¹¹⁵⁰ Therefore rather than have a set table of fees based on the size of the plate, the cost of the work was based on the size of the copper and the amount of detail to be engraved, and was calculated on a case by case basis.

Table 6.1 Table of the costs of engraving different size charts, 1828-9

Size of engraving	Date	Cost			Source
		£	s	d	
Small correction	1828	1	5	0	UKHO, MLP3/5
Chart DE/8	1829	6	15	0	UKHO, MLP3/5
Chart DE	1829	60	0	0	UKHO, MLP3/5
Chart DE/4	1829	18	0	0	UKHO, MLP3/5
Chart DE/4	1829	13	13	0	UKHO, MLP3/5

One way to reduce costs was to recycle old copper plates. Parry really took the bull by the horns in March 1828 when he and Walker examined 251 plates Des Barres had produced for the Gulf and River St Lawrence, Nova Scotia and the Bay of Fundy. It was found that 167 of them were fit to be used for engraving new charts upon, saving around £40 in the purchase of new copper. Unfortunately 84 of them were ‘so much injured by lying by, as to be of no use for engraving upon’, therefore they were suggested to be sold as old copper saving a further £40 or £50.¹¹⁵¹ The re-use of copper was nothing new but this shows yet another way in which Parry’s efficient management of the office benefited the Admiralty by saving money and space, with his continual revision of the status quo in the Hydrographic Office resulting in many improvements.

Paper

The paper used for drawing, proofing and printing was one of, if not, the best quality papers produced in Great Britain, that of Whatman. By the time Hurd used that type of handmade wove paper the business had passed out of the hands of the Whatman

¹¹⁵⁰ UKHO, OCB 544 A1 *Plan of the anchorage of the N.W. side of the Island Santa Catharina* and OCB 44 A1 *Carlingford Lough*.

¹¹⁵¹ UKHO, MB1 f.168, Parry to Hope, 3 March 1828.

family to William Balston, Thomas Robert Hollingsworth and Finch Hollingsworth. After a split in 1804 Balston took over the supply of paper watermarked ‘J. Whatman Turkey Mill’ and the Hollingsworths supplied ‘J. Whatman’ with the date underneath.¹¹⁵² Both of those types of paper can be found in use for the printing of Admiralty charts from copper plates during the period of this study.¹¹⁵³ Such was the quality of the paper that it continued to be used into the 1970s in the Hydrographic Office but for drawing purposes and not printing.¹¹⁵⁴ Longman and Dickinson supplied ‘Drawing and chart paper’ to Hurd in 1809 amounting to £26 7s 3d, but whether this was the supplier of Whatman paper to the office is not specified;¹¹⁵⁵ the bills for printing would have included the cost of paper. Such was the quality of Whatman paper that one member of Hydrographic Office staff when ordering eight reams in 1823 stated ‘all of which must be of the best quality and of Whatman’s make’.¹¹⁵⁶

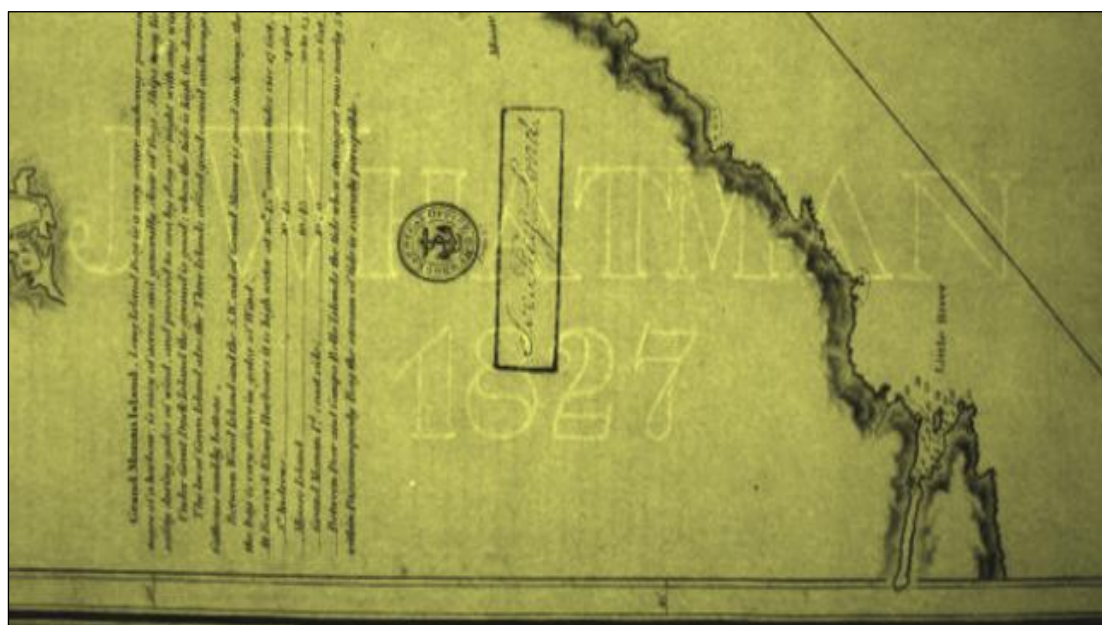


Illustration 6.4 A sheet of Whatman paper used to print an Admiralty chart in 1827. This image was taken over a light table to show the Whatman watermark, which has caused the green effect of the light (UKHO, OCB collection)

Printing had traditionally been undertaken on paper, but examples of maps and charts printed on linen, silk and vellum prior to this period are known. The

¹¹⁵² R.L. Hills, *A short history of papermaking in Britain 1488-1988* (London, 1988), 65-77.

¹¹⁵³ UKHO, OCB series 354 A1 is the former and 623 A1 the latter.

¹¹⁵⁴ Ex inf Mr Adrian Halliwell, 2006.

¹¹⁵⁵ TNA, ADM1/3523, Hurd to Pole, 14 March 1809. For the connection between Longman and the stationer Dickinson of Walbrook see Hills, *Papermaking*, 109-110.

¹¹⁵⁶ UKHO, LB2 f.6, 21 July 1823.

opportunity placed before Parry of putting paper charts on canvas was an attempt to help increase their longevity at sea if they got wet, being a natural progression towards a water resistant chart. The paper was made by Thomas Stackhouse, a lithographic printer of 5 Copthall Buildings, Throgmorton Street, who made his approach to the Admiralty with his invention in 1824. In 1826, after a short trial at sea the year before under Admiral Sir James Saumarez, Commander-in-Chief Devonport, a waterproof chart paper was brought to Parry's attention. The Admiralty Board instructed Parry on 10 January 1826 to 'consider of the expediency of bringing these into general use' and to consult with Mr Walker over its usability.¹¹⁵⁷ A problem for Parry's administration arose at that time after a disagreement between Stackhouse and John Walker senior was reported to the Admiralty Board. As Walker advised both the Board and Parry on technical issues relating to printing, this was not the best way for Stackhouse to build relationships with the man who would be trialling the use of his invention in the Hydrographic Office. Putting the disagreement to one side, Parry found on reading Saumarez's report there were some fundamental issues with the suitability of the paper. He found the paper easily cracked, causing the oiled coating to peel off, which he thought would be made even worse in extreme climates such as the Arctic. Coupled with this, the growing frequency with which the charts were corrected and new impressions needed meant their longevity would be short. Parry also noted the difficulty in making an impression on to the paper, requiring two men to operate the press, and with a resulting image that was 'by no means clear or perfect'.¹¹⁵⁸ Those issues, as well as the additional costs, were good enough reasons for Parry to object to Stackhouse's invention.¹¹⁵⁹

In reply Croker was not put off by Parry's findings, clearly ignoring the advice of the Hydrographer, minuting:

It seems to me, on the whole, that this invention would be useful and cheap for charts of well-known places, which are in constant use, such as the Channel &c &c, and for small vessels employed on our own coasts, but that charts for large ships and for distant stations, or for places in which alterations or additions are likely to be made, should be issued, as usual, in our own old manner.¹¹⁶⁰

¹¹⁵⁷ UKHO, MB1 f.19, Minute of Mr Stackhouse's patent waterproof paper, 10 January 1826.

¹¹⁵⁸ UKHO, MB1 f.20, Parry to the Admiralty Board, 18 February 1826.

¹¹⁵⁹ UKHO, MB1 fos 19-21, Parry to the Admiralty Board, 18 February 1826.

¹¹⁶⁰ UKHO, MB1 f.22, Admiralty Board minute to Parry, 21 February 1826.

He therefore instructed Parry to take as much of the ‘prepared cloth’ as was necessary for the ‘limited employment of his invention’, showing how even after nearly two decades on the Admiralty Board Croker knew little about chart production.¹¹⁶¹ Parry then wrote to Stackhouse on 6 March 1826 asking him to supply 100 sheets of paper (26”x40”), but for some unknown reason, which was another unfavourable shadow cast by Stackhouse, he supplied the Hydrographic Office with an extra 154 sheets! Parry wasted no time stating to the Admiralty Board how he thought the whole transaction was ‘a gross attempt at imposition’, suggesting the extra sheets be returned, which the Board fully supported.¹¹⁶² Subsequently Parry paid £22 16s to Stackhouse to cover the costs of the paper¹¹⁶³ and his waterproof invention was not adopted for chart production.

Stackhouse was not a man to give up easily and two years later informed Sir Edward Owen that he had made improvements to his paper and requested a further trial. Owen instructed Parry to deal directly with Stackhouse,¹¹⁶⁴ but Parry replied immediately to Owen pointing out the problems he had brought to the Board’s attention two years earlier, mainly that of cost. Parry also sent a Channel chart which had been printed on canvas that was ‘quite spoiled where it has been much used’.¹¹⁶⁵ Nevertheless twelve sheets, measuring 39”x26” were ordered¹¹⁶⁶ and as many impressions of the office chart of the Channel pulled before 26 July 1828. Captains Pigot (at Deal) and Mingaye (at Newhaven) were requested to take two copies each for trial and the remaining copies equally divided between Sheerness and Portsmouth. Instructions were given for those remaining copies to be distributed to tenders or vessels that would have constant use of them, with orders

to report upon the advantages and disadvantages of these charts over those in common use, and note particularly as regards their duration and the effect of wet or damp upon them.¹¹⁶⁷

After sorting out the costs¹¹⁶⁸ Walker, styled by Parry as Assistant Hydrographer, arranged for the impressions to be made, after giving Stackhouse the option to choose

¹¹⁶¹ UKHO, MB1 f.22, Admiralty Board minute to Parry, 21 February 1826.

¹¹⁶² UKHO, LB2 f.68, Parry to Stackhouse, 6 March 1826; *ibid*, MB1 f.41, Parry to the Admiralty Board, 2 May 1826.

¹¹⁶³ UKHO, MLP5/5B, Accounts, 1826.

¹¹⁶⁴ UKHO, MB1 f.196, Owen to Parry, 19 June 1828.

¹¹⁶⁵ UKHO, MB1 f.196, Parry to Owen, 5 July 1828.

¹¹⁶⁶ UKHO, LB2 f.163, Parry to Stackhouse, 9 July 1828.

¹¹⁶⁷ UKHO MB1 f.202, Minutes, 26 and 28 July 1828.

from which plate to make the impressions.¹¹⁶⁹ The charts were supplied and the reports subsequently received, which only reinforced the findings of 1826, despite the alleged improvements by Stackhouse. The Admiralty Board ended the whole affair by instructing Parry that ‘their Lordships do not think proper to adopt the plan and will not give him any further trouble’.¹¹⁷⁰ It is possible that Stackhouse’s idea did not catch on as it was not until 1866 that Rachel Stackhouse, widow, took out a patent for waterproof paper, specifically mentioning its use for charts.¹¹⁷¹

Copper plate and lithographic printing

Dalrymple had installed a rolling press in the Admiralty in 1800 that was initially (and predominantly) used to reprint his H.E.I.C. charts for the use of the Navy.¹¹⁷² The security surrounding the printing of charts prior to their sale in 1821 was also introduced by Dalrymple, but a strange dichotomy existed with the charts that ended up being supplied to the Navy. Although Admiralty charts printed before 1821 were effectively classified as ‘secret’, they sat alongside charts in the chart boxes that were commercially available from the London chart sellers, such as those published by Faden and Laurie. Therefore printing outside of the Admiralty could have been considered a security risk before 1821, although it was always a possibility for those charts of a non-sensitive nature. Printing from the copper was the preferred method of production for the Hydrographic Office and the private chart trade during this period.

The office bill for printing in the first quarter of 1818 was £51 8s 6d, in the following quarter £52 5s 6d, then £56 3s 6d and finally £46 5s 3d. This was specifically referred to as copper plate printing in the accounts of 1819 and the amounts spent in that year were all in the vicinity of £50 per quarter. Also during that year £2 18s 6d was spent on blanketing for the printing press. In 1820 the first quarter saw the printing and proofing bill rise to £79 16s 7½d and it remained in the seventies for the rest of the year. In the first quarter of 1821 the figure rose even more dramatically to £122 19s 9d to cope with the demands of selling charts to the public

¹¹⁶⁸ UKHO, LB2 f.168, Parry to Stackhouse, 26 July 1828; *ibid.*, LP1857 S431, Stackhouse to Parry, 28 July 1828; *ibid.*, MB1 f.205, Minute 4 August 1828.

¹¹⁶⁹ UKHO, MB1 f.210, Minutes, 5-8 September 1828.

¹¹⁷⁰ UKHO, MB1 f.220, Minutes, 24 December 1828-5 January 1829.

¹¹⁷¹ *London Gazette*, 18 May 1866, page 6.

¹¹⁷² Cook, ‘Alexander Dalrymple’, 165.

and a new printing press was bought from J. Flanders for £113 10s;¹¹⁷³ in 1826 he had to repair it (being paid £1 18s).¹¹⁷⁴ Money was also spent in 1822 for ‘articles wanting in the Admiralty printing rooms’ that were purchased by Hurd. Although the quarterly figures were regularly over £50 in 1822, the money paid to Baily for copper plate printing only amounted to just over £110 for the whole year, and £27 for the first quarter of 1823. This was due to a combination of factors, mainly the poor take up of sales to the public, but also Hurd’s poor health limiting the amount of energy he could put into that new venture.¹¹⁷⁵ The figures recovered with Baily being paid £202 in 1825, rising to £218 the following year and £255 in 1827. Baily also supplied materials for printing in the Office in 1825 and the sale of charts to the public eventually saw a return to the costs incurred by Hurd in the late 1810s and 1820s.¹¹⁷⁶

Although copper plate printing had a virtual monopoly in the Hydrographic Office its supremacy was challenged by the new technology of lithography. Lithography was a revolution in printing and maps had been produced using this method in Germany in the 1800s and France in the 1810s, as well as in Denmark and Belgium in the 1820s.¹¹⁷⁷ In an undated minute (on paper watermarked 1811) from the Admiralty Board to Hurd, Dyer and Mr Matthews, they desired that

the lithographic press should be kept constantly employed by the Hydrographer in printing charts of the kind which may be most appropriate to that mode – such as individual anchorages and surveys which, tho’ not complete enough to make it worthwhile to engrave them, might yet be useful and above all incomplete surveys which might be issued with a view to having them corrected or completed.¹¹⁷⁸

¹¹⁷³ TNA, ADM17/28, Hydrographic Office accounts, 1818-23. Blanketing was almost certainly made of wool and placed on top of the copper plate to protect it when pressure was being added when the impression was being made.

¹¹⁷⁴ UKHO, MLP 5/5B, Hydrographic Office accounts, 1825-7. Flanders does not appear in any London directories from this period but a Thomas Flanders appears from 1839 to 1841 with a company called French & Son as a press manufacturer at the address William Street, Curtain Road. Then from 1842 to 1849 he was at the same address but trading under his own name as a press manufacturer, millwright, and carpenter (Todd, W.B., *A directory of printers and other allied trades: London & vicinity 1800–1840* (London, 1972).

¹¹⁷⁵ TNA, ADM17/28, Hydrographic Office accounts, 1818-23.

¹¹⁷⁶ UKHO, MLP 5/5B, Hydrographic Office accounts, 1825-7.

¹¹⁷⁷ M. Twyman, *Lithography 1800-1850. The techniques of drawing on stone in England and France and their application in works of topography* (London, 1970), 15-16, 51. See also I. Mumford, ‘Lithography, photography and photozincography in English map production before 1870’ in *The Cartographic Journal*, 9:1 (London, June 1972), 30-6, but he does not make any mention to lithography being used by or in the Admiralty. Mumford’s article ‘Lithography for maps: from Senefelder to Hauslab’ in the *Journal of the Printing Historical Society* 27 (1998), 73 makes a brief reference to its use in the Admiralty.

¹¹⁷⁸ UKHO, MLP 5/3i, Admiralty Board to Hurd, c.1811.

Thus the Admiralty Board set out the terms and conditions of use of the lithographic press, from which they could expect anywhere between 40 and 120 impressions an hour.¹¹⁷⁹ Part of the problem that Croker at least recognised was that reproductions using this method did

not possess that minute exactness and beauty which copper plate engraving gives but the cheapness and ease of working gives it great advantage particularly for maritime charts which are never so crowded as geographical maps.¹¹⁸⁰

He viewed the press as being ideal for those smaller works and an ‘admirable invention’, which he expected to find constantly employed reproducing charts and sketches from the Hydrographic Office, despite the fact it was known that the impression from the stone was not always consistent.¹¹⁸¹

Croker was supported in his promotion of the lithographic press by Thomas Crofton Croker. In his obituary T.C. Croker is credited as having ‘pursued some important experiments in [lithography in] conjunction with Mr. Coindet, the London partner of the house of Engelmann and Company’ and ‘introduced it into the Admiralty as a substitute for transcribing many copies of the same order, and other confidential circulars’.¹¹⁸² However, this is thought to have been a long time after the press had been installed and Hurd instructed to make use of it. It is most likely that J.W. Croker got the idea of the Admiralty having its own press from the Quarter-Master-General’s Office at Whitehall, which had produced a plan of Bantry Bay on 7 May 1808. Crofton Croker wrote in 1829 how the Quarter-Master-General’s Office also printed documents for other departments, including copies of maps and plans, totalling nearly 170,000, produced by one draughtsman, four printers, and one labourer.¹¹⁸³

¹¹⁷⁹ M. Twyman, *The British Library guide to printing history and techniques* (London, 1998), 48.

¹¹⁸⁰ UKHO, MLP 5/3i, Admiralty Board to Hurd, c.1811.

¹¹⁸¹ UKHO, MLP 5/3i, Admiralty Board to Hurd, c.1811.

¹¹⁸² ‘Obituary of T. Crofton Croker Esq. FSA’ in *The Gentleman’s Magazine* NS XLII (London, 1854), 398.

¹¹⁸³ Twyman, *Lithography*, 33, 33 n.2; H. Wallis and A.H.W. Robinson, *Cartographical innovations. An international handbook of mapping terms to 1900* (Tring, 1987), 299-300.

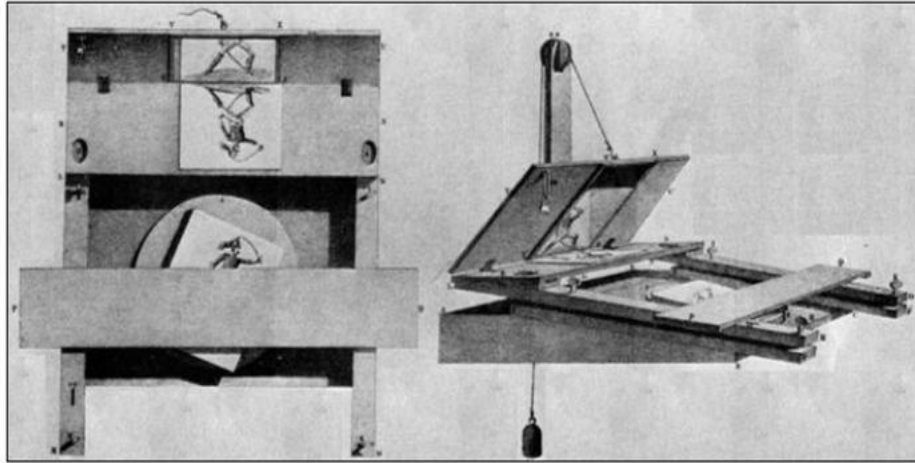


Illustration 6.5 A lithographic draughtsman's desk from Engelmann's *Manuel du dessinateur lithographe* (Paris, 1822)

Hard evidence for the use of lithography in the Admiralty and for what was probably the most notable of those early lithographic printings, was a chart covering the discoveries made on the *Hecla* and *Griper*. At least one chart had been produced by Hurd in 1820, as an untitled example with the legend 'Printed at the Admiralty Lithographic Press Novr 16th 1820' (and published on the same day) is held at the British Library; see Illustration 6.6.¹¹⁸⁴

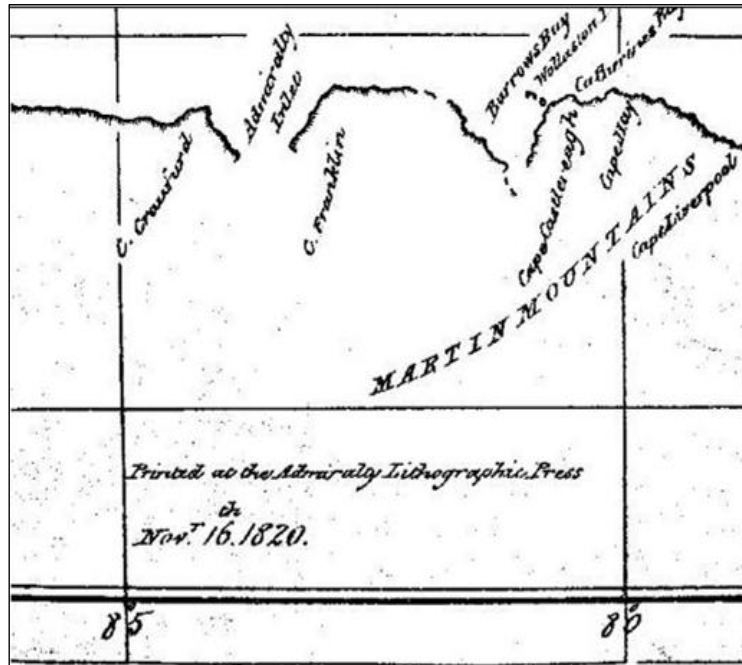


Illustration 6.6 An extract from a chart printed on the Admiralty's lithographic press on 16 November 1820, showing Barrow's Bay, Cape Franklin and Admiralty Inlet (BL, Maps 982(36)).

¹¹⁸⁴ BL, Maps 982(36); UKHO, E245 Ai. This was referred to in *Trewman's Exeter Flying Post or Plymouth and Cornish Advertiser* on 23 November 1820.

Another chart covering a much wider area from 50° to 120° West, but in a similar style with no imprint or publication details,¹¹⁸⁵ was also produced using lithography and could have possibly been issued at the same time to supplement the more detailed chart published on the 19th of November. Such was the interest in the subject matter and demand for the chart that copies were widely distributed, including one to Lord Exmouth for the Devon and Exeter Institution,¹¹⁸⁶ resulting in extra work for the lithographic press that was charged at 10s in that year.¹¹⁸⁷ A chart such as this was ideal for lithographing, as was a small sketch of Bermuda, although Parry thought the latter was not worth issuing because of the ease in which small numbers could be produced.¹¹⁸⁸ Britain was not the only place where lithography was being used by its Hydrographer, as Spain at that time was also experimenting with that relatively new technology¹¹⁸⁹ and a chart of Carlsrona was available in 1828 in Germany.¹¹⁹⁰

By 1826 the use of lithography was becoming more prominent, especially when the firm of Engelmann & Co of 66 St Martin's Lane, Strand, became involved in printing charts for the Admiralty. Engelmann offered extra capacity for the Admiralty to have charts quickly and more cost effectively produced. Hewett's chart of the Leman and Owers Shoals was produced using this method and an initial print run of 100 was struck off, which were offered for sale at 2s 6d each by 24 August 1826¹¹⁹¹ and advertised in the press on 5 September.¹¹⁹² Parry thought that such a price was much too high and queried it with Croker, pointing out that if it had been engraved it should only have been sold for 1s 6d. But Parry was once again over-ruled and the more costly and inferior looking option sold to the public.¹¹⁹³ This confusion over the price and the issue of quality may have been part of the reason behind Croker asking Parry in November 1826 to select some chart of a smaller size than 28" by 22" to be lithographed as an experiment.¹¹⁹⁴

¹¹⁸⁵ C. Verner, *Explorers' maps of the Canadian Arctic 1818-1860* Cartographica monograph no.6 (Toronto, 1972), illustration XIII.

¹¹⁸⁶ UKHO, LB1 f.346, Hurd to Lord Exmouth, 27 November 1820. Pascoe thought one of the first charts to be printed using lithography in the Hydrographic Office was Table Bay by Owen (UKHO, OCB 634 A1) but this was not the case as can be seen by the research in this section.

¹¹⁸⁷ TNA, ADM17/28, Hydrographic Office accounts, 1818-23.

¹¹⁸⁸ UKHO, MB1 f.100.

¹¹⁸⁹ Lamb, 'Felipe Bauzá', 325.

¹¹⁹⁰ UKHO, MB1 f.174, Owen to Parry, 25 March 1828.

¹¹⁹¹ UKHO, MB1 fos 52-3, minute dated 24 August 1826.

¹¹⁹² *The Hull Packet and Original Weekly Commercial, Literary and General Advertiser*, 5 September 1826.

¹¹⁹³ UKHO, MB1 fos 52-3, minute dated 24 August 1826.

¹¹⁹⁴ UKHO, MB1 f.88, minute dated 16 November 1826.

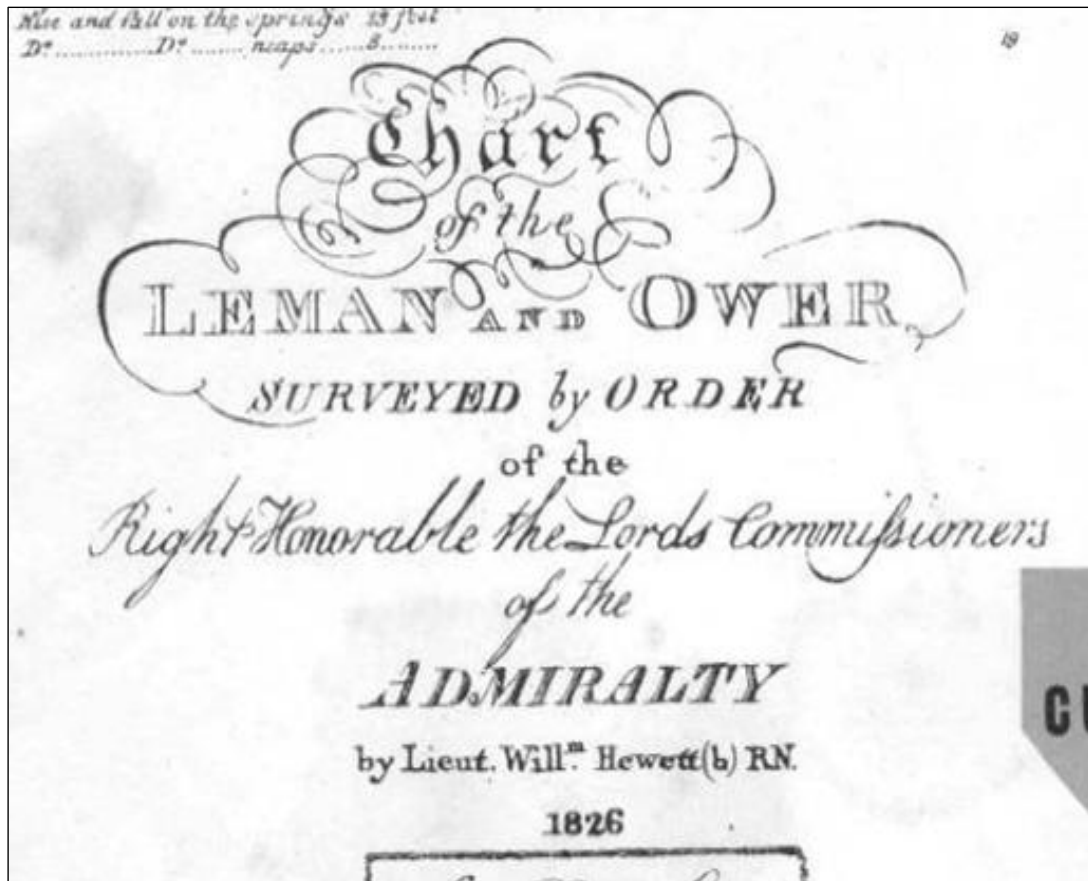


Illustration 6.7 The title from Hewett’s chart of Leman and Ower containing no date of publication but published in 1826. Note the poor quality of the line work compared to the engraving in the reproduction of Dartmouth Harbour in illustration 6.1 (UKHO, OCB 106 A1)

In October 1826, Captain W.F.W. Owen ‘frustrated and angry’, protested to Cockburn about the lack of publication of his charts.¹¹⁹⁵ Shortly afterwards Croker instructed Parry to fill any gaps in Owen’s coverage with information from the best authorities, prepare the work for lithographing and to make a report to the Board. Just over a week later Parry had the charts ready for printing and he reported to Croker on 8 December the technical details of the printing capabilities. As each chart measured 39 inches by 26 inches it was impossible for them to be reproduced by the lithographer Engelmann, as his press could only take a maximum size of 28 inches by 22 inches. Therefore Parry suggested dividing the sheets into two and then pasting them together after printing, which was ‘more convenient for use than multiplying the number of sheets’, an idea that was subsequently approved by the Board.¹¹⁹⁶

¹¹⁹⁵ Burrows, *Owen*, 176-7.

¹¹⁹⁶ UKHO, MB1 fos 94-5, minutes dated 27 November-11 December 1826.

The cartographic evidence suggests that Owen's six small-scale charts covering Africa were not lithographed by either the Hydrographic Office or Engelmann at that time. The six sheets covered an area from Gibraltar to the Cape and on to the Red Sea, but early states show those charts were engraved and printed from the copper, rather than going through the inferior lithographic process.¹¹⁹⁷ However, on 1 February 1827 Owen's chart of Table Bay was published using the lithographic method by Engelmann,¹¹⁹⁸ but the great expansion of lithography did not happen as Croker wished and still Owen's six small scale-sheets had not been published. Owen wrote to the Admiralty Board in May complaining of the delay and the fact that Croker had caused the same by holding them back from printing to use as an experiment. Owen even offered to have them published at his own expense, if the Admiralty covered the cost of the copper,¹¹⁹⁹ but as there was no progress he wrote directly to the Lord High Admiral. He claimed in May 1827 that only two of his charts had been published by lithography and it had cost three times as much as using the traditional copper-plate method.¹²⁰⁰ This sums up the competition lithography faced.

Clearly the use of lithography at that time was problematic and guidelines were needed if its use was going to be productive for the Admiralty. Such an opportunity occurred when the Lord High Admiral allowed Parry's great office reform of June 1827, as one of the rules laid down was 'that lithography be employed only for temporary or less important objects, all other surveys being engraved on copper'.¹²⁰¹ Subsequently the plans for publishing Owen's six sheets, along with the rest of his surveys for that matter, suddenly changed. Croker's plans for having them lithographed were curtailed, as the decree from the Lord High Admiral meant they had to be engraved and printed from the copper. Shortly after that decree two of Owen's charts that had been transferred to stone by Engelmann & Co were ordered to be returned to the Admiralty at the end of August, for which they were paid £26 5s

¹¹⁹⁷ See charts of the Strait of Gibraltar to the River Gambia (UKHO, OCB 1226 A1), River Gambia to Cape Lopez (UKHO, OCB 594 A1), Annabona to Hollams Bird Island (UKHO, OCB 595 A1), Hollams Bird Island to Cape Corrientes (UKHO, OCB 596 A1), Cape Corrientes to Juba Islands (UKHO, OCB 597 A1) and Juba Islands to Muscat (UKHO, OCB 598 A1).

¹¹⁹⁸ UKHO, OCB634 A1 Chart of Table Bay, published 1 February 1827. Mumford states that it was published by Engelmann Graf Coindet & Co (I. Mumford, *Milestones in lithographed cartography from 1800* (unpublished PhD thesis, University of Reading, 1999), 19).

¹¹⁹⁹ TNA, ADM12/246.

¹²⁰⁰ Burrows, *Owen*, 177.

¹²⁰¹ UKHO, MB1 fos 109-110, Lord High Admiral's minute on office reforms, 7 June 1827.

9d.¹²⁰² Owen had good grounds for being frustrated as those charts were not published until August and October of 1828, which was a big delay considering they were ready for publication in December of 1826.¹²⁰³

From that period, partly as a result of the problems Owen encountered with the limited capacity of the office, Parry's reforms dictated how delays could be avoided by the surveyors sending in surveys 'in a fit state for immediate publication'. This was of course dependent on the scale of the surveys and he also had standards in mind when he desired

almost all particular plans of harbours &c should be drawn on such a sized paper as will bind up in our large quarto books of plans, being the eighth part of a double-elephant sheet. Regulations somewhat similar, tho' not quite so specific, may be adopted for the general charts.¹²⁰⁴

Such regulations affected the expediency of the widespread use of the lithographic press. Parry sought guidance from the Board, asking four fundamental questions that would not totally stop its use altogether, but certainly curtail it. Whether he really could not ascertain the answers to those questions, or whether he wanted to put enough doubt in the minds of their Lordships, is unclear, but he asked:

- 1st Can an expert lithographic draftsman draw a chart on the stone more quickly, and with the same mathematical accuracy, as an engraver on copperplate?
- 2^d What is the comparative expense of an equally well executed chart, produced from the stone, and from the copper?
- 3^d Can alterations (as well erasures as additions) be made on the stone – and this after a lapse of years, if necessary?
- 4th Can the drawing on the stones, and the stones themselves, be preserved quite free from injury for a number of years?¹²⁰⁵

Despite Parry's observations lithography did not cease and in September 1828 he was supplying copies of a small plan of Man of War Bay on the Island of Egina surveyed by C. Brown, master of H.M.S. *Warspite* (surveyed in February of that

¹²⁰² UKHO, MLP 5/5B, Hydrographic Office accounts for 1827.

¹²⁰³ See charts of the Strait of Gibraltar to the River Gambia (UKHO, OCB 1226 A1), River Gambia to Cape Lopez (UKHO, OCB 594 A1), Annabona to Hollams Bird Island (UKHO, OCB 595 A1), Hollams Bird Island to Cape Corrientes (UKHO, OCB 596 A1), Cape Corrientes to Juba Islands (UKHO, OCB 597 A1) and Juba Islands to Muscat (UKHO, OCB 598 A1).

¹²⁰⁴ UKHO, MLP 5/3ii, Notice respecting the establishment &c of the Hydrographic Office 1 February 1827 by Captain Parry.

¹²⁰⁵ UKHO, MLP 5/3ii, Notice respecting the establishment &c of the Hydrographic Office 1 February 1827 by Captain Parry.

year)¹²⁰⁶ that was produced using that method. Two further charts were most likely produced around that time of the Rabbit Islands and an enlarged plan of Great Rabbit Island by William Farley, master and Henry James, midshipman of H.M.S. *Revolutionaire* from surveys made in June 1820. Both charts were issued at the end of October 1828, but had taken over eight years before they were taken up for printing,¹²⁰⁷ thus lithography provided an ideal medium as both charts were small enough for this method. Producing those two charts proved to the Admiralty Board what was possible and lithography continued to be used.

The production of Lieutenant Robert Loney's plan of Exmouth Harbour was an ideal candidate for lithography and shows the speed with which charts could be produced. The manuscript chart was supplied to the office by William Bowles, Comptroller General, Coast Guard Office on 12 March 1829. Loney was not a hydrographic specialist but an officer in command of His Majesty's Revenue Cruiser *Nimble*, and it was Bowles who asked Parry if it could be lithographed for use by the revenue cruisers on that station. Cockburn approved the request, instructing Parry to proceed on the thirteenth,¹²⁰⁸ which he must have put in hand almost immediately. On the 24th of March Parry wrote to Loney enclosing a drawing of a reduction of his plan that had been prepared for lithography, asking him to resolve several queries that had arisen.¹²⁰⁹ A reply was sent by Loney on the 30th in which he apologetically returned the answers to Parry's questions, stating how 'other arduous duties to attend to, and to its having been completed on board a cutter of only 65 tons during the winter season' were the causes of those defects.¹²¹⁰ Although the chart was published without any imprint date¹²¹¹ (on 15 April), just over a month after Cockburn had approved the lithographing of the chart, Parry sent a first impression of the plan to Loney for further corrections.¹²¹² Four days later Bowles wrote to Parry asking for 30 copies of the plan, which Parry instructed Sheringham to supply,¹²¹³ but on the 20th Loney wrote to Parry with one final addition, which Thomas Walker was instructed to

¹²⁰⁶ UKHO, LB2 f.187, Parry to Grey and Shield, 18 September 1828. An example of this chart can be found at the UKHO reference OCB 213 A1.

¹²⁰⁷ UKHO, LB2 f.206, Parry to Malcolm, 31 October 1828. An example of this chart can be found at the UKHO reference OCB 222 A1 and OCB 223 A1.

¹²⁰⁸ UKHO, LP1857 B427, Bowles to Parry, 12 March 1829.

¹²⁰⁹ UKHO, LB2 f.282, Parry to Loney, 24 March 1829.

¹²¹⁰ UKHO, LP1857 L344, Loney to Parry, 30 March 1829.

¹²¹¹ UKHO, OCB 24 A1, A plan of Exmouth Bar and Harbour.

¹²¹² UKHO, LB2 f.293, Parry to Loney, 15 April 1829.

¹²¹³ UKHO, LP1857 B444, Bowles to Parry, 19 April 1829.

include on the 22nd.¹²¹⁴ The 30 copies of the plan Bowles asked for were finally sent on 2 May,¹²¹⁵ thus from receipt to supply making a total of 52 calendar days, including two revisions, was a resounding success compared to the years it had taken to produce some charts using the traditional copper plate method.

Although the number of charts produced by lithography was relatively small (see Appendix 14) and the cost of their production more expensive than copper plate printing, lithography was well established in the Admiralty. It was not only used for charts because from 1827 (at least) Parry was using lithography to produce small printed notices relating to chart corrections;¹²¹⁶ this was much quicker and cheaper than using the engraving system. The new technology was firmly in place, although Croker's enthusiasm had been dampened by Parry and the Lord High Admiral, with lithography being used hand-in-hand with copper plate printing for decades to come.

Mounting and binding

The final stage of production that affected the Admiralty chart was either its mounting, or binding into atlas form,¹²¹⁷ so it could be supplied to the Fleet, a measure put in place to try and increase its longevity. From the very start of Hurd's term as Hydrographer charts were being pasted onto linen, although it is not always explicitly stated that 'new charts', rather than original documents, were being backed.¹²¹⁸ Initially Hurd had to pay Mr Brown on a weekly basis out of his own pocket for undertaking the mounting work, then claim a lump sum from the Admiralty Board. This bill amounted to £142 2s by June 1809 (and Hurd had paid £85 by November 1808), for which Secretary Pole granted immediate payment and an imprest of £100.¹²¹⁹ The amounts varied from £58 7s 10d in 1818, to a quarterly bill between £36 and £60 in 1820.¹²²⁰ In 1821 Hurd authorised payment for mounting upon rollers and for repairs, which was another service Brown provided in addition to

¹²¹⁴ UKHO, LP1857 L345, Loney to Parry, 20 April 1829. This suggests Thomas Walker may have been working as a lithographic draughtsman in addition to his other duties for which he received no extra pay.

¹²¹⁵ UKHO, LB2 f.300, Parry to Bowles, 2 May 1829.

¹²¹⁶ UKHO, MB1 f.98, minute dated 5 February 1827; *ibid*, LB2 f.229, Parry to Brocklebank, 19 December 1828.

¹²¹⁷ From copies in the Admiralty Library the larger size volumes were approximately A2 portrait size.

¹²¹⁸ There are numerous paper documents, mainly manuscript surveys, in the UKHO archive that have been backed with linen during the 19th century. Record of when they were backed have not survived.

¹²¹⁹ TNA, ADM1/3523, Hurd to Pole, 14 March 1809; *ibid*, Hurd to Pole, 7 June 1809 and minute by Pole, 8 June 1809.

¹²²⁰ TNA, ADM17/28, Hydrographic Office accounts, 1818-1823.

standard mounting on white and brown linen. In 1822 Brown's bill for the second half of the year was only £22 8s 8d and prior to Hurd's death only £17 10s 4d was spent in the first four months of 1823.¹²²¹ This reflects the amount of work Hurd was able to put Brown's way, which must have been difficult for both men, *i.e.* for Hurd not being able to output as much as he had in previous years and for Brown to lose the income from the Hydrographic Office as he relied on payments made on a weekly basis.

In November 1828 Sheringham proposed radical changes regarding the mounting of charts on linen, which involved the acquisition of the figures in Tables 6.2 and 6.3. He suggested that all sizes of single sheet publications up to and including the size of half double-elephant should no longer be backed with linen but with scrap paper. The source of the scrap paper was the vastly growing number of superseded charts in the office, due to the large increase in the production of new charts in that same year. For plans and views smaller than half double-elephant he suggested a quarter inch border should be left so as to prevent any damage to their edges. His suggestion was based on the practice used by the chart trade who backed their charts with blue paper, thus making them last longer.¹²²² Something which was on the face of it a very simple measure provided excellent value for money for people purchasing charts, and as a product this brought them in line with those produced by the private chart trade, which had been backed since the second half of the eighteenth century.

Table 6.2 Prices of mounting individual charts, 14 November 1828

	£	s	d
On new coloured calico			
Double Elephant and Atlas each sheet		1	4
On old material furnished by the office			
Double Elephant		0	8
Atlas		0	6
Half Elephant		0	4
all under half Elephant		0	2

Source: UKHO, LB2 f.215

¹²²¹ TNA, ADM17/28, Hydrographic Office accounts, 1818-1823.

¹²²² MLP 5/3vc, Sheringham to Parry, 20 November 1828 .

Table 6.3 Cost of mounting charts by Mr Brown, 1824-8.¹²²³

	£	s	d
1824	88	14	6
1825	149	19	11
1827	164	18	3
1828 ¹²²⁴	84	10	2

Source: UKHO, MLP 5/5B

In 1820 W. Winchester and Son of the Strand, who had printed nautical memoirs for Dalrymple, undertook the binding of atlases, as well as supplying paper for printing. But in 1821 ‘Fraser’ was paid for ‘chart and atlas binding’, however a vast difference can be seen between the £394 17s paid in the previous year to Winchester compared to the £27 18s paid to Fraser. This must have been a one-off task as Winchester received £330 8s as well in 1821, being the preferred contractor for the office binding; Winchesters also supplied stationery and supplies in 1823.¹²²⁵ An insight into the binding of charts into atlases can be seen in Becher’s journal kept for seven months in 1827. During that time he sent small consignments of atlases to the binders, in numbers of 4, 12, or 13. He also sent 50 copies of Tofino’s volume covering the coast of Spain and Portugal, and 12 copies of the *Columbian Navigator*. Becher also arranged for other works, such as three copies of Dalbe’s *Theatre of War in Italy* to be bound, showing how important binding was for the protection of charts and other valuable works to the Hydrographic Office.¹²²⁶

Sailing directions

The compilation and printing of sailing directions was often as laborious as the time it took to survey, compile and engrave a chart, as usually they were compiled by one man. The publication of sailing directions by the Hydrographic Office had been introduced by Dalrymple, continued by Hurd and then formalised into a standard size of volume by Parry publications of 1825 and 1829; for a list of volumes published by the Hydrographic Office and bought in see Appendix 15. However, producing a

¹²²³ The figures for 1824 and 1825 in the original do not correspond with the months given. The order they appear here is in the order they appear in the original, ignoring the attempted amendments in the original.

¹²²⁴ Half year only.

¹²²⁵ TNA, ADM17/28, Hydrographic Office accounts, 1818-1823.

¹²²⁶ UKHO, OD814, Becher’s journal, 30 March to 1 November 1827.

worldwide coverage of uniform sailing directions was not achieved overnight and certainly not by Parry, an idea which Hurd was well aware of. A significant part of the world had been worked upon by Dalrymple's successor at the H.E.I.C., James Horsburgh, who had taken 20 months compiling his 'Directory for the Navigation from England to India, throughout those seas, and back to Europe'. When he wrote to Hurd in August 1808 he estimated it would take three or four more years to finish it, but Hurd and other naval officers urged him to complete it as soon as possible. Hurd even placed an advanced order for 100 copies and Columbine suggested that it should not be sold for less than 2½ guineas.¹²²⁷ After inspecting the work Horsburgh wrote to Hurd on 20 April 1809 informing him of the publication of part that covered 'the navigation for the outward passage, the whole of the western parts of the India Seas, Red Sea, Persian Gulf, and Bay of Bengal; also directions for Bass Strait, West Coast of New Holland, the River Plate, and principal ports on the coast of Brazil'.¹²²⁸ Hoping for support from the Lords of the Admiralty he was not disappointed. The second part appeared in 1811¹²²⁹ and with virtually no effort at all Hurd was able to supply a significant coverage of the globe to the Fleet.¹²³⁰

Buying in such volumes was easy but publishing them under the Admiralty Board was another matter. Approval for the publication of volumes of sailing directions had to be obtained from them and during Hurd's term as Hydrographer numerous volumes were issued. The introduction of Horsburgh's *India Directory* may explain why Hurd only revised and reprinted two of Dalrymple's nautical memoirs,¹²³¹ although Parry was still issuing Dalrymple's 'Remarks to and from East Indies' in 1827.¹²³² Other additions came in piecemeal, such as a book of remarks and views of the coast adjacent to the Loire by Captain Brokes, which Hurd recommended would be 'for the general good of the Naval service' in 1809.¹²³³ Both Hurd and Parry regularly bought in similar material, eventually building up a significant body of directions for areas that included Brazil (1818),¹²³⁴ Jersey and Guernsey (1819), Nova

¹²²⁷ BL, IOR MSS EUR F305/1 f.181, Horsburgh to Hurd, 25 August 1808.

¹²²⁸ BL, IOR MSS EUR F305/1 f.181, Horsburgh to Hurd, 20 April 1809.

¹²²⁹ Cook, 'Horsburgh, James (1762–1836)' [accessed 28 Sept 2008].

¹²³⁰ TNA, ADM17/28, Hydrographic Office accounts, 1818–23. In 1819 Hurd paid £69 15s 10d for 'India chart and Directory supplies'.

¹²³¹ Cook, 'Alexander Dalrymple', 208.

¹²³² UKHO, MLP 5/5Aii.

¹²³³ TNA, ADM12/139.

¹²³⁴ J.F. Dessiou, *The Brazil pilot; or, sailing directions for the coast and harbours of Brazil, by Messrs. Warner and Harris, Masters, R.N.; including an account of the prevailing winds in the Atlantic and*

Scotia (1822), North Atlantic, St George's Channel and the English Channel (1828).¹²³⁵ In addition to which can be added the reprints of earlier works published by Dalrymple, such as his *Collection of papers concerning the navigation, winds and weather at the French Islands Mauritius and Bourbon* and *A description of the island called St Paulo*, both reprinted in 1809.¹²³⁶ Also in those early years appeared a publication by a combination of various authors' directions and remarks covering the Baltic, resulting from British operations during the previous decade.¹²³⁷ Although the volume has no single author or publisher's imprint, it was printed by Ballintyne and Byworth in 1811 and contains two sailing directions printed by Winchester and Son that appear to have been issued by Hurd; it was most likely this volume that was claimed by Parry to have been published by the Hydrographic Office that was still being issued in 1827.¹²³⁸ With the production of that volume and one along similar lines for use by the Western Squadron in 1809, Hurd effectively created the forerunner of the compilation volumes issued by Parry but in a different format.

Of sailing directions that were published by Hurd there were many notable volumes. The expression 'from humble beginnings' aptly describes the production of sailing directions during that period, which started with a flurry of activity in 1809, including Captain Kent's *Harbour of Port St Vincent*¹²³⁹ and finished with arguably the most prolific, *i.e.* White's English Channel directions of 1822,¹²⁴⁰ only to have the latter 'thrown upon the shelf' and not issued.¹²⁴¹ In 1822 Hurd paid £463 8s for the paper and printing of 750 copies of White's *magnum opus*, which was probably the largest single print run of any book that was published by the Hydrographic Office up to that time.¹²⁴² White's work pushed the boundaries of sailing direction publication.

Ethiopic Oceans, with directions for navigating from the English Channel, to the coast of Brazil, Cape of Good Hope, St. Helena, the Madeira, Canary, Cape Verde, and Azore or Western Islands; also, particular directions for the River Plate, by Capt. Peter Heywood, on H.M.S. Nereus (London, 1818).

¹²³⁵ TNA, ADM17/28, Hydrographic Office accounts, 1818-23.

¹²³⁶ Cook, 'Alexander Dalrymple' vol.2, 645-6.

¹²³⁷ J. Black, *The British seaborne empire* (Yale, 2004), 156.

¹²³⁸ AL, *Baltic Seas. Directions and remarks for the better navigating those seas. As made and collected by various Naval officers, in the course of service, during the years 1808 & 1809* (London, 1811); UKHO, MLP 5/5Aii.

¹²³⁹ Cook, 'Alexander Dalrymple' vol.2, 647. For details of other volumes published by Hurd in 1809 see Appendix 15.

¹²⁴⁰ TNA, ADM17/28, Hydrographic Office accounts, 1818-23. See Chapter Four for details of White's contribution to science.

¹²⁴¹ TNA, ADM1/1579/109, White to Graham, 7 June 1831. I am indebted to Paul Hughes for sending me this reference.

¹²⁴² TNA, ADM17/28, Hydrographic Office accounts, 1818-23. See Chapter Four for details of White's contribution to science.

He included a 'great variety of foreign matter' of a scientific nature 'into a mere book of instructions', which Hurd had to consult the Admiralty Board for approval before publishing.¹²⁴³ Those larger volumes were not printed in the office as Hurd used 'Haden' (G. Hayden, Little College Street, Westminster) for memoir printing in 1820.¹²⁴⁴ Hurd also published Owen's translation of Marino Miguel Franzini's *Description of the coasts of Portugal* (1814) that was very economic in printing and supply terms, leaving a significant number of volumes for Parry to expand upon.

In 1826 Parry proposed (and effectively put in place) a major change in the publication of sailing directions, which he resurrected when the Lord High Admiral took charge of matters at the Admiralty in February of the following year. Fundamentally he wanted to print as many hydrographical remarks and sailing directions that were in the office which were suitable for issuing, as (like surveys) there was a backlog of material waiting to be published. Whilst Becher had been arranging the remark books that had accumulated in the Admiralty (from the 1750s), he brought to Parry's attention the problem and could well have suggested the idea himself.¹²⁴⁵ Parry also had some involvement in the assessment of sailing direction material as he wrote of one remark book in September 1826 how it contained a 'good deal of new and useful matter . . . the principal part appears to be a compilation directly from the remarks and observations of Mr DeMayne'.¹²⁴⁶

Simply transcribing those remarks, printing them and issuing them was not going to be possible as Parry wanted to make volumes that contained all of the latest data, not just one source. He pointed out how a 'judicious compilation' of some of those materials was needed and how the whole process would be made more efficient if it was carried out by Becher whilst he was sorting through the remarks. By publishing the material Parry identified five advantages for the Admiralty. First, by quashing the frequent complaints of material being sent in to the Admiralty that was not made any use of, and secondly, by selling copies to the public so part (if not all) of

¹²⁴³ UKHO, LB1 fos 467-8, Hurd to White, 23 February 1822.

¹²⁴⁴ TNA, ADM17/28, Hydrographic Office accounts, 1818-23.

¹²⁴⁵ Parry informed their Lordships that there was 'a great deal of valuable information; a very small proportion of which has ever been made use of, in any shape whatever. The most important information of this kind is contained in numerous books of original sailing directions, as well of our own surveyors (Spence, Mackenzie, Captns. Hall and White, Messrs. Thomas and de Mayne &c) as by those of foreign countries, more especially such as have been transmitted from the Hydrographical Office at Copenhagen (UKHO, MLP 5/3ii, Notice respecting the establishment &c of the Hydrographic Office 1 February 1827 by Captain Parry).

¹²⁴⁶ UKHO, MP47, Parry to Cockburn, 11 September 1826.

the costs could be recovered. Thirdly, a benefit for the Navy would eventually come when officers could see what was published and then report any additions or errors, rather than sending in duplicate material. Fourthly, Parry thought that it would also

. . . deter officers from sending erroneous or careless remarks, when they know that what they do transmit is liable to be acted upon, and published upon their individual authority – thus increasing the responsibility which attaches to them in this important matter.¹²⁴⁷

Finally, he also optimistically hoped that the officers who sent in the remarks

. . . would be very glad to employ their leisure in assisting us to make the publication complete without any other reward than that of seeing their labours thus noticed and rendered useful.¹²⁴⁸

He thus provided overwhelming arguments for adopting his proposal.

More importantly from a planning perspective he proposed that all the volumes should be produced in a ‘uniform manner, as to size’, with revisions easily bound in as issued on a yearly basis, which was the forerunner of the ‘supplements’ issued much later under Beaufort. Key to what was the most important factor, its content, was the instruction given to surveyors in preparing sailing directions to accompany their charts, drawing on their accumulated local knowledge.¹²⁴⁹ Therefore Parry wrote to Sir Edward Owen in April 1828 asking him to approve a proposal ‘to invite Captain Smyth to draw up a hydrographical memoir for the Mediterranean Sea’.¹²⁵⁰ Parry knew that although Smyth had sent a considerable number of remarks into the office, they did ‘not constitute one tenth part of the materials of this kind in his possession’.¹²⁵¹ Smyth was the best person to undertake the work, due to the time he had spent in the Mediterranean and the fact that he was not employed on

¹²⁴⁷ UKHO, MLP 5/3ii, Notice respecting the establishment &c of the Hydrographic Office 1 February 1827 by Captain Parry.

¹²⁴⁸ UKHO, MLP 5/3ii, Notice respecting the establishment &c of the Hydrographic Office 1 February 1827 by Captain Parry.

¹²⁴⁹ Parry suggested using men who had ‘been occupied for years in the examination and delineation of a definite portion of coast, and has been accustomed to compare, upon the spot, the various authorities (where any exist) and to supply the deficiency where there are none – must, of necessity, be better qualified to draw up practical directions for that particular portion of coast, than any other individual whatever’ (UKHO, MLP 5/3ii, Notice respecting the establishment &c of the Hydrographic Office 1 February 1827 by Captain Parry).

¹²⁵⁰ UKHO, MB1 f179, Parry to Owen, 8 April 1828.

¹²⁵¹ UKHO, MB1 f179, Parry to Owen, 8 April 1828; *Ibid*, LB2 f.124, Parry to Smyth, 11 April 1828.

hydrographic duties at that time, but found to be working in his observatory at Bedford on astronomical matters.¹²⁵²

To get such a grand scheme resourced, experienced men were needed to undertake the compilation of such volumes, therefore Parry recruited two men, Lieutenant J.S. Roe¹²⁵³ and J.F. Dessiou, a master in the Navy. Roe was chosen because he was a good surveyor and draughtsman ‘and writes clearly’, whereas Dessiou had ‘for many years been accustomed to this kind of compilation; and is well acquainted with the navigation of many parts of the World’.¹²⁵⁴ Despite being written to on the 27 February 1827 Roe did not start straight away as he had been ill and his contribution was minimal, although he is credited with compiling *The Australia Directory; volume I* published in 1830.¹²⁵⁵ However, Dessiou’s addition to the staff of the Hydrographic Office paid dividends for the Navy. Not only did he contribute to Parry’s publication programme for sailing directions, but he went on to make a significant contribution to the publication of tidal data. Although the Hydrographic Office did not produce its own tide tables during this period (which could be considered a failing of both administrations), and the Royal Society did not establish a ‘Tidal Committee’ until 1832,¹²⁵⁶ Dr Whewell (1794-1866), Master of Trinity College, nevertheless considered Dessiou’s ‘labour and judgement’ was as important as any on astronomical observations.¹²⁵⁷ For Dessiou this was a good turn in fortune as he had been declared bankrupt in February 1821.¹²⁵⁸

¹²⁵² UKHO, MB1 f179, Parry to Owen, 8 April 1828.

¹²⁵³ See M. Uren, ‘John Septimus Roe (1797-1878)’, *Australian Dictionary of Biography*, 2 (Melbourne, 1967), 390-2.

¹²⁵⁴ UKHO, LB2 f.111, Parry to Roe and Dessiou, 27 February 1828. Dessiou had revised many sailing directions, including Michael Lane’s sailing directions for north east America, from which three volumes were published in 1810. He also worked on volumes for the Mediterranean and the English Channel before joining the Hydrographic Office (P. Hughes and A.D. Wall, ‘The Dessiou hydrographic work: its authorship and place’, *The International Journal of Maritime History* 17:2 (December 2005), 167-92).

¹²⁵⁵ Roe was still not in the Hydrographic Office a month later and according to a note by Parry both he and Dessiou started on 2 April 1828 (UKHO, MLP5/5B). Roe was destined for Australia by the end of the year so could not have achieved very much (UKHO, LP1857 B216, Roe to Parry, 21 March 1828). Included with this letter is a certificate from Best to Parry, of the same date, stating Roe’s poor health. Roe’s letter of acceptance is at the UKHO, LP1857 R320. For a list of officers involved in the editing of sailing directions from 1828 see J.S.N. Pryor, *A record of officers employed in revising Admiralty Sailing Directions (including details of the books and supplements they have revised) 1828-1982* (Taunton, 1983), 31.

¹²⁵⁶ Reidy, ‘The flux and reflux of science . . .’, 145.

¹²⁵⁷ H. Raper, *The practice of navigation and nautical astronomy*, 4th edition (London, 1852), fn. table 15.

¹²⁵⁸ *London Gazette*, 13 January 1821. For further information on Dessiou see Reidy, ‘The flux and reflux of science . . .’, 20-1, 63, 84, 92.

Parry also received help in his quest to produce sailing directions from an offer by Captain Symonds to work at home, outside of the Admiralty, to compile a volume of directions for the Adriatic.¹²⁵⁹ This meant Symonds having access to material in the Hydrographic Office, but as he lived in Jersey Parry sent him ‘all the information whether contained in charts, or ships remarks, which this office can furnish’ in June 1828.¹²⁶⁰ Working at such a distance Parry also had to send Symonds detailed instructions regarding the layout of his work, including an example of a sheet of letterpress, and in return expected him to send in progress reports no longer than six weeks apart.¹²⁶¹ This acceptance of an offer to prepare a volume covering the Mediterranean impinged on Smyth’s territory, but as materials had not been forthcoming from Smyth what choice did Parry have but to take up the offer from Symonds? Thus Parry sent him a box containing 9 charts, 49 remark books (dating from 1808 to 1827), *A Treatise on the Currents in the Gulf of Venice* by Luccio and three manuscript books of directions from Sir Thomas Troubridge.¹²⁶² Initially Symonds was to receive no recompense for his labours,¹²⁶³ but although the work had not been published by the time Parry left,¹²⁶⁴ the Hydrographer had established the compilation of sailing directions both in and outside of the Admiralty.

The publication in 1829 of *The West India Directory; volume I* has been mistakenly regarded by many as first volume of sailing directions to have been published by the Hydrographic Office. It cannot even be claimed to be the first compilation of numerous sources into one narrative and then issued by the office. Although it contained material from Captain Columbine, Brigadier D. Joaquin Francisco Fidalgo and ‘British officers employed on that coast’, the *Memoir on the Navigation of South America, to accompany a chart of that station* (1825) also contained remarks on ports on the South American Station ‘selected from the various materials transmitted by different officers, from time to time, to the Admiralty’.¹²⁶⁵ In

¹²⁵⁹ UKHO, MB1 f.185, Owen to Parry, 22 April 1828.

¹²⁶⁰ UKHO, LB2 f.149, Parry to Symonds, 12 June 1828.

¹²⁶¹ UKHO, LB2 f.149, Parry to Symonds, 12 June 1828.

¹²⁶² UKHO, LP1857 S726, Symonds to Parry, 21 June 1828.

¹²⁶³ UKHO, MB1 f.185, Owen to Parry, 22 April 1828.

¹²⁶⁴ The work had not been published over a year later as Beaufort wrote to Symonds asking for a progress report (UKHO, LP1857 S728, Beaufort to Symonds, 20 November 1829). Symonds submitted a 77 page manuscript in the following year to Beaufort who had the work referred to Captain Smyth (through John Barrow), but it was not published (UKHO, MP80 fos 1-77, Sailing directions for the Adriatic by Captain W. Symonds, 1830).

¹²⁶⁵ Hydrographic Office, *Memoir on the navigation of South America, to accompany a chart of that station* (London, 1825), iv.

1829 when Parry left the office there was in place both the manpower and logistics to produce the worldwide coverage of standard volumes of sailing directions, which Dalrymple and Hurd had longed for, and Parry had been able to put in place. Beaufort continued with this scheme and issued *The Australia Directory; volume I* in 1830 compiled from British and French sources,¹²⁶⁶ from which step the United Kingdom Hydrographic Office now publishes a worldwide series in 74 volumes.

Translations

Some volumes covering foreign waters were unsurprisingly in the language of those countries which had a territorial claim to all or part of those waters. Before supplying such volumes Hurd put in place a policy to have them professionally translated into English, as every officer at sea would not have sufficient knowledge of Danish, Portuguese or even French, for example, to enable them to use those directions accurately. However, finding accurate translators was not always easy, especially as navigational texts contained a significant amount of technical information which had to be understood to enable an accurate translation. Dalrymple had also noted the difficulty in obtaining translations, especially Danish language material. He lamented how ‘a Person once offered to translate them, but his demands were so exorbitant, and his ability so questionable, that I could not recommend that he should be employed’. But Danish was not the only problematic language and he thought a person, or persons, should be employed to translate Dutch, Danish, Swedish, French, Spanish, Portuguese and Italian.¹²⁶⁷

Despite Dalrymple’s reservations and suggestions, in 1814 Hurd managed to publish a significant translation made by Owen of Franzini’s description of the coast of Portugal, which had previously been printed at the Royal Press in Portugal two years earlier. This planned pro-active approach was continued by Hurd, who partly resolved the Danish problem by paying Donovan £31 10s for ‘chart supplies and translations from the Danish’ in 1818 and £200 in the following year¹²⁶⁸ when the issue came to light again during Hurd’s correspondence with Löwenörn.¹²⁶⁹ Fortunately for Parry his Danish counterpart had translated a sailing direction of the

¹²⁶⁶ Hydrographical Office, *The Australia Directory; volume I. Containing directions for the southern shores of Australia, from Cape Leeuwin to Port Stephens, including Bass’ Strait and Van Diemen’s Land* (London, 1830), iii.

¹²⁶⁷ TNA, ADM1/3522, Dalrymple to Pole, 10 October 1807.

¹²⁶⁸ TNA, ADM17/28, Hydrographic Office accounts, 1818-1823.

¹²⁶⁹ UKHO, LB1 fos 260-1, Hurd to Löwenörn, 30 December 1819.

western coast of Greenland which he sent to London in 1825, but even Löwenörn had to confess his anxiety that his translation was ‘not so correct, as for the language and orthography, as I could wish, but I beg your indulgence in hope it may be sufficient [*sic*] intelligible’.¹²⁷⁰

Translations appear to have been made more on an as needed basis with £25 being paid for translating a Spanish book in 1823.¹²⁷¹ But such payments prove that some if not all of what needed translating was translated, taking in hand the specific needs of the office, as opposed to an unsolicited Spanish translation sent to the Admiralty Board in 1816 which turned out to be of little value.¹²⁷² The Admiralty had employed a translator of French and Spanish in 1810 at £100 per year,¹²⁷³ but it is not clear whether that person was working for the Hydrographer as he did not appear under his contingent expenses. Similarly St Amand’s talents as a potential translator were put to the Admiralty Board in 1812 when his employment would be ‘found extremely useful to the Naval Service’, avoiding the necessity of going to the trouble of finding and procuring the services of other translators.¹²⁷⁴

By 1827 Lieutenant Badgley, who had been employed to complete Owen’s charts of Africa in 1826,¹²⁷⁵ was translating Baron Roussin’s *Memoir of the coasts of Africa and Brazil*. The Admiralty Board took an interest in Badgley’s work as Croker suggested it should be abridged and Becher thought it should be combined with Napier’s work, which also covered the coast of Brazil.¹²⁷⁶ Becher’s idea of combining different sources was in line with Parry’s plan to include multiple reports into single volumes. However, the old concerns over the quality of translations was evident when Becher examined Badgley’s work. Becher found ‘a sentence I am entirely at a loss to understand the meaning of’ having spent some time trying to resolve it, he had to return it along with another small section ‘to render it more distinctly’. More worryingly Becher had to ‘very materially’ alter the language of the text to make it

¹²⁷⁰ UKHO, LP1857 L396, Löwenörn to the Hydrographic Office, 19 December 1825. A volume of directions for Iceland had been translated under the inspection of Löwenörn and was received by Hurd on 29 June 1821 (Admiralty Library, Ub.D.20).

¹²⁷¹ TNA, ADM17/28, Hydrographic Office accounts, 1818-23.

¹²⁷² UKHO, LB1 f.37, Hurd to Wade, 8 April 1816.

¹²⁷³ House of Commons, *The ordinary estimate of His Majesty’s Navy for the year 1810* (London, 1810), 1.

¹²⁷⁴ TNA, ADM1/3458, Hurd to Yorke, 13 February 1812.

¹²⁷⁵ TNA, ADM12/239.

¹²⁷⁶ UKHO, MB1 f.104, Minutes of Lieutenant Badgley’s translation, 7-11 April 1827. J. Napier was a master in the navy and his chart of the entrance to the harbour of Rio de Janeiro and the adjoining coast, made from his own observations whilst on board H.M. ships *Spartiate*, *Wellesley* and *Jaseur* from 1824 and 1826, was in the Hydrographic Office at that time (UKHO, E426 shelf Af2).

ready for the press. This required a further stage in its production to be introduced and another when Becher requested Badgley to bring in the French original to the office so Becher could read his revision whilst Badgley compared it to the original and his translation.¹²⁷⁷ From start to finish Becher took 53 calendar days to process Badgley's work, which was the single most time consuming publishing activity during that period when Becher was temporarily Hydrographer. The work was eventually published after Becher had finished checking the proofs on 1 June 1827,¹²⁷⁸ being printed by Duckworth and Ireland, 76 Fleet Street for His Majesty's Stationery Office, who were also asked for an estimate for printing 500 copies of Bullock's Bonavista Bay in 1828.¹²⁷⁹ Translating foreign language material became a regular occurrence, especially as the number of foreign hydrographic offices increased and more publications were received that needed the attention of an experienced translator.

Notices to Mariners

The production by the Admiralty of notices of navigational importance, or 'notices to mariners' during this period has been overlooked. The concept of a formal series of numbered notices informing mariners of changes to the charts produced by the Hydrographic Office was something that was sadly lacking during this period. However, because there was no 'series' of numbered notices this did not stop both Hurd and Parry producing updates to charts using such a pseudo-concept. This was done in two ways, as textual notices and as small extracts of charts (or 'blocks') to be pasted down onto the corresponding area of the chart.¹²⁸⁰ The Hydrographic Office appears to have had little involvement in the production of textual notices, apart from an advisory role, as records of circulars issued contain more notices than have survived in the records of the Hydrographic Office. Conversely the production of blocks was almost exclusively under the Hydrographer's control, especially during the second half of Parry's term when many references are made to printing notices and blocks in the Hydrographic Office. This suggests that at some time during this period the responsibility for issuing notices might have changed from the Admiralty (system) to the Hydrographer.

¹²⁷⁷ UKHO, LB2 f.80, Becher to Badgley, 4 May 1827.

¹²⁷⁸ UKHO, OD814, Becher's journal, 1827.

¹²⁷⁹ UKHO, LB2 f.185, Parry to Duckworth, 27 August 1828.

¹²⁸⁰ For details of the supply of both items see Chapter Seven.

PORT OF PASSAGES.

A ROCK has been discovered about fourteen feet beneath the Surface of the Low Water, in the entrance to the Harbour of Passages.

It lies, in the fair way of a Ship going in, just within the Outer Warning Buoy, where, in the Chart published for the Admiralty from TOFINO'S Survey of the Port, the first Soundings of four and three quarter fathoms are marked.

J. W. CROKER.

Illustration 6.8 A notice to mariners issued through the Admiralty circular system on 23 February 1814 (TNA, ADM2/1084)

One such textual notice issued directly by the Hydrographer covered five dangers off the Irish coast and contained information ranging in date from 1807 to 1822. It was issued because he did not hold the original copper plates of Mackenzie's charts of the area to be able to correct them, so he had to issue a paper notice instead (see illustration 6.9). He only printed information on dangers that were incorrectly marked or not noticed on the charts, and the notice was included in the appropriate chart boxes.¹²⁸¹ This inclusion of different dated material, from a wide geographical area, shows how internal office records (now lost) must have included some rudimentary system, at least, for recording errors on charts to be taken up for correction when an opportunity arose. It is worth noting how this notice was not included as an Admiralty circular, showing how at that time the two systems (if they can be considered as such) were running in tandem.

¹²⁸¹ UKHO, LB1 fos 481-2, Hurd to unnamed recipient, 10 April 1822.

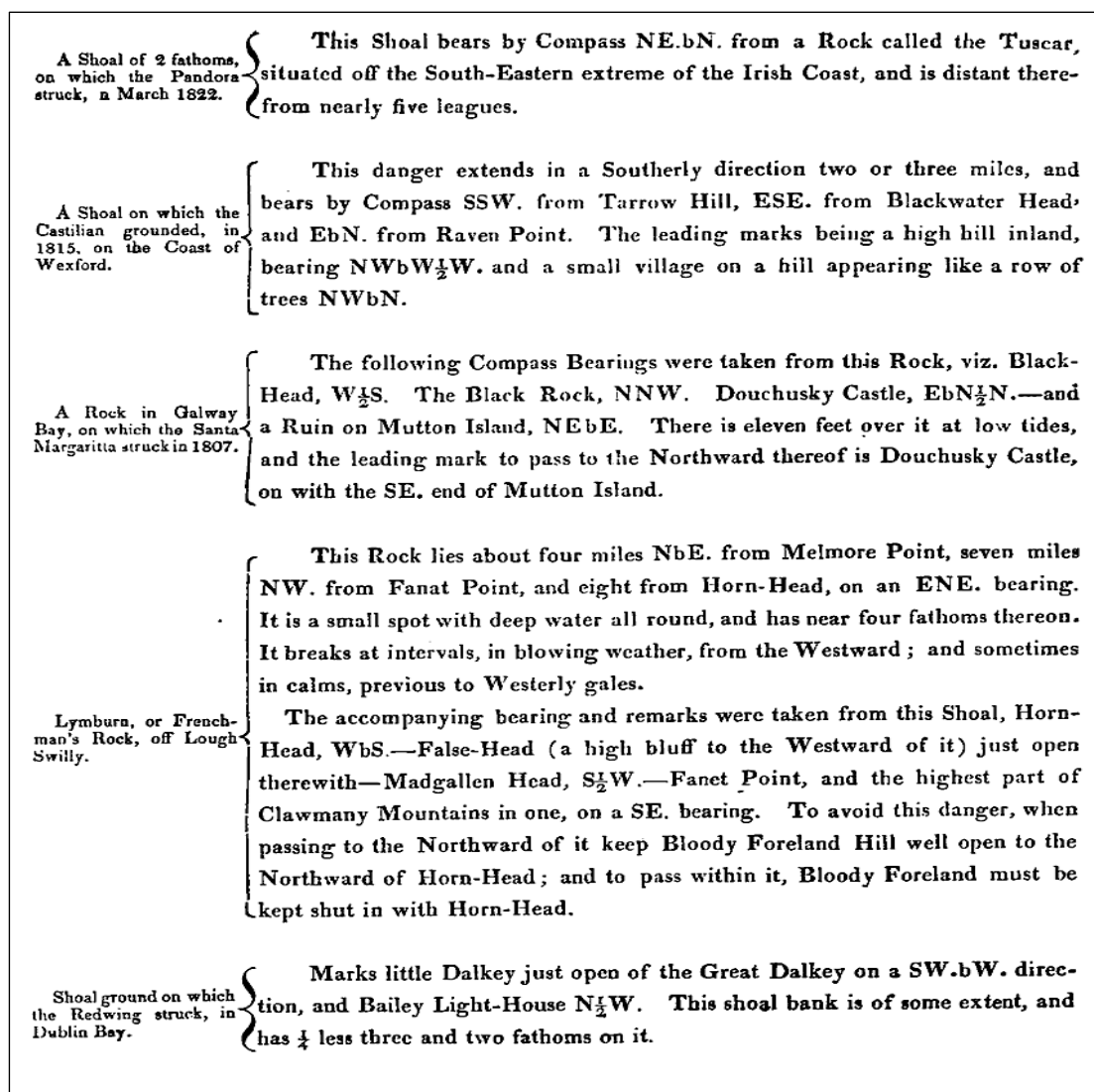


Illustration 6.9 A notice to mariners issued by Hurd in 1822 (UKHO, LB1 fos 481-2)

Notices were also produced using lithography in 1828, such as the rock observed by Captain Dixon that was issued to His Majesty's ships.¹²⁸² To accompany the notices a standard letter was also lithographed, that was sent out from at least the 31 December 1828.¹²⁸³ This quick but inferior quality method, compared to engraving, was ideal for such a publication. There was also a growing use of adding information to charts by pasting on small sheets, not just of small sections of charts but positional data as well. Here was another example of the quest towards more accurate charting and in Illustration 6.10 can be seen details of prominent islands and headlands given in their correct position as of 1829 pasted on to the chart.¹²⁸⁴

¹²⁸² UKHO, LB2 f.229, Parry to Brocklebank, 19 December 1828.

¹²⁸³ UKHO, LB2 f.236, notices dated 31 December 1828.

¹²⁸⁴ UKHO, OCB 354 A1.

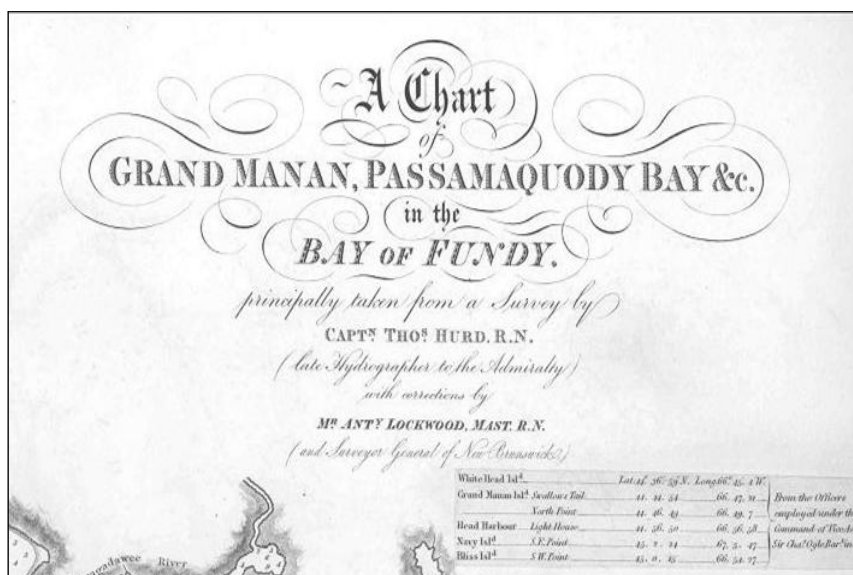


Illustration 6.10 A pasted on note (in the bottom right hand corner) detailing the positions of the main geographical features in the chart (UKHO, OCB 354 A1)

Alongside the issuing of corrections was the business of correcting the image on the copper and it was principally the Hydrographer (supported by Walker and Sheringham) who carried out the assessment of information and drew up instructions for those corrections. But in 1826 Parry was instructing Mr Walker to effectively read through a remark book and make use of any information ‘in correction of the charts’.¹²⁸⁵ As the number of charts in the Admiralty series grew so did the amount of work correcting them. In one week during May of 1829 for example, Higgins, a draughtsman in the office, was employed inserting additions and corrections into the Office store charts of Parga to Kaiapha, St Margarets Bay (Nova Scotia), the West Indies and South America. At the same time the engravers were working on corrections and additions to the general chart of Australia, as well as adding corrections and new Russian surveys to the Polar chart.¹²⁸⁶ Thus chart correcting was underway involving one draughtsman and at least one engraver, but the downside to this was the knock-on effect for the production of new charts. As more time was being spent correcting there were less resources available for new engraving.

In his article on ‘The development of Admiralty Notices to Mariners and Radio Navigational Warnings’, Ritchie made no mention of anything before 1832.¹²⁸⁷ Similarly Magee wrote in 1968 how ‘there was no system for correcting charts before

¹²⁸⁵ UKHO, MP47, Parry to Walker, 11 September 1826 or later.

¹²⁸⁶ UKHO, ADM1/3470 Parry to Barrow, received 13 May 1829.

¹²⁸⁷ G.S. Ritchie, ‘The development of Admiralty Notices to Mariners and radio navigation warnings’, *The Journal of the Institute of Navigation* XI:4 (1958), 396-403.

the 1830s',¹²⁸⁸ which was not entirely correct. Information finding its way into the Admiralty had two avenues through which it could be systematically handled and disseminated as a 'notice' to the Fleet. The system was eventually standardised under Beaufort, but it had its origins in the Admiralty under Dalrymple, with expansion under Hurd and Parry.

Conclusion

Chart production was the bread-and-butter work of the office and a great deal of responsibility fell upon John Walker to produce what was needed. By 1814 the collective efforts of Dalrymple and Hurd amounted to at least 104 new charts,¹²⁸⁹ which was a good foundation from which to work upon in the following years of peace when more time was available. During that time the use of lithography was ideal for temporary objects, but the question must be asked 'how did Hydrographers in the first half of the nineteenth century define which charts were really less important than others?'. Loney's chart of Exmouth was produced using lithography, but when consideration is given to the amount of trade that passed Exmouth to and from Exeter, then classing his chart as a temporary one was dubious at least. Nevertheless lithography was a useful addition to the production resources in the Hydrographic Office.

Although many charts were published on a piecemeal basis, the concept of scheming was well and truly established during this period. However, although it was always the intention to publish charts which had been schemed, this was not always the case; a scheme of charts covering the whole of the Bristol Channel was prepared, probably in 1824 or 1825, to fill a significant gap in the charting of Home Waters but was never published. This was a classic example of the failures and achievements of the production process that had evolved by the mid-1820s. On the positive side it was a good scheme of charts for coastal navigation on three sheets, with a slightly small overlap utilising¹²⁹⁰ the best available source materials in the office, with the topography from Ordnance Survey mapping (which had been supplied as manuscript

¹²⁸⁸ G.A. Magee, 'The Admiralty chart: trends in content and design' in *The Cartographic Journal* (June 1968), 29.

¹²⁸⁹ BL, Maps C.21.c.15 List of charts presented to the British Museum, 1814; A.C.F. David, *A catalogue of charts, plans, and views, printed at The Admiralty Office, for the use of His Majesty's Navy in 1814* (Taunton, 1991).

¹²⁹⁰ UKHO, survey E143/1-3.

tracings) and the hydrography from two separate surveys, a naval one of 1771-2¹²⁹¹ and a commercial one of 1815.¹²⁹² However, this careful piece of work was for no obvious reason, apart from another survey of part of the area being undertaken in the 1820s by White, never published by Parry. Whether it was put to one side to make way for Owen's Africa work and forgotten about is only speculation. What made matters worse was the appointment of a chart agent in Bristol in 1827¹²⁹³ who would have been able to sell copies to local chart users, had it been published. Thus can be seen a disconnect between the life of a chart, from its conception, through scheming to compilation, but alas no further, although a local point of sale had been established. Such were the teething problems during the transition towards a fully schemed chart series with worldwide sales.

Like many areas of hydrographic administration, production was one of extremes and inevitable problems, with the introduction of new ideas and technologies being no exception. All ideas, even existing processes, were challenged in order to find the most efficient and cost effective way of undertaking them, especially during Parry's reforms in the 1820s carefully watched over by the Admiralty Board.

¹²⁹¹ UKHO, survey 640. This only covers the western half of the scheme from Cardiff to Lundy. From Lundy to Portishead there is no survey in the UKHO archive covering this area and it is most likely compiled from Lieutenant M. Mackenzie junior's survey that was once in the Hydrographic Office but is now lost.

¹²⁹² UKHO, 804 shelf 37c. This covers the area from Portishead to Gloucester.

¹²⁹³ UKHO, LB2 f.84, Parry to King & Son, 26 September 1827.

Chapter 7

Supply to the Fleet

Charts

The main item supplied by the Hydrographic Office to the Fleet throughout the period of this study was the navigational chart.¹²⁹⁴ The situation prior to 1800 (when the Admiralty did not produce its own charts) was one that saw few being supplied directly to the Navy. In the 1770s 100 sets of Des Barres' charts of North America were supplied (through Lord Howe's initiative) to ships on the American Station,¹²⁹⁵ but this was exceptional. Dalrymple is known to have discovered during his arrangement of printed charts in the Admiralty, between 1795 and 1800, a cache of hundreds of duplicate charts dating from 1748 to 1793.¹²⁹⁶ From those multiples only six vessels could have been supplied with all 28 charts, but the problem was that those charts did not offer complete coverage of any particular region, but it was a start. As only 20 proof copies were initially made by Dalrymple from new charts produced in the Hydrographic Office it is not surprising they were also not used for mass supply purposes. Subsequently after 1800 Dalrymple was in a far better position to be able to supply charts from the numerous duplicates he had identified, from each of his own H.E.I.C. plates which he managed to persuade the Admiralty to purchase 100 pulls, as well as from the growing number of new charts he had ordered to be engraved.

Key to the Admiralty being able to supply all its ships with charts was the formation of the Chart Committee in November 1807, who recommended in the following year that all Royal Naval ships should be supplied with charts from the Hydrographic Office.¹²⁹⁷ Therefore armed with the Chart Committee's report, a fully functioning printing outfit and a reasonable number of duplicate charts in hand (see Appendix 16), Hurd was on the front foot, but in comparison with countries such as France and Portugal he was many years behind.¹²⁹⁸ Subsequently there was an odd

¹²⁹⁴ This chapter focuses on the supply of charts to the navy. For the supply of charts to the public see the following chapter.

¹²⁹⁵ Evans, *Uncommon obdurate*, 68.

¹²⁹⁶ Dalrymple recorded in the Hydrographic Office multiple copies of charts such as 26 copies of Lewis Morris's coast of Wales from Milford Haven to Conway, to 274 copies of Richard Cowl's Plymouth Sound. The accumulation was not exclusively of Home Waters and the Admiralty had acquired those multiple copies by supporting their publication by granting cash sums in return for multiple copies (UKHO, MLP183). See Appendix 16.

¹²⁹⁷ *The Times*, 30 November 1807, page 3 column c; Robinson, *Marine cartography*, 112; TNA, ADM1/3523.

¹²⁹⁸ TNA, ADM1/3523 Hurd to Pole, 7 July 1809.

situation whereby the Admiralty had paid for new charts to be drawn and engraved, but the paper copies were not then supplied to its ships on a fleet-wide scale, until Dalrymple's departure from office. Nevertheless Hurd started making up as many charts as were needed and put them into boxes for issue to particular stations, although their storage was cumbersome and they were kept in the corridors and printer's room at the Admiralty.¹²⁹⁹ One notable change Hurd made in 1808 when he took over as Hydrographer, was to issue existing charts produced by Dalrymple with a new imprint giving Hurd's name as Hydrographer and the day it was re-issued,¹³⁰⁰ giving the user an indication of a more recent, if not always up-to-date, version of an Admiralty chart. Although this was a small step forward in updating charts, it did not increase the number in circulation and a great reliance was still placed on the private chart trade to provide charts, many of which were based upon surveys Royal Naval officers and masters had compiled. This state of affairs was still prevalent in the 1820s,¹³⁰¹ despite the improvements in the logistics of production which were in place in the Admiralty.¹³⁰²

Complaints about the quality and lack of charts forced the Admiralty to take the decision to supply all the charts each vessel needed, which Hurd was explicitly employed to undertake in June 1808. In that brief period before regulations for the supply of charts was issued to the Fleet there were no clear guidelines how the system should have operated.¹³⁰³ The main method used to transport multiples of charts was a 'chart box' and Hurd wasted no time supplying the same to the Mediterranean Fleet in that same month.¹³⁰⁴ Sir Joseph Yorke wrote to Hurd on 22 September 1808 requesting to be supplied with charts for the 'Flushing Station', asking for them to be sent to him through his admiral.¹³⁰⁵ Hurd had to refer the request to the Admiralty Board, who instructed him to instruct Yorke that his request should be addressed to them and not the Hydrographer.¹³⁰⁶ Clearly every such request could not be dealt with in such a manner as it would have added a significant amount of extra administration.

¹²⁹⁹ UKHO, MB1 f.111, Douglas to Becher, 11 June 1827.

¹³⁰⁰ A.C.F. David, 'Is it Hurd's or Dalrymple's *Channel Atlas*' in V. Scott (ed.), *The Map Collector* (September, 1995), 21-2.

¹³⁰¹ Lamb, 'The London years', 325.

¹³⁰² See Chapter Six covering chart production.

¹³⁰³ Hurd was instructed by the Admiralty Board to 'procure at the cheapest rate in his power and arrange for sets of charts' to be supplied from June 1808 (TNA, ADM1/3523, quoted in Day, *Hydrographic Service*, 23).

¹³⁰⁴ TNA, ADM1/3523 Hurd to Pole, 4 January 1808.

¹³⁰⁵ TNA, ADM1/3523 Yorke to Hurd, 22 September 1808.

¹³⁰⁶ TNA, ADM1/3523 Hurd to Pole, 23 September 1808.

Complaints also came in to Hurd about the quality of supply, such as Sir John Borlase Warren's of being 'very badly furnished with charts of the coast of America and Bermuda Islands'.¹³⁰⁷ Warren was subsequently furnished with 12 'sets' of charts in December 1808.¹³⁰⁸

To avoid further confusion the Admiralty Board issued an order on 27 January 1809,¹³⁰⁹ with printed instructions on 7 February (Illustration 7.1), to captains and commanders of all of His Majesty's ships and vessels covering the administrative process that had to be followed. A receipt had to be given showing the mark and number on each box received, and when a ship arrived on a new station the commanding officer had to arrange delivery of any other boxes for any other station to the resident commissioner. On arrival at a foreign station boxes were to be given to the commissioner in order that they could be checked, to make sure they were as up-to-date as possible. Any chart or charts returned by the commanding officer would be given a receipt and any deficiencies could be charged against that officer 'unless accounted for in a satisfactory manner'.¹³¹⁰ Therefore a reasonably efficient system was quickly in place, but like many new processes that were regularly undertaken errors and omissions would soon come to light.

By January 1809 Hurd had already managed to supply 113 boxes of charts. At that time he suggested to the Admiralty Board how it would be beneficial if 12 sets of charts were sent to the commanding admirals of the East Indies, Cape, Brazil, Jamaica and Mediterranean stations, therefore bringing them into line with the American and Leeward Islands Stations. He had set up general supply depots at Portsmouth and Plymouth from which ships on the Western Station, or bound for the Atlantic, could easily procure the charts they needed; those ports were regularly supplied with new charts to keep their supplies up-to-date. Hurd proposed a similar situation should be set up for the eastern stations, with depots at Deal, Yarmouth and Sheerness being

¹³⁰⁷ TNA, ADM1/3523 Warren to Hurd, 3 October 1808.

¹³⁰⁸ TNA, ADM1/3523 Hurd to Pole, 7 December 1808; *ibid*, Admiralty Board to Hurd, 8 December 1808. The new demands on Hurd also caused him some financial worries and an imprest advance was put in place as a result (TNA, ADM1/3523 Hurd to Pole, 4 January 1808; *ibid*, 3 November 1808).

¹³⁰⁹ TNA, ADM2/1082 fos 83-92.

¹³¹⁰ TNA, ADM1/5122/2, 7 February 1809. See also ADM3/167 for the minute drawn up, with amendments, dated 23 January 1809 and instructions to send 50 copies of the notice to Portsmouth (dated 14 March 1809). The instruction was acknowledged but took over two months to arrive at Simons Bay (TNA, ADM1/63 Tyler to Pole, 20 May 1809. I am grateful to John Day for this reference).

supplied by wagon rather than by coach to save money.¹³¹¹ In reply to his suggestion the Admiralty Board informed him of measures they had already put in place with the dockyard commissioners for chart supply, as well as instructing Hurd to keep detailed accounts of all the boxes issued.¹³¹² At that time charts supplied were sent in locked boxes fastened with two brass hooks, carefully numbered and titled and packed together in a larger box for transportation to the depots. After this lack of security came to the Admiralty Board's notice they ordered Hurd to have locks placed on all the boxes from then on.¹³¹³

Sir,

MY Lords Commissioners of the Admiralty having thought proper to order Sets of Charts, arranged for the different Stations, and packed in Boxes, to be lodged with the Commissioners of the Dock Yards, at Chatham, Sheerness, Portsmouth, and Plymouth, for the purpose of being issued to His Majesty's Ships, on demands being made by their several Captains, approved by the Commanders in Chief of His Majesty's Ships at the said Ports respectively; I have it in command to acquaint you therewith, and to signify their Lordships direction that, when you find it necessary to demand, and shall have received a Box of Charts, you conform to the following Regulations:

You are to give a Receipt for the Charts, specifying the Marks and Numbers on the Box.

Upon the issue of a Box of Charts for any particular Station to the Ship you command, you are to deliver to the Resident Commissioner any Box or Boxes of Charts which you may have received for any other Station.

Whenever you may arrive from any Foreign Station, you are to deliver into the charge of the Commissioner any Box of Charts with which you may have been supplied, in order that the Set of Charts so returned may be examined and compared with the contents of the Set specified in the Box in which they were issued.

You will observe that a Receipt will be given for such Charts only as shall actually be returned by you, the state of which, with any Deficiencies which may appear, the Navy Board are directed to report immediately for their Lordships' information, in order that such Deficiencies may be charged against you, unless accounted for in a satisfactory manner.

Illustration 7.1 The order sent to captains and commanders of His Majesty's ships informing them of their decision to supply them with sets of charts, issued from the Admiralty Office 7th February 1809 (TNA, ADM1/5122/2)

¹³¹¹ TNA, ADM1/3523 Hurd to Pole, 17 January 1809 also briefly touched upon in Ritchie, *Admiralty chart*, 112. The Admiralty order for the supply of ships going to foreign stations to be supplied with a box of Western charts is in TNA, ADM2/1084 f.317.

¹³¹² TNA, ADM1/3523 Admiralty Board to Hurd, 30 January 1809.

¹³¹³ TNA, ADM1/3523 Hurd to Pole, 8 March 1809; *ibid*, Admiralty Board to Hurd, 9 March 1809. It is unlikely that an Admiralty chart box is still in existence as an enquiry at the NMM Greenwich in 2008 did not reveal anything. A collection of Admiralty charts seen by the author at Orchard Wyndham, Somerset in a private house were not in any box but found as loose sheets with no sign of any canvas covers.

One problem with supply, which was a more fundamental issue than the omission of odd charts or volumes in boxes, came to light in 1811. Commissioner Lobb, with the help of the Navy Board, brought a grievance to the Admiralty Board over the subject of supplying ships at Sheerness with charts. Hurd identified that the problem was primarily due to the ‘unavoidable consequence where there is no direct communication between the office for their distribution and that for their selection’.¹³¹⁴ To add to the problem was the fact that supply in those early years caused ‘much irregularity . . . in the manner of their distribution’, when some vessels were only given a few loose charts and others whole boxes, both with no markings or numbering system! Hurd had remedied that last problem in 1809 and to further resolve the issue raised by Lobb he suggested in his usual direct and efficient manner:

either sending some person from this office to examine and make good whatever deficiencies may be found in the returned chart boxes at Sheerness, or, that the commissioner may be directed to have all the loose charts whether on paper or linnen, together with all the boxes that may not have been originally marked with a number, made up into convenient packages and sent by water carriage to Deptford from whence they may with care be conveyed to the office and again be made useful to the service.¹³¹⁵

Subsequently Hurd was ordered to act ‘accordingly’.¹³¹⁶ From such an experience the supply of charts improved, as that episode showed how Hurd not only had the ability to identify problems with the process, but also how to solve them in an efficient way. Despite problems like that being resolved, in November 1812 an Admiralty order was sent to the commissioners at Plymouth, Portsmouth, Sheerness and Chatham not to issue any more boxes of charts ‘having a number on them’. The commissioners had to send them to Woolwich or Deptford from where they were returned to the Admiralty,¹³¹⁷ but why this order was given is unclear, and the return of a potentially large number of boxes must have meant some fundamental problem had come to light.

Parry, who was almost constantly looking for improvements to the numerous systems under his administration, found chart supply to have been no exception. He wrote to George Kingdom, Clerk of the Cheque at Sheerness Dockyard in February 1828, looking for a ‘fresh arrangement’ for the supply of charts to Sheerness and

¹³¹⁴ TNA, ADM1/3458 Hurd to Croker, 13 November 1811.

¹³¹⁵ TNA, ADM1/3458 Hurd to Croker, 13 November 1811.

¹³¹⁶ TNA, ADM1/3458 Hurd to Croker, 13 November 1811.

¹³¹⁷ TNA, ADM2/1083 fos 267-8.

Chatham. He clearly had concerns over the time it took to supply both yards.¹³¹⁸ Kingdom may have been keen to relinquish some of the work of chart supply, as he replied to Parry how there was no need for any charts at Sheerness ‘for foreign stations in addition to that which is kept in store at Chatham’, although he advised that ‘it may be advisable that a few sets for the North Sea, and Channel, should be kept in store at Sheerness’.¹³¹⁹ Such an arrangement was beneficial to the Hydrographic Office and to the dockyards.

A success for Hurd in the supply business was the acquisition of large numbers of impressions from the private chart trade, from which he could afford to be selective and only chose those charts that were fit for purpose. This was made easier by officers who recommended particular charts, such as the *Atlas Maritimas de España*, which was held in ‘high estimation’ by British officers but was difficult to get hold of. Subsequently when it was reprinted by Faden in 1812 it contained five additional pieces of important navigational information, making the English version immediately more valuable than the Spanish original. Faden made a nice living from the Admiralty and when it came to his retirement he sold over 80 plates to Hurd, with an unspecified number of impressions, valued at £3,649 for only £1,000.¹³²⁰ In those early months of the new system (in 1808) it was Mr Arrowsmith who presented the largest bill to Hurd for materials supplied to the Hydrographic Office. His £1,622 8s was almost £200 more than Faden’s bill (£1,438 11s 8½d) and over three times that of Messrs Laurie and Whittle (£487 6s), Mr Heather (£483 12s) and Mrs Steel (£542 3s 6d).¹³²¹ Charts were not exclusively obtained from the private chart trade, as buying in charts and plates for supply occasionally proved cheaper than having to engrave a new plate and making new pulls. Hurd arranged with Flinders in 1811 to use his charts of Australia, even though they were published outside of the Admiralty.¹³²² He also acquired 100 sets of the St Lawrence River from J. Bouchette, which he praised

¹³¹⁸ UKHO, LB2 f.103, Parry to Kingdom, 9 February 1828.

¹³¹⁹ UKHO, LP1857 K134, Kingdom to Parry, 11 February 1828.

¹³²⁰ His bill was one of a small series of papers called ‘Curator’s Papers’ when it resurfaced in 2001 and was indexed, since then it has been re-numbered as MLP 196. A brief account of this transaction can be found in A.C.F. David, ‘Admiralty charts and William Faden’s copper plates’ in *Journal of the International Cap Collectors’ Society* 115 (Winter 2008), 7-11.

¹³²¹ TNA, ADM1/3523 Hurd to Pole, 29 March 1809.

¹³²² Brown and Dooley, *Matthew Flinders private journal*, 349.

very highly to the Admiralty Board and the Royal Society.¹³²³ Similarly Parry saved £17 and a great deal of time by purchasing plates and charts from Mr Anthony Lockwood in 1826, which meant those charts were ready to be supplied straight away.¹³²⁴ Another saving was made when Hurd borrowed a copper plate from one officer, which Parry eventually purchased several years later.¹³²⁵ However they were acquired, those commercial charts supplied to ships soon became known as ‘Admiralty charts’,¹³²⁶ just as much as those printed in the Admiralty.

Those early years must have been difficult, especially with the large number of unprecedented demands for printed charts; therefore Hurd had to be organised. In 1819 he looked back over the period and was able to tell Croker how he ‘arranged and placed in separate Presses the shelves of which being distinctly labelled, no mistake could possibly take place in their delivery and they may therefore be considered in a state of readiness for immediate service’.¹³²⁷ Although the shelves were labelled, there was one small criticism to be held against this element of Hurd’s administration, and that was the lack of a comprehensive unique single numbering system for the charts. His system for the retrieval of charts, and for the preparation of boxes to cover the limits of newly formed stations, would have been a lot more efficient if the charts had been numbered in one single way. Once a chart made it into an atlas it was numbered (as in Illustration 7.2), but between being printed and bound into the atlas there was plenty of room for errors to occur, which partly explains why there are letters concerning missing charts from atlases. The problem hinged upon the introduction of new sheets to an atlas, or when a sheet was totally withdrawn. If someone then referred to ‘Mediterranean 15’ for example, when it may not have been current, or if 15 had been replaced with another 15, of a different area, then confusion would easily have arisen.

¹³²³ Royal Society of Arts, *Transactions*, XXXIII (London, 1815), 248. In the same year Bouchette advertised his cartographic works for sale in the *Liverpool Mercury* (*Liverpool Mercury etc*), 7 April 1815 (Liverpool, 1815).

¹³²⁴ UKHO, MB1 f.40 Minutes on the purchase of copper plates of Nova Scotia, 21-7 April 1826.

¹³²⁵ UKHO, MB1 f.28 Minutes on a copper plate of Fowey, 15 March 1826. The plate was purchased for £45 9s.

¹³²⁶ UKHO, MP40 fos 39-40, Arabin to Hurd, 6 April 1823. In this letter he referred to a chart published by Arrowsmith as the ‘Admiralty General Chart of the West Indies’.

¹³²⁷ TNA, ADM1/3461 Hurd to Croker, 18 September 1819.

C O N T E N T S
OF THE
MEDITERRANEAN ATLAS.

No.	
1	General Chart of the Mediterranean Sea.
2	Coast of Spain and Portugal.
3	Gibraltar to Cape de Gata, and opposite Coast, including the Alboran, and Zaffarine Islands.
4	Cape de Gata to Cape St. Antonio.
5	Cape Nao to Barcelona.
6	Barcelona to the Hyeres Isles.
7	Port of Carthagen.
8	Port of Mahon
9	Coast of France, from Cape Couronne to Cape Sicie.
10	Road and Harbour of Toulon.
11	Road and Isles of Hyeres.
12	Road of Leghorn.
13	Gulph of Ajaccio.
14	Magdalen Islands.
15	Bonifacio, Ogliafter, Terra Nova.
16	Part of Sardinia, Oriftana Bay.
17	Gulf of Palma, in Sardinia.
18	Bay of Naples.
19	Faro of Meffina.
20	Elba and the Formigas, Tunis Bay.
21	Lampidofa, &c.
22	Gulf of Venice.
23	Liefina, Veruda.
24	Fafano and Rovignia.
25	Orfera and Parenzo.
26	Citta Nova, and Paran.
27	Isle of Paros, Tchesme, &c.
28	Scio Passage, and Gulf of Smyrna.
29	Sea of Marmora.
30	Marmorice and Karagatch.

Illustration 7.2 A contents page of an atlas of charts supplied by the Hydrographic Office for the Mediterranean showing the numbering system used in the left-hand column (AL, Vk5)

Examples of the atlas internal numbering system can be seen in Hurd's three sheet chart of the English Channel and also of the North Sea which were numbered 1, 1*, 1**, 2, 2* and 2** respectively,¹³²⁸ with loose charts occasionally referred to by

¹³²⁸ UKHO, MP46 after f.476, slip of paper headed 'Charts for the Channel and North Sea', undated but for the *Channel Atlas*.

their title. An exception to this can be seen in the records kept at Portsmouth, when from 1810 to 1812 the clerk recorded any missing charts by their name and number in the box, e.g. ‘Chart No. 5 Missing’ from a Mediterranean box, ‘Chart 30 Sleeve missing’ and ‘No.1.1.1.1. missing’ from a Channel and Western box.¹³²⁹ This was not a major problem whilst the number of charts in circulation was relatively low, as in 1821 when (at least) 575 had been published since 1800. Appendix 17 shows how by 1829 that figure had risen to (at least) 986, with large additions to charts in the Mediterranean, North America, Australia, West Indies and Africa, causing additional work to update the chart boxes and records of their supply.¹³³⁰ Additional work was also caused by charts having to be replaced when they became lost or damaged beyond repair. One set of charts belonging to one of the boat’s crew of H.M.S. *Venerable* was ‘swamped’ and the ship’s captain had to apply to Hurd for a replacement.¹³³¹ Such losses were inevitable but nevertheless ‘repairing defaced charts’ was time consuming enough to have continually occupied one man for ‘many months’ in 1826, who should otherwise have been working as a draughtsman.¹³³²

After the system had been in place for almost two decades, Parry (in 1826) raised his concerns over the ageing contents of the boxes. In his usual forthright and efficient manner he tackled the problem head on, identifying how the older boxes which had been in circulation since 1809 needed a complete revision. This was achieved by sending a list of the boxes which needed returning to the Hydrographic Office to the dockyard commissioners, as well as instructing all ships which had been in commission for three years or more to return their boxes. By undertaking this program of revision Parry hoped that ‘the supply of our entire hydrographic information will be ensured to every ship leaving the ports’.¹³³³ Such a revision was greatly needed as the supply of charts incurred many errors, on both sides of the operation. One far from isolated example occurred in 1826 when the naval officer in charge of chart supply at Cork (Haulbowline Island) returned the Spanish coasting pilot volumes instead of the Mediterranean equivalent.¹³³⁴ Only when all of the older boxes had been checked could the true scale of the number of errors have come to

¹³²⁹ NMM, POR/L1 Charts issued and received at Portsmouth, 1809-31.

¹³³⁰ UKHO, MLP 5/5B.

¹³³¹ TNA, ADM1/3523 King to Hurd, 4 November 1808.

¹³³² UKHO, MB1 f.76 ‘Remarks on the probable time of completing what is now in office, or very shortly to be expected’, c. November 1826.

¹³³³ UKHO, MB1 fos 84-5, 2 November 1826.

¹³³⁴ UKHO, LB2 f.72, Parry to Kingdom, 1 April 1826.

light. This could have been partly achieved by issuing a form to officers to complete, rather than have them return a whole box of charts.

As the needs of the British Government changed so did the extents and numbers of stations administered within the chart box system. For the Hydrographer this meant the creation of new boxes to cover the needs of those stations. Thus from those early days in 1808, when compared to 1828, the number of stations had changed, but not dramatically. In August 1827, for example, reforms were made of the coverage of boxes with Newfoundland being merged into the American Station, when the Cape and Brazil were classified as South American.¹³³⁵ Appendix 18 shows the station changes and how the number of boxes supplied increased by over 300%, despite the number of ships in commission decreasing over the same period. In those latter years Becher (from September 1826)¹³³⁶ and Sheringham (from June 1827)¹³³⁷ were key to the efficient administration of chart boxes and Parry relied on those lieutenants to take a good deal of responsibility for chart supply.¹³³⁸ This included extra demands from the Admiralty Board to supply captains of every flag ship, going on foreign service, with an additional set of charts for the use of the admiral.¹³³⁹ Changes such as these may account for the confusion over the contents of some boxes, such as Captain Hickey's observation in 1817 regarding charts to the west of Cape Horn that were lacking from his Brazil Station box. Hurd got five sets of 'Pacific' mounted and sent off to him and others on the Brazil Station,¹³⁴⁰ but it is unlikely a 'Pacific' box was created; the Pacific charts should have been in the 'Cape and Brazil' box in the first place.

In January 1829 Parry brought to Cockburn's attention another saving for the Hydrographic Office. He pointed out how 'in consequence of a very useless subdivision' in the arrangement of Home Waters chart boxes, there was a duplication of charts which could be avoided. Thus the Leith and Sheerness Stations were combined into one box called the 'Channel and North Sea', at the same time combining the Plymouth and Portsmouth Stations with the Irish Station and naming it

¹³³⁵ UKHO, MB1 f.115, Minutes on chart boxes, 11 August 1827.

¹³³⁶ UKHO, MB1 f.58, Minute by Croker, 28 September 1826.

¹³³⁷ UKHO OD814, Becher's Journal, 13 June 1827.

¹³³⁸ UKHO, MLP 5/3, Sheringham to Parry, 20 November 1828; *ibid*, MLP 5/5Aiii, Naval assistants' duties, n.d. [c.1828].

¹³³⁹ UKHO, MB1 f.221, Edward Owen to the Admiralty Board, and Admiralty Board to Parry, 10 January 1829.

¹³⁴⁰ TNA, ADM3/189.

the ‘Channel and Western’. The geographical boundary between the two new boxes was the Dover Strait and the proposal was accepted and a letter drawn up to inform the commissioners at Portsmouth, Plymouth and Chatham.¹³⁴¹ Following on from this successful change a month later Cockburn approved a general order for all chart boxes returned by ships to be sent to the Hydrographic Office, without the Hydrographer or his clerk having to write to the commissioners of the dockyards once a month to remind them. The order stipulated how the boxes were to be sent by the ‘first water conveyance that may occur, free of expense’ so they could be revised and made ready for re-issuing.¹³⁴² Although this was only a small monthly saving on the administrative side of things, it meant over eighty less letters needed to be written each year and was yet another step nearer towards a highly efficient service.

The monthly and quarterly ‘returns’ of charts

What appears on the surface was a relationship the Hydrographic Office had with the depots which involved the unnecessary inclusion of the Navy Office for administration purposes. It was from the Navy Office that supplies of the form for the ‘monthly’ and ‘quarterly’ returns of charts were obtained, which (when complete) kept a track of what boxes were where. This accounting system was introduced on 18 March 1813 at Portsmouth, Plymouth, Sheerness, Chatham, Woolwich and Leith,¹³⁴³ with an amendment issued in the following January.¹³⁴⁴ The officials at the ports had to apply to the Navy Office for the forms, then the Navy Office would instruct the Hydrographer to supply them direct to the official in charge at the port, in varying quantities, for example 20 forms to Deal in 1818,¹³⁴⁵ three dozen of the monthly and one dozen of the quarterly returns to Sheerness in 1819,¹³⁴⁶ and three dozen monthly returns to Cork in 1819.¹³⁴⁷ In February 1820 Hurd referred to supplying Deal with 12 forms for both quarterly returns of charts received, as well as charts issued and 24 monthly forms,¹³⁴⁸ being enough for three and two years administration.¹³⁴⁹ After Hurd’s death, when the Admiralty Board took an even closer management of the

¹³⁴¹ UKHO, MB1 fos 221-2, Minutes on rearranging chart box coverage, 22-23 January 1829.

¹³⁴² UKHO, MB1 f.223, Minutes on correspondence with dockyard commissioners, 6 February 1829.

¹³⁴³ TNA, ADM2/1084 f.32.

¹³⁴⁴ TNA, ADM2/1084 fos 86-7.

¹³⁴⁵ UKHO, LB1 f.158, Hurd to Trounsell, 30 June 1818.

¹³⁴⁶ UKHO, LB1 f.232, Hurd to Boyle, 5 July 1819.

¹³⁴⁷ UKHO, LB1 f.238, Hurd to Kingdom, 3 August 1819.

¹³⁴⁸ UKHO, LB1 f.287, Hurd to Trounsell, 5 February 1820.

¹³⁴⁹ UKHO, LB1 f.370, Hurd to Day, 9 February 1821; *ibid.*, f.440, Hurd to Shield, 30 October 1821.

office, Barrow sent three years worth of forms to one correspondent.¹³⁵⁰ From that time it appears the business of the supply of forms may have been more regularly administered (and passed to the Navy Board), as the matter does not appear in the out letters with as much frequency as it had done whilst Hurd was Hydrographer.

When the Navy Office were running low on forms in July 1828, they wrote to Parry informing him they were going to obtain some spare forms from Sheerness, unless he could suggest some other way of satisfying their demand.¹³⁵¹ If the depots dealt directly with the Hydrographer (who could have held a supply of forms) then the involvement of the Navy Office could have been done away with. The matter came up again in January 1829 when Morton (at the Navy Office) found out that their stock was running precariously low. Morton wanted to know whether the forms would be reprinted in the Admiralty, or if not, ‘whether Capt. Parry wishes any and what alteration to be made in the printing of them, if done by this Office’. Sheringham took up the matter, revised the form and Parry requested the Navy Office to continue printing and supplying them.¹³⁵² This was one example of how Parry could have taken over control of that system to increase the responsibility of the Hydrographic Office, but by not doing so it can possibly be seen as a reflection of his declining enthusiasm for the post of Hydrographer, or a reluctance to add new costs to his yearly expenditure.¹³⁵³

Although the supply of forms could have been improved, it was nevertheless an invaluable aid to the Hydrographer to keep a track on the location of boxes issued from the ports, or depots. In August 1815 Hurd was able to identify a mistake at Portsmouth whereby two East India boxes were, according to the monthly returns from that port, still at that port. The staff at the Commissioner’s Office were politely asked by Hurd to ‘let some enquiry be made relative to these charts and be kind enough to favor me with a line on the subject’.¹³⁵⁴ Parry was able to bring Commissioner Cunningham at Chatham to task over the non-appearance of four Channel and Western boxes in March 1828.¹³⁵⁵ Both examples prove how the office records must have been as meticulous (or more so) as those kept at the ports, which by 1829 enabled the Admiralty to know who, where, when and what each ship had on

¹³⁵⁰ UKHO, LB2 f.3, Barrow to an unnamed recipient, 27 May 1823.

¹³⁵¹ UKHO, LP1857 M312, Morton to Parry 12 January 1829.

¹³⁵² UKHO, LP1857 M312, Morton to Parry, 12 January 1829.

¹³⁵³ I am grateful to Mike Duffy for pointing out this possibility.

¹³⁵⁴ UKHO, LB1 f.15, Hurd to Hill, HO 4 August 1815.

¹³⁵⁵ UKHO, LB2 f.112, Parry to Cunningham, 1 March 1828.

board at any time, at least in theory if not always in reality. What made matters worse was the return cycle of the form once completed, which was sent to the Navy Office, who then forwarded them to the Admiralty Board who passed them to the Hydrographer. Although this caused a possible small delay of a few days,¹³⁵⁶ there were good reasons for doing so, as it enabled the Navy Board to keep an eye on their officers at the dockyards to make sure they were keeping the returns complete and were sending them in. It also allowed the Admiralty Board to be aware of any issues concerning chart supply, which they felt they had to instruct the Hydrographer to resolve. The actions he had to take varied from having to recall multiple boxes,¹³⁵⁷ to Croker hoping (in a remindful way) that Hurd had been preparing boxes ready for Portsmouth, Plymouth and Cork.¹³⁵⁸

It was not just whole boxes that were supplied, as single charts were also sent to the ports. When the Duke of Clarence had authorised extra resources for the Hydrographic Office in the late 1820s there was subsequently a flood of new charts to be supplied. Those charts, along with the growing number of corrected charts and new publications, meant the amount of materials being supplied would have constantly been on the increase. Commander Boteler and Captain W.F.W. Owen were each sent a new chart, four corrected charts and numerous volumes of latitudes and longitudes in 1828,¹³⁵⁹ and the commodore at Sierra Leone was sent a similar but larger consignment for the ships on his station on the same day.¹³⁶⁰ Single atlases were also sent and received, as the commander of the Admiralty Yacht found out in 1822 when his *Channel Atlas* needed to be returned to the Hydrographic Office so the latest charts could be inserted into it.¹³⁶¹ Single charts were also supplied to naval contractors, when one was sent all the way to Plymouth by coach for the Superintendent of the Breakwater to resolve a question raised by Lord Melville.¹³⁶²

¹³⁵⁶ TNA, ADM1/3524 Navy Board to Admiralty Board, 12 October 1815. This group of letters only covers the period 1809-1818 and contains letters sent from Deal, Haulbowline (Cork), the Navy Office, Leith, Portsmouth, Chatham, Sheerness and Plymouth.

¹³⁵⁷ TNA, ADM1/3524 Shield to Croker, 1 December 1814, with minute to Hurd, 3 December 1814.

¹³⁵⁸ TNA, ADM1/3524 Croker to Hurd, 3 March 1815.

¹³⁵⁹ UKHO, LB2 f.220 Parry to Boteler and Owen, 24 November 1828.

¹³⁶⁰ UKHO, LB2 f.221 Parry to Collier, 24 November 1828.

¹³⁶¹ UKHO, LB1 f.485 Hurd to Allen, 26 April 1822.

¹³⁶² UKHO, LB1 fos 483-4 Hurd to Whidbey, 25 April 1822.

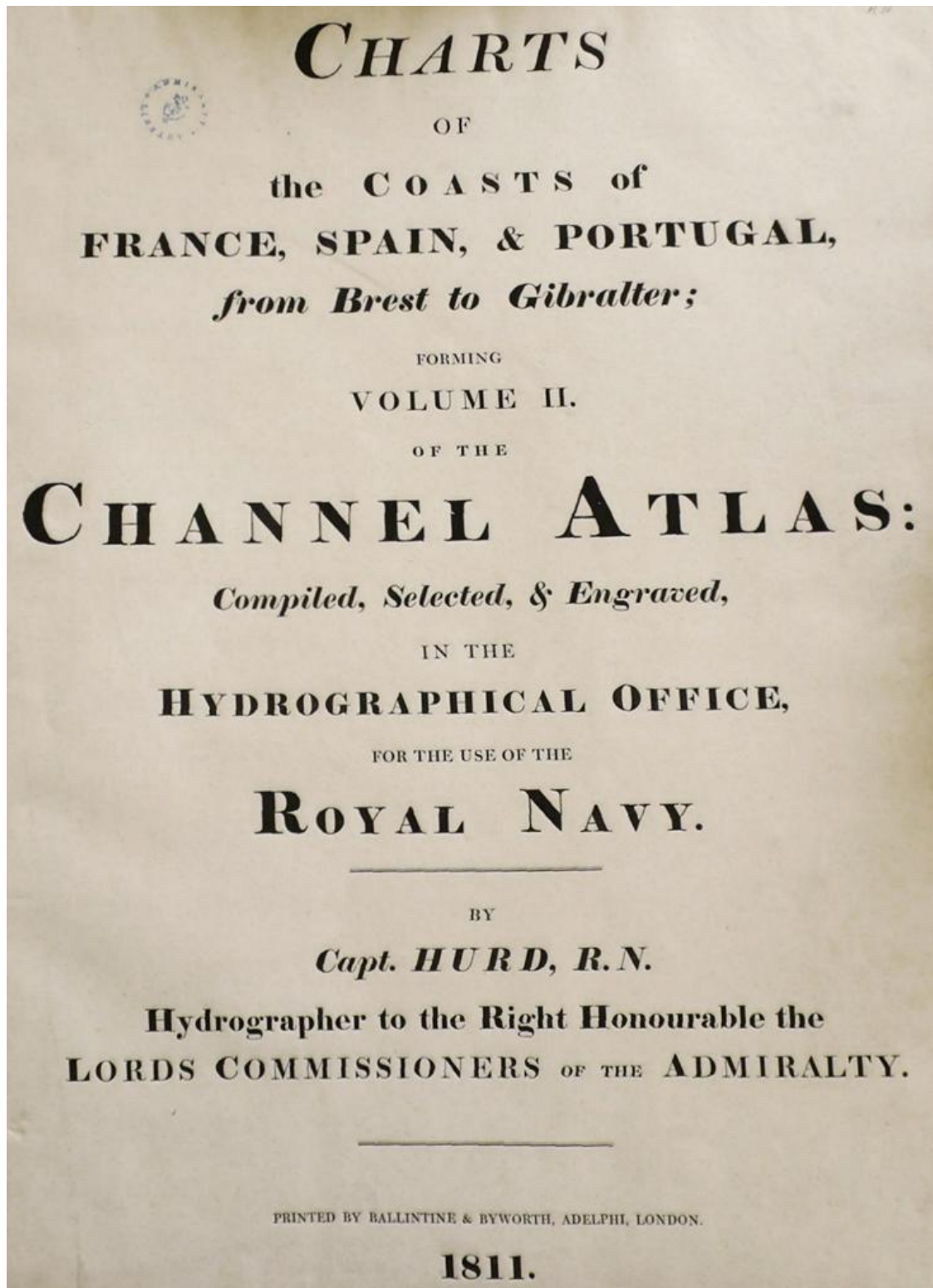


Illustration 7.3 The title page of volume two of an atlas of charts covering the English Channel issued by Hurd to the Fleet in 1811 (Admiralty Library, Vy10)

As the number of charts in circulation increased and the encumbrance of having to insert new charts in atlases was coming to the fore, Sheringham proposed a

revision to chart supply. He proposed having a folio of canvas to cover the charts so they were then loose and easily handled and replaced, but the charts were still mounted to give them extra strength and longevity, thus doing away with the cost of binding.¹³⁶³ With over 400 boxes in circulation by 1828 Sheringham's proposal, compared against the existing costs, would have saved the Admiralty over £1,000 (see Appendix 19),¹³⁶⁴ in addition to which could be added the time saved in not having to amend atlases to include new and corrected charts. The proposal was adopted in November 1828 giving the Admiralty securer and cheaper transport, because the charts were sealed and overall lighter due to the lack of boards.¹³⁶⁵ His proposal sat well with within Parry's and Clarence's revisionist agenda that saw many efficiencies and improvements introduced in 1828 and 1829.

Secret charts

The classification of charts as 'secret' was something the Hydrographer always found necessary, even from the earliest of times. Dalrymple drew up measures in c.1805 for the careful handling of, and access to, information within the Hydrographic Office, which was regarded as 'secret' even if not classified as such. However, it is far from clear what exactly secret charts were, or whether they were only ordinary charts put into a box marked secret. It is known how charts of the Great Lakes published in the 1820s were not included in the catalogues of charts for sale to the public by the Hydrographic Office,¹³⁶⁶ presumably due to the threat from America that existed during Hurd's time. This threat was also one of the reasons Hurd (whilst Hydrographer) did not engrave and publish his own work on Bermuda, which meant it was not until 1827 that a much reduced version was published by his successor. Vessels on 'secret service', as indicated in the published *Navy lists* and not particular charts marked 'secret' or 'confidential' as became the practice in later years, was the most likely reason certain charts were classified. Lieutenant Franklin was described as

¹³⁶³ UKHO, MLP5/3vc Sheringham to Parry, 20 November 1828. A minute of 11 June 1827 refers to the supplying of charts mounted on linen 'has for some time discontinued' (UKHO, MB1 fos 111-12, Douglas to Becher, 11 June 1827).

¹³⁶⁴ UKHO, MLP5/5B.

¹³⁶⁵ UKHO, MLP5/3vc Sheringham to Parry, 20 November 1828.

¹³⁶⁶ The charts of the Canadian Lakes were supplied to the fleet but not to the chart sellers under orders from the Admiralty Board (UKHO, MB1 f.204, Minutes from Parry to Owen, 6 August 1828). See also the Hydrographic Office, *Catalogue of charts, 1825* (London, 1825) for details of the coverage of the Canadian Lakes available through the chart sellers.

being on Secret Service duties in 1819, as was Lieutenant Beechey in 1821,¹³⁶⁷ which both can be classed as voyages of discovery or exploration, some of the results of which may have been sensitive.

Although the composition of Secret Service boxes might have been different from those boxes supplied for the ordinary service, lists of their contents have not come to light. It is known how boxes were numbered by a letter rather than just a number as ordinary boxes were (as in illustration 7.4).¹³⁶⁸ Out of the thousands of boxes handled at Portsmouth from 1809 to 1829 there was no mention of any secret boxes,¹³⁶⁹ although it is possible a separate ledger may have been kept for secret work. Clearly the secret boxes were real enough but short lived, as in August 1827 Becher suggested to Croker how the ‘secret service boxes in charge of the commissioner at Portsmouth be returned to this office as old’, which he agreed to.¹³⁷⁰ Thus it appeared that Portsmouth may have been the only depot to handle secret charts, but that was not the case as secret boxes at Plymouth and the Nore (as well as Portsmouth) were revised in May 1827; at that time fresh boxes were made up in the Hydrographic Office and sent up to Croker who marked them for use on the ‘Secret Service’.¹³⁷¹ Therefore the concept of secret charts, and some of the secretive work undertaken by the Hydrographic Office, was well and truly established during this period, even though many ‘secrets’ were effectively sold to the public when the majority of Admiralty charts were offered for sale in 1821.

¹³⁶⁷ TNA, RGO1133 ‘A list of Government Time-keepers and how disposed of up to the 3rd September 1821’.

¹³⁶⁸ TNA, ADM2/1084 Admiralty circular, 10 December 1814.

¹³⁶⁹ NMM, POR/L1 Charts issued and received at Portsmouth, 1809-31.

¹³⁷⁰ UKHO, MB1 f.115, Minutes on chart boxes, 11 August 1827; *ibid*, OD814 entry 25 July 1827.

¹³⁷¹ UKHO, MB1 f.188, Minute on secret boxes, 5 May 1828.

An ACCOUNT of the NUMBER of BOXES of CHARTS for
the various STATIONS, and of those for SECRET SERVICE,
remaining in Store at

STATIONS.	NUMBER OF BOXES IN STORE.		Total.	SECRET SERVICE.	
	Demanded from Ships.	New.		Boxes marked by Letters.	Boxes in Stock, unissued.
African				A	
Atlantic				B	
American				C	
Baltic & North Sea				D	
Channel				E	
Cape and Benuels. .				F	
Down				G	
East Indies.				H	
Irish				I	
Mediterranean ...				K	
Newfoundland ...				L	
Northern Seas ...				M	
Western Station. .				N	
West Indies				O	
				P	

Illustration 7.4 The form for recording the numbers of chart boxes in store and on issue, resulting from an Admiralty circular of 10 December 1814 (TNA, ADM2/1084)

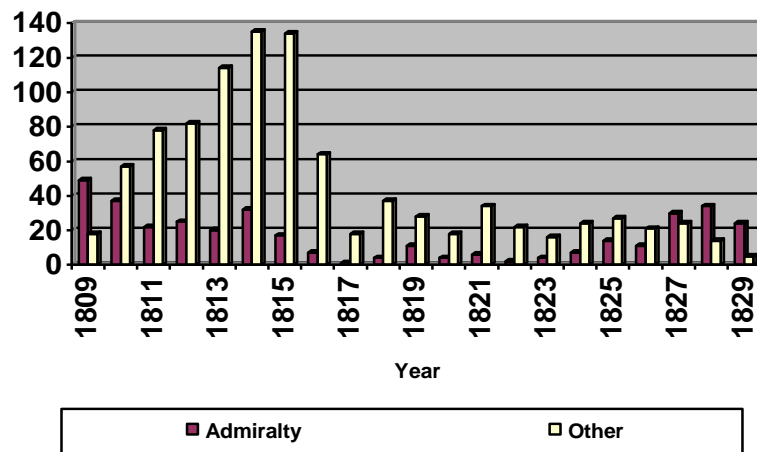
Portsmouth: a case study

The records of charts received and supplied from Portsmouth give an insight into the amount of work undertaken not only by the Dockyard Commissioner’s staff, but also

by the Hydrographic Office in supplying them in the first instance. Meticulous records had started by 23 February 1809 when a register was kept recording chart boxes received in the first half of the volume and issues in the second half. The number of errors in the contents of the boxes are surprisingly small, as on average there was only one incomplete box received per year and not all of those were from boxes from the Hydrographic Office. The majority of omissions occurred in the first ten years of chart box issue and were only minor; for example in October 1809 a box with no number or mark was received that was lacking a chart and in July 1816 ‘Leghorn Road’ was wanting from another.¹³⁷²

Figure 7.1 Number of incoming transactions of chart boxes at Portsmouth, 1809-29

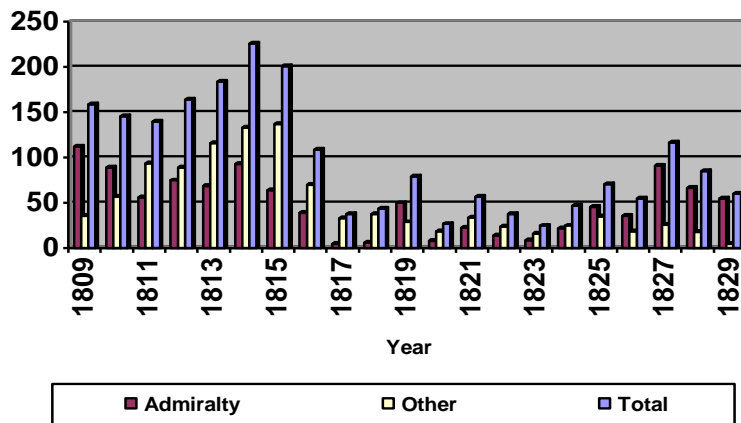
No. of Transactions



Source: NMM, POR/L1 Charts issued and received at Portsmouth, 1809-31

Figure 7.2 Total number of chart boxes in store at Portsmouth, 1809-29

No. of Boxes



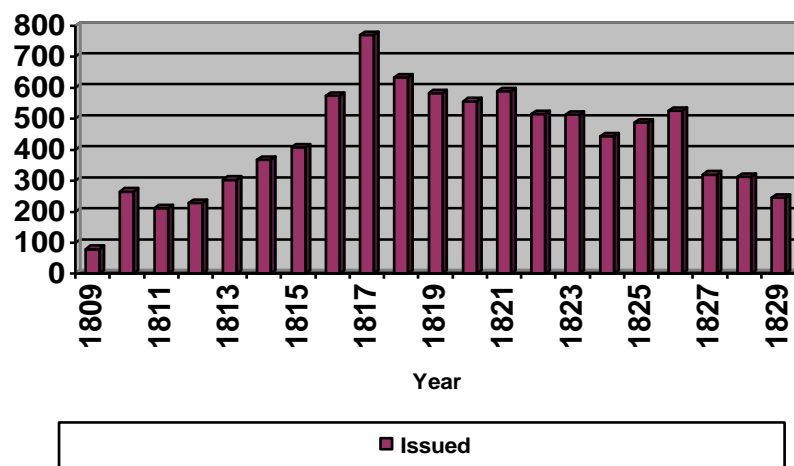
Source: NMM, POR/L1 Charts issued and received at Portsmouth, 1809-31

¹³⁷² NMM, POR/L1 Charts issued and received at Portsmouth, 1809-31.

From the number of transactions of receipt recorded at Portsmouth (see Figures 7.1 and 7.4) it must have been a similar story proportionally at the other depots, to a greater or lesser extent. Thus in 1809, when the initial surge of new boxes was sent out from the Hydrographic Office, there were over twice as many boxes received from the Admiralty as were returned by ships coming into Portsmouth. As time progressed so the number of new boxes issued from the Hydrographic Office decreased, but the number in circulation grew with over 200 being returned in 1814 and 1815 to Portsmouth. With the advent of peace in Europe and the down-sizing of the Fleet, so the numbers of boxes being returned and issued dropped dramatically by 50% each year in 1816 and 1817, with no great fluctuation until the late 1820s. At that latter time Parry's reforms, along with the publication of over 200 charts from 1827 to 1829, meant a return to the situation back in 1808 and 1809 when the number of boxes supplied by the Hydrographic Office outweighed the number being returned to the depot.¹³⁷³

Figure 7.3 The number of chart boxes processed and in store at Portsmouth based on the end of quarter figures, 1809-1829

No. of Boxes

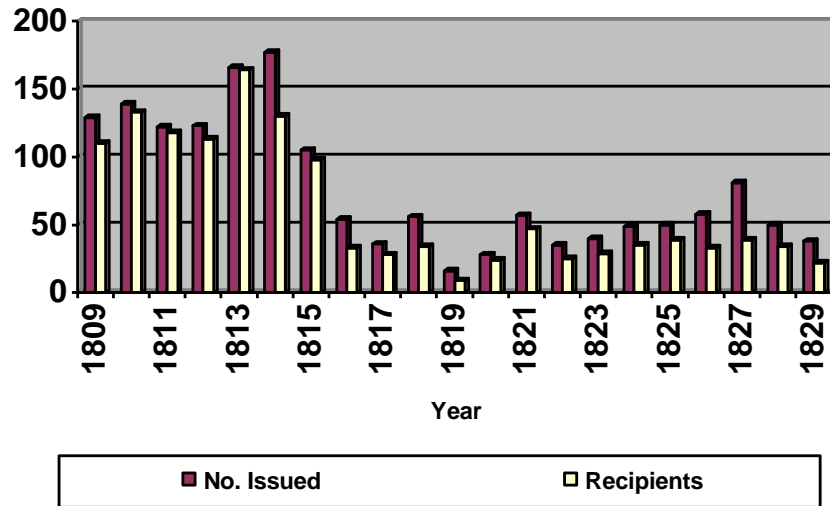


Source: NMM, POR/L1 Charts issued and received at Portsmouth, 1809-31

¹³⁷³ NMM, POR/L1 Charts issued and received at Portsmouth, 1809-31.

Figure 7.4 The number of chart boxes issued from Portsmouth, 1809-29

No. of Boxes

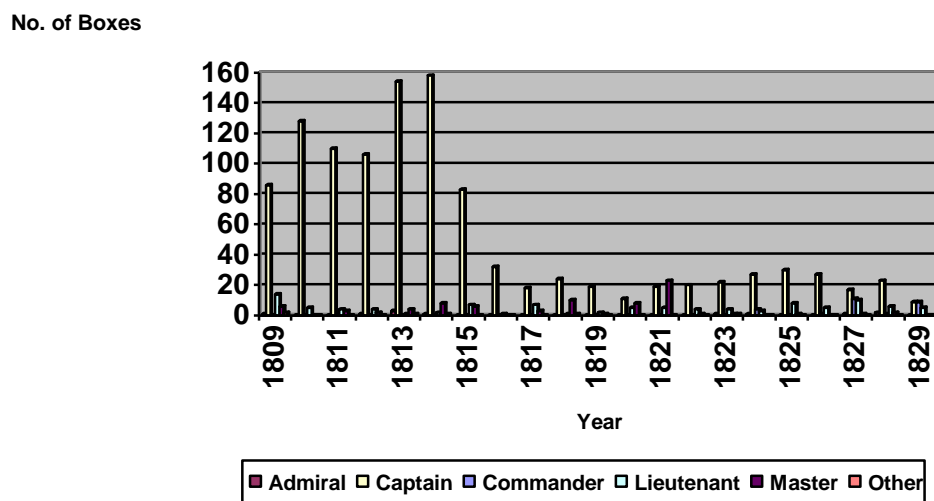


Source: NMM, POR/L1 Charts issued and received at Portsmouth, 1809-31

Of the number of boxes issued to ships Figure 7.4 shows how 1813 and 1814 were the two busiest years, with over 160 boxes issued in each year. After 1815 (when just over 100 boxes were supplied) no year saw as much activity, except 1827 when 81 boxes were issued, but normally there were no more than 60 issues per year. During that same period it was predominantly the ship's captain who took responsibility for issues, as can be seen in Figure 7.5. Only in 1821 did the ship's master appear to have held more responsibility for receiving boxes of charts from the dockyard. However, the master's level of responsibility in the 1820s dramatically decreased compared to the rise in responsibility of the rank of lieutenant.¹³⁷⁴ This goes against the common perception of the ship's master having responsibility for all things navigational, whereas from the Portsmouth sample it was the captain and lieutenants who held far more responsibility for the receipt of the ship's charts from store than the master.

¹³⁷⁴ NMM, POR/L1 Charts issued and received at Portsmouth, 1809-31.

Figure 7.5 The number of boxes issued particular ranks from Portsmouth, 1809-29



Source: NMM, POR/L1 Charts issued and received at Portsmouth, 1809-31

Instruments

Prior to the Hydrographer's involvement with the supply of surveying instruments (*i.e.* any moveable instrument for measuring that was not a chronometer), the responsibility appears to have been one that fell upon the Navy Board and the local dockyard officials.¹³⁷⁵ Apart from specialist instruments it was the responsibility of the master to purchase their own mathematical instruments, when one author lamented how they only used the cheapest ones because of their cost.¹³⁷⁶ The Navy Board remained solely responsible for a limited number of specialist instruments, until Hurd managed to obtain a small number for direct supply to officers primarily involved in hydrographic surveying. Dalrymple suggested to the Admiralty Board in October 1807 that every ship in the Navy (which were already issued with an azimuth compass, leads and lines for sounding), should be furnished with chronometers, nautical almanacs, a small Hadley of 3 inch radius, a pair of compasses, a parallel ruler, a protractor and a 'graduated Semi circle of transparent Horn'.¹³⁷⁷ Such a measure would have brought to the attention of many masters and officers the fact

¹³⁷⁵ At Portsmouth a commissioner required instruments for surveying seacoasts and harbours in 1750 and there was a theodolite in store there, but none at Sheerness. Whereas Woolwich had not had any surveying instruments since 1736 and Trinity House loaned instruments from the Navy Board in 1751 to undertake a survey off Norfolk; for a sample of instruments supplied to surveyors see Appendix 20 (TNA, ADM106/1082/84 Hughes to Navy Board, 25 July 1750; *ibid* 1085/164 Sheerness Officers to Navy Board, 23 July 1750; *ibid* 1087/184 Woolwich officers to Navy Board, 26 July 1750; TNA, *ibid* 1095/39 Shuttlewood to Navy Board, 5 June 1751).

¹³⁷⁶ A. Aikin, *The Annual Review of History and Literature* (London, 1805), 579-80.

¹³⁷⁷ TNA, ADM1/3523 Dalrymple to Pole, 10 October 1807.

they would then have had better instruments for surveying, which for some may have been a greater incentive to undertake such duties to the benefit of the Navy.

From Hurd's early days in charge of the office there is evidence for him being involved with the supply of specialist instruments. On 20 October 1808 Captain Columbine, who had served on the Chart Committee with him, returned a station pointer originally supplied by Hurd to the Navy Office.¹³⁷⁸ Hurd was also consulted by the Admiralty Board as to the propriety of whether one surveyor should be supplied with all the instruments he needed, to which he replied 'that without being possessed of such instruments I do not see how the service he is directed to perform can be effected, either with credit to himself, or to their Lordships satisfaction'.¹³⁷⁹ Subsequently the Admiralty Board ordered the Navy Board to supply the instruments requested.¹³⁸⁰ Shortly after those two events Hurd wrote to the Admiralty Board asking for all surveying instruments to be placed under his charge, rather than the Navy Board, at the same time he acquired a number of second-hand instruments from a Mr Adams.¹³⁸¹

It was all very well the Hydrographer being tasked with supplying instruments but there was a more fundamental issue that needed to be addressed, and that was instructing men how to use them and whether new inventions were of any use. Thus Captain Henry Kater¹³⁸² was involved in drawing up instructions for using instruments for members of the polar expedition of 1818, which must have proved popular as he subsequently was asked to perform a similar act for later voyages.¹³⁸³ Information was received in the Hydrographic Office concerning the utility of particular instruments, from which the Hydrographer could have acted. H.M.S. *Acteon* was on the American Station in 1813 and recommended the use of the azimuth compass by small vessels, to enable the errors of other navigational instruments (due to the iron in the ships) to be made more obvious.¹³⁸⁴ Thus, although azimuth

¹³⁷⁸ TNA, ADM1/3523 Hurd to Pole, 20 October 1808. Day quotes Hurd suggesting a surveyor should use 'a good chronometer and spyglass, a sextant made by Troughton, a quicksilver horizon, and an improved azimuth-compass' (Day, *Hydrographic Service*, 24).

¹³⁷⁹ TNA, ADM1/3523 Hurd to Barrow, 20 July 1809.

¹³⁸⁰ TNA, ADM1/3523 Admiralty Board to Hurd, 21 July 1809.

¹³⁸¹ TNA, ADM1/3458 Hurd to Pole, 19 August 1808. Although the minute by Secretary Pole did not explicitly give Hurd approval to take on the additional responsibility he must have done so as in 1817, for example, he was supplying all the instruments needed by one surveyor (TNA, ADM1/3460 Hurd to Croker, 18 February 1817).

¹³⁸² For Kater's biography see J. Holland, 'Kater, Henry (1777–1835)', *ODNB* [accessed 28 Aug 2009].

¹³⁸³ Miller, 'The revival', 117.

¹³⁸⁴ UKHO, MP101 remark book of H.M.S. *Acteon*, 1813.

compasses had been available since the eighteenth century,¹³⁸⁵ they were far more common after the receipt of such reports.

As Hydrographer Hurd was also sought out for his knowledge of navigational and scientific instruments by Home Popham when he was instructed to obtain the position of Port Royal. Popham required two refracting telescopes and two chronometers, and was open to any suggestions Hurd could give in assisting him with the task given to him by the Lords Commissioners of the Admiralty.¹³⁸⁶ This was not always the case as one officer employed on surveying duties was known to only ask the Hydrographer for instruments when he could not procure them from the countries he was employed surveying,¹³⁸⁷ to supplement the theodolite, sextant, telescope and station pointer which had been supplied by the Hydrographic Office.¹³⁸⁸ One lieutenant in the Mediterranean also purchased some instruments from a senior officer who was returning home, which Parry thought were worth twice the £200 paid for them, a view that was endorsed in the Admiralty and subsequently the money was paid to the lieutenant.¹³⁸⁹ As time progressed it was always the Hydrographer who had a controlling hand in instrument supply, one that saw Parry on occasions reducing the number of instruments asked for by surveyors as he thought them excessive.¹³⁹⁰

The delivery of instruments to relatively near destinations was achieved by a variety of methods. When supplying the 'Discovery' voyage of 1821 Hurd asked the Admiralty Board if they could arrange for the Admiralty Barge to be at Whitehall stairs at 11.30 on a Monday morning to take some instruments to Deptford.¹³⁹¹ At that time Parry took at least 104 instruments on the *Fury*, with *Lyon* taking 47 on the *Hecla*, of which there were 37 different types supplied for that scientific voyage,¹³⁹² compared to the 23 types and 56 examples (plus drawing instruments) taken on his previous voyage in 1819.¹³⁹³ Those voyages involving the Royal Society naturally saw the two institutions jointly supplying instruments, such as the request made by

¹³⁸⁵ Jonkers, *North by northwest*, 198-9.

¹³⁸⁶ UKHO, MLP 6/5, Popham to Hurd, 7 December 1817.

¹³⁸⁷ UKHO, LB1 f.274.

¹³⁸⁸ A.C.F. David, 'British hydrography in the Mediterranean in the early nineteenth century', paper read at Greenwich, 1974.

¹³⁸⁹ UKHO, MB1 f.23 Minutes on Lieutenant Slater, 24 February 1826.

¹³⁹⁰ HKUO, MB1 f.134 minute 22 April 1828.

¹³⁹¹ TNA, ADM3/196.

¹³⁹² Parry, *Journal of a second voyage*, iv-v.

¹³⁹³ Parry, *Journal of a voyage*, vii. One consignment of instruments transported from the Hydrographic Office to the 'Polar ships' in 1818 cost £3 16s (TNA, ADM17/28 Hydrographic Office accounts, 1818-23).

John Barrow to the Society to lend a block to Captain Parry for making experiments on the pendulum in 1824.¹³⁹⁴ However, the vast majority of instruments for non-Polar voyages also had to be supplied before leaving Home Waters as they could not be procured in the countries they were visiting, such as a Kater's compass that was needed in 1818 by Lieutenant King in Australia.¹³⁹⁵ As time progressed so did the number of instruments supplied both directly and indirectly by the Hydrographic Office. Appendix 21 shows the difference in number from 1818 through to 1829, which in real terms meant more work on the administrative side of supply with both acquisition and delivery.

Parry (and by inference Hurd) found the position regarding the supply of instruments a difficult one due to their physical condition and inspection. Parry wrote how due to a lack of documentation he had no idea 'that the various articles and repairs were ordered – and, if ordered, that they were executed'.¹³⁹⁶ Subsequently with Dyer he put forward a 'Proposal for the better security of the nautical and astronomical instruments belonging to the Admiralty, and for regulating the expences connected with the same'.¹³⁹⁷ Their suggestion was yet another, of many, substantial reforms the Hydrographic Office witnessed under Parry and hinged upon the involvement of Thomas Jones, an optician of Charing Cross. Jones had been involved (amongst other things) with the Board of Longitude since the 1810s,¹³⁹⁸ produced an azimuth compass for Kater in 1820¹³⁹⁹ and had supplied instruments to surveying voyages in 1825.¹⁴⁰⁰ He was not the only optician associated with the Hydrographic Office as Messrs. P and G. Dollond of 51 St. Paul's Church Yard supplied and repaired instruments from at least 1819,¹⁴⁰¹ but Jones was the most prolific. By 7 January 1826 Parry had delivered all of his astronomical and mathematical instruments 'belonging to the public' to Jones,¹⁴⁰² but it is not clear whether these

¹³⁹⁴ Royal Society, DM3 f.120 Barrow to Royal Society, 3 April 1824.

¹³⁹⁵ UKHO, LB1 f.179 Hurd to Croker, 20 November 1818.

¹³⁹⁶ UKHO, MLP 10/1/1 Parry to Admiralty Board (?), 18 February 1828.

¹³⁹⁷ UKHO, MB1 fos 144-8 Proposal for the better security of the nautical and astronomical instruments belonging to the Admiralty, and for regulating the expences connected with the same.

¹³⁹⁸ A.N. Stimson, 'Some Board of Longitude instruments in the nineteenth century' in P.R. de Clercq (ed.), *Nineteenth century scientific instruments and their makers: papers presented at the Fourth Scientific Instrument Symposium, Amsterdam 23-26 October 1984* (Amsterdam, 1985), 103.

¹³⁹⁹ Alexander, *Catalogue*, 5.

¹⁴⁰⁰ UKHO, MLP2/2 Hoppner to Croker, 20 October 1825.

¹⁴⁰¹ UKHO, LB1 f.237 Hurd to Dollond, 31 July 1819. Dollond's were not as prolific as Jones and a reference to a compass being purchased from them does not occur until 1828 (UKHO, LB2 f.219 Parry to Dollond, 22 November 1828).

¹⁴⁰² UKHO, MLP3/2 Parry to Croker, 7 January 1826.

were ones solely from his Arctic voyage or generally in the Hydrographic Office. After that time Jones' regular handling of surveyors' instruments became normal practice, for example receiving them from Captain W.F.W. Owen in September 1826.¹⁴⁰³ Shortly after that time Captain King of the *Adventure* brought a complaint against Jones to the attention of the Admiralty Board, who sent Parry to see Jones to resolve the matter of having supplied 'useless' instruments. Parry found that the problem was caused by Jones not supplying the instruments to the ships until a day or two before they embarked. Therefore the instruments could not be checked in time for any defective ones to be returned, to which Jones promised 'this shall never happen again'.¹⁴⁰⁴ Jones continued to repair mathematical instruments during 1827 when his bill to the Hydrographic Office for that year was £75 13s 6d, over four times that of the previous year.¹⁴⁰⁵

Subsequently Parry and Dyer drew up a comprehensive series of instructions for the improved administration of instrument supply at the beginning of 1828, after asking Jones for a complete inventory of Admiralty instruments in his possession, including details of their usability. The new system transferred responsibility for housing and administering the instruments to the Hydrographer and not the optician. From that time Parry would only let instruments into the hands of the optician which needed repairing. Thus any officer involved in surveying would have to apply to the Hydrographer for any instruments they needed and not to the optician. There was, however, still a problem with identifying faulty instruments supplied from the optician (back to the Hydrographic Office or direct to a ship), that was 'the source of great useless expense, constant vexation to the individual using the instruments, and serious delay and detriment to the service'. Parry and Dyer openly admitted this and suggested how an open trial of the instruments would partially resolve the problem. Thus the matter was left to hang on the reliability of the maker, as Parry thought:

the optician's reputation ought to be sufficient to ensure our instruments being good and in good order; or if he has no regard to his reputation, he should like any other person, be subject to some penalty (such as the non-payment of his bill) in case of neglect.¹⁴⁰⁶

¹⁴⁰³ UKHO, MLP2/3 Owen to Croker, 7 October 1826.

¹⁴⁰⁴ UKHO, MB1 f.92 Parry to the Admiralty Board, 2 December 1826.

¹⁴⁰⁵ UKHO, MLP5/5B Summary of Hydrographic Office accounts, 1825-7. Other optical instruments were also accounted for by the Hydrographer for the 'Discovery ships' as well as Franklin's voyage, amounting to £556 5s 5d in 1825, £1125 1s 4d in 1826 and £1545 18s 4d in 1827.

¹⁴⁰⁶ UKHO, MB1 fos 144-8, Parry and Dyer to the Admiralty Board, 13 February 1828.

Jones continued to supply and repair instruments for the Admiralty, as well as being involved in the supply of stationery,¹⁴⁰⁷ but he was not always as efficient as expected. He failed to supply DeMayne with a reflecting circle and a protractor in April 1828,¹⁴⁰⁸ a matter which Parry had to look into.¹⁴⁰⁹ Subsequently Jones delivered all the Admiralty's instruments in his possession to Parry by 10 June 1828, when they were stored in a locked room near the Hydrographic Office; see Appendix 22. Parry examined all of them and classified them depending on their state of usefulness for future supply. He found 51 types of instruments of which there were 204 examples (as well as some sounding lines for 'Massey's machines'), of which only 39 were ready for immediate supply and a further 143 required repairing. What was more alarming were the 22 instruments which were beyond repair, either destroyed by rust, or in poor condition, designed 'on a principle which can never again be admitted' or just useless;¹⁴¹⁰ some of those were the victim of scientific advancement where new technology had overtaken them. With the approval of the Admiralty Board only 17 compasses, 5 telescopes, 3 theodolites and 6 sextants were returned to Jones for repair, with instructions to mark each instrument with unique identifying characters.¹⁴¹¹ Despite those defective pieces Parry achieved his objective to introduce a more efficient way of handling and supplying instruments (including the repair of instruments after Jones was brought to account),¹⁴¹² all of which he brought again to the Admiralty Board's attention in December 1828.¹⁴¹³ Efficiency was high on Parry's agenda and this reform benefited surveyors in the field who were supplied with accurate instruments in good working order.

Chronometers¹⁴¹⁴

Prior to 1809 both the Board of Longitude and the Navy Board (who supplied a 'stock of chronometers to be kept at the Naval Academy' at Portsmouth)¹⁴¹⁵ were involved

¹⁴⁰⁷ UKHO, LP1857 F83, Foster to Croker, 20 March 1828.

¹⁴⁰⁸ UKHO, LP1857 D307, DeMayne to Parry, 5 April 1828.

¹⁴⁰⁹ UKHO, LB2 f.134 Parry to DeMayne, 28 April 1828.

¹⁴¹⁰ UKHO, MB1 fos 192-5 Parry to E. Owen, 10 June 1828. See Appendix 22 for a transcript of the list of instruments.

¹⁴¹¹ UKHO, LB2 fos 150-1 Parry to Jones, 13 June 1828.

¹⁴¹² UKHO, LB2 f.216 Parry to White, 14 November 1828.

¹⁴¹³ UKHO, MLP5/5Ai, Parry to the Admiralty Board, 30 December 1828. A minute was drawn up detailing the procedure and a copy can be found in the Parry Papers (UKHO, MLP 5/3iv).

¹⁴¹⁴ For a useful account on the chronometer at sea see W.E. May, 'How the chronometer went to sea' in *Antiquarian Horology* (March 1976), 638-63.

with supplying chronometers to naval vessels.¹⁴¹⁶ In 1795, the year the Hydrographic Office was established, Thomas Mudge entered into a contract to supply the Navy each year with no less than eight chronometers for the first three years and twelve thereafter.¹⁴¹⁷ Despite such an action they were not in plentiful supply as the Navy Board informed Beaufort in June 1808 how, although he could retain the chronometer he had been supplied with in 1804, there was no other available for him to use.¹⁴¹⁸ Prior to 1809, apart from voyages of exploration, May stated how officers in the 1790s were required to purchase their own ‘common watch’ for determining longitude, a state of affairs which had not improved by 1808, although few valuable merchantmen were without them. There continued to be a mix of privately owned chronometers and those supplied by the Admiralty, although it soon became obvious how the ideal situation was for every ship to have three, so that if one went wrong it would become blatantly obvious.¹⁴¹⁹ Rear Admiral Popham pointed this out to Croker in 1818, citing how one hydrographic surveyor should have had three chronometers but only had two, which proved problematical when one of the two went wrong and he had to return it. But whether this was the reason for the Admiralty supplying three chronometers, or for that matter the improvements to their conveyance, is unclear even though it was brought to the Board’s and Hurd’s attention.¹⁴²⁰ The Navy Board remained responsible for chronometers until 1809 when Hurd was given sole responsibility for around 30 pieces,¹⁴²¹ but only received the official title of ‘Superintendent of Chronometers’ in 1818.¹⁴²²

In most respects naval officers were extremely fortunate in that the Admiralty was in a financial position where it could supply them with chronometers. Although the Admiralty was not short of funds the purchase of chronometers was a major part of the Hydrographer’s expenditure. When compared to his American counterpart who

¹⁴¹⁵ May, ‘How the chronometer went to sea’, 646-7.

¹⁴¹⁶ Examples concerning the supply of chronometers can be found in ADM2/314 and 315 for 1808.

¹⁴¹⁷ T. Porthouse, *The chronometer: its origin, and present perfection* (London, 1848), 17-18.

¹⁴¹⁸ TNA, ADM 354/232/71 Pole to Beaufort, 16 Jun 1808.

¹⁴¹⁹ May, ‘How the chronometer went to sea’, 644, 648.

¹⁴²⁰ UKHO, LP1857 P319, Popham to Hurd, 26 July 1818.

¹⁴²¹ UKHO, LB1 fos 431-2 Hurd to Pond, 3 September 1821. Day states Hurd was made responsible for chronometers in 1809 but gives no indication of the source (Day, *Hydrographic Service*, 31).

¹⁴²² One author in 1918 thought that since 1818 the Hydrographic Office had been ‘responsible for the purchase and supply of chronometers for all ships of H.M. Navy’, which may have been the case as the office accounts only start in 1818 (Technical History Section, *The war work of the Hydrographic Department (1914-1918)* (London, 1919), 81). One example of Hurd supplying all the timepieces and instruments a surveyor needed occurred in 1817 when Martin White was sent to re-sound the English and St George’s Channels (TNA, ADM1/3460 Hurd to Croker, 18 February 1817).

was only allowed £3,000 for ‘instruments’ in the 1810s to supply the whole of the American surveying function,¹⁴²³ Hurd spent between £525 in 1820¹⁴²⁴ and £1,610 in 1821 on timepieces alone; over a five-year period from 1818 to 1822 (inclusive) he averaged over £1,100 per annum just on chronometers.¹⁴²⁵ Their use by the Merchant Fleet was partly hampered by the expense but primarily by the ability to obtain a good rate for them to enable them to be used accurately, which was brought to the attention of the Admiralty Board in 1827. It was thought that the shore rate and the sea rate varied because of the amount of iron in the ship, so a proposal was put forward that would benefit both naval and merchant ships using chronometers.¹⁴²⁶ It was also during this period that an improvement for naval vessels occurred when the observatory at the Cape of Good Hope was opened in 1820. After that time naval ships received instructions from the Admiralty Board to regulate their chronometer(s) with the astronomer at the Cape.¹⁴²⁷

The number of chronometers issued by the Admiralty took a big step forward when the number of ships in commission dropped after the Peace of 1815, which meant that there were more chronometers to be used by fewer ships. May quotes that of the eighteen naval ships stationed in Indian waters between 1815 and 1820, fourteen were supplied with a single chronometer by the Admiralty, leaving the other four to use privately owned timepieces. Also, how ‘around 1825’ the position changed when, if the captain or master owned a chronometer an additional one would be supplied, to make the three so desperately needed to prove their accuracy when at sea,¹⁴²⁸ unaware of Popham’s 1818 proposal. Like the supply of charts, supplying chronometers or timepieces was an evolving process bringing more benefits to the Navy as time progressed.

From 1809 to 1821 Hurd thought of himself as not only financially responsible for chronometers ‘but as the recorder of all the different transactions relative to them’ including their purchase, repairs, transport and administration.¹⁴²⁹ By

¹⁴²³ National Oceanographic and Atmospheric Administration ‘The Hassler legacy: Ferdinand Rudolf Hassler and the United States Coast Survey’ <http://www.lib.noaa.gov/edocs/HASSLER1.htm> (accessed November 2007), 5.

¹⁴²⁴ House of Commons, *A return in detail of £3,000; charged in the Navy estimates for 1820, for contingencies relating to the service whereon the Hydrographer is employed* (London, 1821).

¹⁴²⁵ TNA, ADM17/28, Hydrographic Office accounts, 1818-1823.

¹⁴²⁶ TNA, ADM1/3466 Wauchope to Croker, 21 June 1827.

¹⁴²⁷ Owen, *Narrative*, vi.

¹⁴²⁸ May, ‘How the chronometer went to sea’, 649, 654.

¹⁴²⁹ UKHO, LB1 fos 431-2 Hurd to Pond, 3 September 1821.

1816 a form had been put in place that helped speed up the supply of chronometers, thus avoiding much repetition which occurred when the same letters were handed out with a chronometer. The form required the clerk at the Hydrographic Office to only fill in the name of the person being issued with the piece, the date, number, maker and ship, that was addressed to Croker. Examples in the Royal Greenwich Observatory papers only survive for 1816 and 1817, suggesting the idea may have only been short-lived,¹⁴³⁰ although Hurd's reference to issuing 'certificates of the various transactions' suggests otherwise.¹⁴³¹ This did not stop problems occurring, or confusion arising, over what chronometer should be where and when.¹⁴³²

It was also in 1816 that an order was made for 'charging' chronometers, which involved the Hydrographic Office keeping a record of the maker's name, the number, the ship or service and the officers name who was given charge of the piece. A covering letter was drawn up and usually signed by Barrow that was sent to the Navy Board, which involved Nares keeping a record of the issues on behalf of Hurd. Although this was a considerable responsibility for Nares it appears Hurd only signed the lists he submitted to the Admiralty Board (that were passed on to the Navy Board) on four occasions out of seventeen surviving lists drawn up between 1816 and 1823. From those records the numbers of chronometers issued can be seen in Figure 7.6. This clearly shows how as time progressed after the Peace the number of chronometers issued increased. The returns also show how it was only surveyors who were (on the whole) ever issued with two or more chronometers from 1816 to 1823, with Parry receiving 15 for his two voyages and Captain P.P. King nine in 1826 for his surveying voyage. There was also some involvement with the Admiralty 'Secret Office' in 1824 due to the nature of the voyages some chronometers were sent on.¹⁴³³

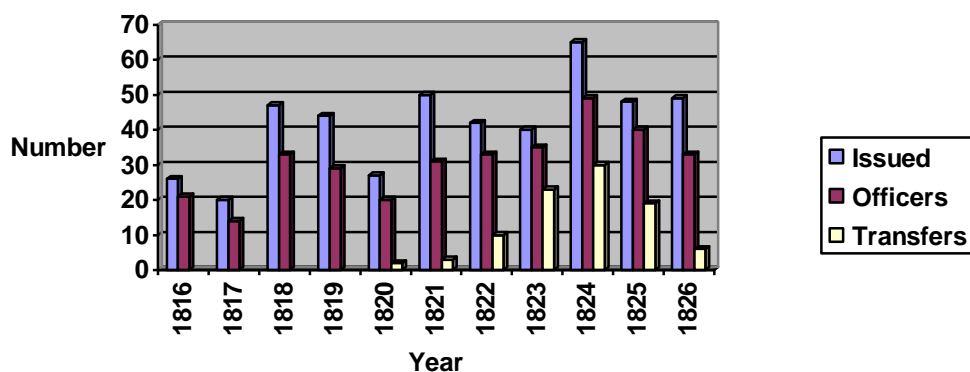
¹⁴³⁰ TNA, RGO19/1 fos 12-28. For an example of a pro-forma letter see May, 'How the chronometer went to sea', 650.

¹⁴³¹ UKHO, LB1 fos 431-2 Hurd to Pond, 3 September 1821.

¹⁴³² See below under the heading 'Portsmouth and Plymouth: a case study'.

¹⁴³³ UKHO, MLP 82 Returns of chronometers, 1816-26.

Figure 7.6 The number of chronometers issued by the Admiralty, 1816-29



Source: UKHO, MLP 82 Returns of chronometers, 1816-29. Note: The figures for 1816 actually run from 20 August 1815 to 31 December 1816. For 1817 from 20 August 1816 to 20 August 1817. For 1818 from 1 August 1817 to 31 December 1818. Transfer data only exists between 1820-6 but is incomplete.

The Admiralty Board took a close interest in the development of chronometers. In an effort to increase the number being used in the Navy it opened a depot at the Royal Greenwich Observatory in 1821 where makers could have their pieces tested. If the pieces passed the trial they could be purchased for use by the Navy and thus an added incentive for chronometers to be as accurate as possible was introduced. The competition rules stipulated that the best timekeeper would be purchased at £300 and the second best at £200, with the Astronomer Royal and the Board of Longitude having responsibility for keeping the records of this open competition. Hurd was involved with the process, as it was advertised in the *London Gazette* how the conditions and regulations of the competition could be obtained from him, or from the Astronomer Royal.¹⁴³⁴ The first recipient of the £300 prize was Barraud (chronometer number 957) announced on 28 April 1823¹⁴³⁵ two days before Hurd died. As quality testing was put before the purchase price, it ensured that the most accurate pieces were used by the Navy.

After the competition had been announced the responsibility for the supply of chronometers was taken out of Hurd's hands and placed with John Pond, Astronomer Royal on 23 July 1821.¹⁴³⁶ Despite the arrangement being approved by the Royal

¹⁴³⁴ *London Gazette*, 26 June 1821, page 7 column B. For the Admiralty Board minute see TNA, ADM3/196.

¹⁴³⁵ *London Gazette*, 3 May 1823, page 3 column B.

¹⁴³⁶ TNA, RGO1133 Croker to Pond, 23 July 1821. Hurd had only held the title since 1818 when a salary of £100 a year was granted (Order in Council, 31 October 1818).

Society this must have been difficult for Hurd as the Royal Observatory was under the Admiralty's administration and Hurd was in regular contact with the Astronomer Royal.¹⁴³⁷ Having the chronometers transferred direct to the Astronomer Royal arguably was a saving for the Admiralty, as in many ways they cut out the middleman (Hurd) as many transactions already involved Pond. But Hurd was not happy with the new arrangement, partly because of the loss of income and also for the following technical and logistical reasons brought to Croker's attention the day after the transfer of responsibilities. Hurd thought the transfer was 'likely to prove more injurious than beneficial to the service' and cause 'many inconveniencies to the Board'. His opinion was that chronometers were best kept by their makers, especially after long voyages, with the journey to the Astronomer Royal to check their 'fitness for use' likely to cause more harm than good.¹⁴³⁸

It was however some time until a list was drawn up (on 3 September 1821) recording the 130 timepieces transferred from the Hydrographic Office. 70 percent were made by Arnold, roughly 10 percent by Earnshaw (both of whom had received awards from the Board of Longitude) and the other 26 by seven other makers. Of those 130 only four were unfit for service or useless, with nine under examination or being repaired, with all but four of them having been supplied before 1817. Two of the four were in the possession of George Thomas, master of the *Investigator*, surveying in Home Waters (supplied in 1812 and 1814) and the other two had been supplied in 1807 and 1811 to Vice Admiral Drury. Thus just over one in ten of the Navy's chronometers had been out on issue for four years or more.¹⁴³⁹ But those in use included 43 in the hands of surveyors, or on voyages of exploration,¹⁴⁴⁰ which may explain why after that time the Hydrographic Office was still involved in matters of chronometer supply to surveyors; Captain W.F.W. Owen's chronometer was returned via Portsmouth to the Hydrographic Office and Nares was instructed by Hurd

¹⁴³⁷ Day, *Hydrographic Service*, 33. Even before such an arrangement was in place the post had drawn attention from Greenwich when the First Assistant at the Observatory, Thomas Taylor, wrote 'If the appointment of a person solely for taking care of the Chronometers should fall under the gift of the Admiralty, I conceive myself entitled to a claim on the Board, having been 12 years Schoolmaster in the Navy' (CUL, RGO14/19, letter dated 14 September 1817). Another person applied to Croker in June 1819 and there was clearly a considerable interest in the post, especially since it came with a salary (CUL, RGO14/19, letter to Croker, 20 June 1819).

¹⁴³⁸ UKHO, LB1 fos 433-4 Hurd to Croker, 22 September 1821.

¹⁴³⁹ TNA, RGO1133 'A list of Government Time-keepers and how disposed of up to the 3rd September 1821'.

¹⁴⁴⁰ CUL, RGO14 Board of Longitude accounts; TNA, RGO1133 'A list of Government Time-keepers and how disposed of up to the 3rd September 1821'; May, 'How the chronometer went to sea', 652.

to inform Pond of its arrival in November 1822.¹⁴⁴¹ Similarly Parry was consulted over the question of supplying three chronometers to Rear Admiral Sir Charles Ogle at Halifax in 1828.¹⁴⁴² The former also wrote to Bayfield in March 1829 informing him how two chronometers and a station pointer were being sent to him and that a receipt for them was required.¹⁴⁴³ All proving how, despite the transfer, the Hydrographer still had some involvement with the supply of chronometers.

The 1821 list prepared in the Hydrographic Office also shows how Arnold dominated the Admiralty's supply of chronometers for their general routine use by the Navy, rather than Mudge who had the contract in the 1790s. However, some chronometers required for the discovery voyages were obtained outside of the Admiralty by officers having direct contact with the makers, with the timepiece being sent direct to the Astronomer Royal and the bill being picked up by the Government.¹⁴⁴⁴ Captain Ross was loaned a chronometer by Parkinson and Frodsham in 1818 that he took to the Arctic to prove its worth and when it proved to be highly accurate Parry took it again (along with three others) in 1819. Those chronometers were subsequently purchased by the Admiralty. They exclude one that was bought by Parry's crew and presented to him by them 'as a testimony of their esteem and respect for their commander'.¹⁴⁴⁵ Parry took that chronometer with him again, making the arrangements with Parkinson and Frodsham for them to send the piece to his home in 1825.¹⁴⁴⁶ In 1827 others were supplied direct to the discovery ships as time did not permit the luxury of them being sent to the Astronomer Royal.¹⁴⁴⁷

Like other hydrographic instruments, the successful use of chronometers depended upon accurate instructions being issued to officers. An undated 28 page manuscript in the Royal Greenwich Observatory papers (thought to be from c.1822), shows how detailed instructions were being considered for using chronometers and keeping a log of their rates.¹⁴⁴⁸ However, it was not until 1827 that a significant step forward in the efficient use of chronometers occurred through the Hydrographic

¹⁴⁴¹ TNA, RGO1133, Nares to Pond, 20 November 1822.

¹⁴⁴² UKHO, MB1 f.216 Minutes on chronometer supply to Sir Charles Ogle, 26 December 1828.

¹⁴⁴³ UKHO, LB2 f.286, Parry to Bayfield, 30 March 1829.

¹⁴⁴⁴ NMM, ADL/D/15 Sabine to Parkinson and Frodsham, 12 March 1825.

¹⁴⁴⁵ E.M. Blunt, *The American coast pilot; containing the courses and distances between the principal harbours, capes, and headlands, on the coast of North and South America . . .* 10th ed. (New York, 1822), advert at the rear of the volume.

¹⁴⁴⁶ NMM, ADL/D/15 Parry to Parkinson and Frodsham, 4 July 1825.

¹⁴⁴⁷ NMM, ADL/D/15 Parry to Parkinson and Frodsham, 12 March 1827.

¹⁴⁴⁸ CUL, RGO14/19, 'Instructions to officers commanding H.M. ships supplied with chronometers', c.1822.

Office, when it published Captain Richard Owen's *Essay on the management and use of chronometers*.¹⁴⁴⁹ Such a volume of instructions had 'been long wanted' and Becher thought a copy should be supplied to anyone in the Navy who had responsibility for a chronometer. It also contained details of how to keep a good rate, which was vital for their efficient use and Becher's suggestion was taken up by the Admiralty Board.¹⁴⁵⁰

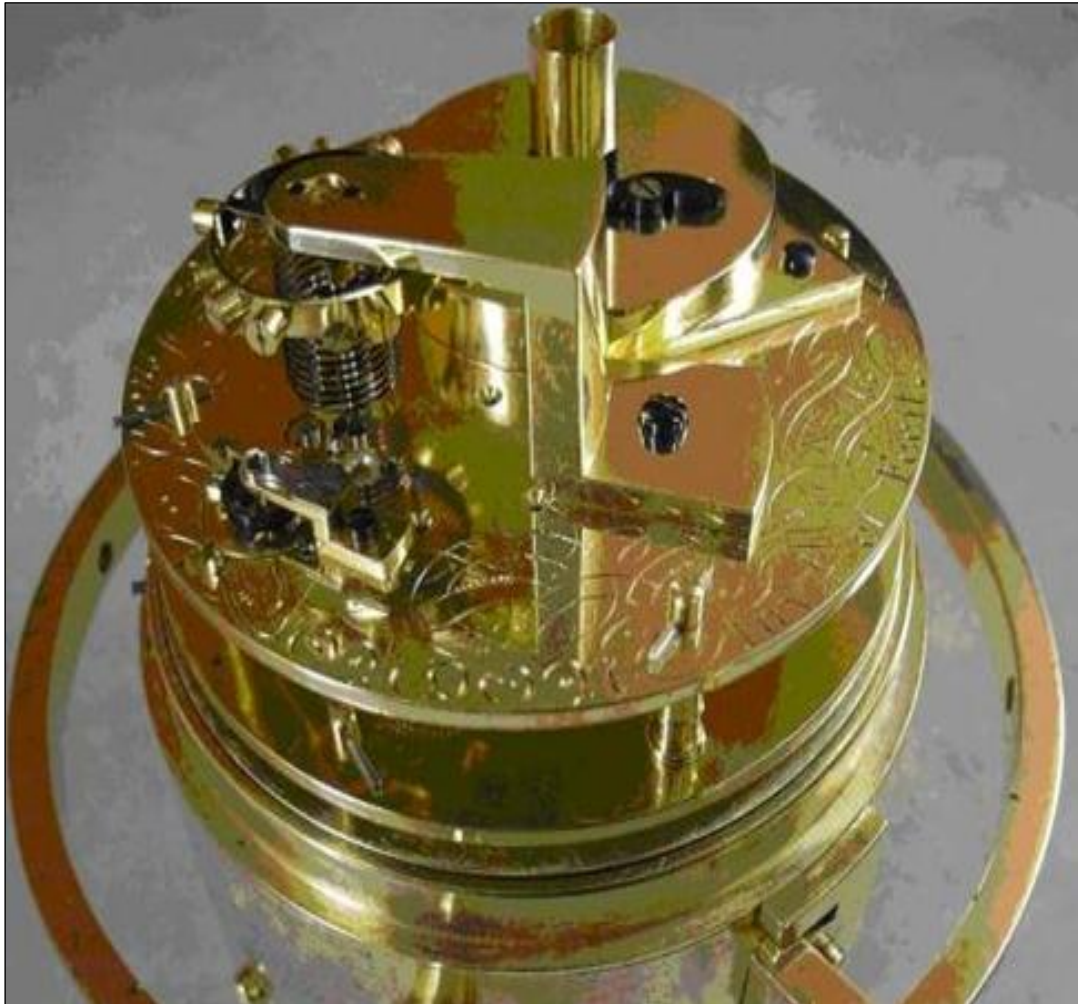


Illustration 7.5 The movement of Anthony De Mayne's chronometer, Arnold no.410, supplied to him in 1822 which was with him when he grounded the *Kangaroo* subsequently being dismissed from the Navy (courtesy of Roy Harris, RCH Clocks)

¹⁴⁴⁹ Cdr R. Owen, *Essay on the management and use of chronometers* prefixed to W.F.W. Owen's *Tables of latitudes, and longitudes by chronometer, or places in the Atlantic and Indian Oceans* (London, 1827).

¹⁴⁵⁰ UKHO, MB1 f.105 Becher to Admiralty Board, 8 May 1827.

Exceptionally the scientific cruise by Foster on the *Chanticleer* saw him take sixteen chronometers with him,¹⁴⁵¹ but most vessels had one and rarely more than that unless they provided their own, or borrowed one from another source. What had started off as something which was almost exclusively for the use of voyages of discovery, by the end of the 1820s was commonplace on naval ships. Despite problems of their supply and the transfer of their responsibility to the Astronomer Royal from the Hydrographer in 1821, the chronometer was one of, if not the most, valuable pieces of equipment on a naval vessel in the 1810s and 1820s. Thus by the late 1820s the Hydrographer had mainly overcome the three main issues concerning chronometers, their supply, their rate and how to use them effectively. However, having a chronometer did not guarantee protection from disaster, as DeMayne found to his cost.

Chronometer supply to Plymouth and Portsmouth: a case study

For chronometer supply the two main ports dealt with by the Hydrographic Office were Portsmouth and Plymouth. At Portsmouth Hurd was fortunate in having Professor Inman in charge of chronometers, who not only knew how to use them but could also rate them as well. Inman, a Cambridge mathematician, had been on the *Investigator* under Flinders and appointed to the newly formed Royal Naval College at Portsmouth in 1808,¹⁴⁵² although chronometers were available from the Academy prior to this.¹⁴⁵³ Despite having a designated individual in charge of chronometers the business of supply was known to have been problematic in that early period, as one officer on returning to Portsmouth in 1811 was told by Inman to return his chronometer to the dockyard commissioner. The officer should have returned it to Inman, who should have known what to do with it rather than have to refer the matter to the Navy Board who then had to ask the Admiralty Board;¹⁴⁵⁴ this was an exceptional case as Hurd thought very highly of Inman and his ‘sea side’

¹⁴⁵¹ UKHO, LB2 f.130 Parry to Rossel, 19 April 1828.

¹⁴⁵² H.W. Dickinson, *Educating the Royal Navy. Eighteenth- and nineteenth-century education of officers* (London, 2007), 46-7. In 1824 H.W. Jeans took over responsibility for supplying chronometers at Portsmouth (CUL, RGO1138; <http://www.stfaith.com/st%20nicholas%20leaflet.htm>).

¹⁴⁵³ TNA, ADM1/2148, Murray to Admiralty Board, 10 April 1804 quoted in unpublished notes on Lieutenant John Murray compiled by Lt-Cdr A.C.F. David, 29 September 1981. For example see NMM, ADM 354/232/114 Pole to LeGeyt, pointing out how a chronometer was in the Professor’s possession in 1808.

¹⁴⁵⁴ May, ‘How the chronometer went to sea’, 648.

observatory.¹⁴⁵⁵ The administration at Portsmouth also required Hurd liaising with the Lieutenant Governor of the College and the cost of transporting the chronometers to and from Portsmouth by coach, with the accompaniment of a member of office staff, was £6 6s a time in 1818.¹⁴⁵⁶

At Plymouth matters were not so well refined as at Portsmouth, as Hurd admitted to Pond (in 1821) that he experienced the most difficulty when dealing with ships fitting out there, or suddenly ordered to a foreign station.¹⁴⁵⁷ From the beginning of September 1811 the Government appointed Mr Howells to provide a chronometer rating service at Falmouth,¹⁴⁵⁸ which appeared to cover Plymouth as well. Howells advertised in March 1812 how

The Officers of the Navy, and Navigators frequenting Plymouth and parts adjacent, will find that the trouble, risk and expence, together with the time of sending their Chronometers to London, *will be entirely* superceded by Mr. Howells appointment.¹⁴⁵⁹

suggesting how there was no service for rating chronometers in Plymouth prior to that time. Howells resigned in October 1813 and was replaced by William Goffe.¹⁴⁶⁰ To improve matters the best solution Hurd came up with was to keep six spare chronometers by Arnold at Plymouth

ready for delivery at the house of his agent Mr. Cox in Fore Street the moment they are wanted and where the several rates are duly watch'd, register'd and open for inspection.¹⁴⁶¹

Cox, who described himself as a 'Chronometer Agent', was active on Hurd's behalf from at least 1818. In that year Cox received Arnold's chronometer no.485 from Hurd for use by Captain O'Brien, who on collecting it from Cox was required to sign a receipt and forward it to the Hydrographer 'addressed under cover to either the Admiralty Secretaries'. Hurd also advised the captain to leave the watch with Cox as long as possible, to try to ensure it would have the best rate before sailing.¹⁴⁶² Cox

¹⁴⁵⁵ UKHO, LB1 fos 433-4 Hurd to Croker, 22 September 1821.

¹⁴⁵⁶ TNA, ADM17/28 Hydrographic Office accounts, 1818-23.

¹⁴⁵⁷ UKHO, LB1 fos 431-2 Hurd to Pond, 3 September 1821.

¹⁴⁵⁸ TNA, POST 48/6 f.288 Saverland to Freeling, 16 September 1811. I am extremely grateful to Tony Pawlyn for sharing this information with me.

¹⁴⁵⁹ *Royal Cornwall Gazette* (Truro), Saturday 4 April 1812. I am extremely grateful to Tony Pawlyn for sharing this information with me.

¹⁴⁶⁰ TNA, POST 48/8 f.67 Saverland to Freeling, 11 October 1813. I am extremely grateful to Tony Pawlyn for sharing this information with me.

¹⁴⁶¹ UKHO, LB1 fos 431-2 Hurd to Pond, 3 September 1821.

¹⁴⁶² UKHO, LB1 f.174, Hurd to O'Brien, 27 October 1818.

also had to deal with one chronometer whose ‘unfortunate habits’ were brought to Hurd’s attention by Captain Collier in 1819. Hurd instructed Collier to take it to Cox ‘to remove its defects and render it serviceable in a few minutes – should that however not be the case I will endeavour to effect your wishes as to a change’. Such a change was incompatible with Collier’s original request, but was not untypical as many officers requested particular chronometers as they knew they could rely on them.¹⁴⁶³ Cox continued to be involved with Admiralty chronometers into the 1830s.¹⁴⁶⁴ Thus Plymouth and Portsmouth had a system in place for managing supply and competent men in charge of supplying accurately rated chronometers to the Fleet, who Hurd could rely upon with valuable assets, both in financial and safety terms.

Stationery, sailing directions and books

In addition to the supply of charts, instruments and timepieces the Hydrographer also found himself having to deal with requests for stationery (mainly to surveyors) and books (to the Fleet). The amount of stationery supplied depended upon the length of the voyage and the availability of new supplies at the location of the survey. Thus when a comparison is made between two survey vessels working in Home Waters with another bound for the West Indies, there is a stark difference to be seen in their needs (see Appendix 23). For the West Indies voyage 21 different items were supplied in large quantities, whereas the two Home Waters surveys only received five and twelve items each.¹⁴⁶⁵ The logistics of their supply was similar, in that material sent to Devonport in 1824 was forwarded to the Port Admirals Office by wagon with the cost of carriage paid by the Hydrographic Office, with the obligatory receipt required on their arrival in the hands of the surveyor.¹⁴⁶⁶

One lieutenant who applied directly to the Hydrographic Office for stationery in 1827 was told by Becher how it had been supplied immediately by coach to Plymouth, but that future requests should be made through his captain.¹⁴⁶⁷ A year later a different officer requested stationery for the *Chanticleer* direct from Croker, who passed the letter to Parry, with the paper, pencils, rubbers and ink being sent to Mr

¹⁴⁶³ UKHO, LB2 f.190, Hurd to Collier, 5 January 1819.

¹⁴⁶⁴ CUL, RGO1138.

¹⁴⁶⁵ UKHO, LB2 f.28 Parry to White, 14 February 1824; *ibid*, LP1857 B987 Barnett to Parry, 4 December 1828; *ibid*, SL101/1.

¹⁴⁶⁶ UKHO, LB2 f.28 Parry to White, 14 February 1824.

¹⁴⁶⁷ UKHO, LB2 f.88 Becher to Denham, 23 November 1827.

Jones's shop (at Charing Cross) three days after the request was received.¹⁴⁶⁸ These two examples show how if there was any guidance to surveying officers on how to obtain their stationery it was not being followed strictly to the letter, but as no formal printed instructions have been identified they cannot be criticised for not knowing what method the Hydrographer or the Admiralty Board required them to follow.

Careful thought had to be given as to which sailing directions were supplied to the Fleet in order that conflicting texts were not in circulation at the same time. Hurd pointed out to his friend Sir James Saumarez in 1818 how one publication 'might operate or interfere with the views' expressed in the volume being prepared by Martin White, who was working on a volume on the English Channel. This did not stop Hurd ordering four dozen of the former, which he planned to distribute immediately to the Channel cruisers.¹⁴⁶⁹ Similarly Parry in 1828, when offered a coasting pilot of the French coast, thought it was 'drawn up with considerable care' and a 'useful addition to each of our chart boxes for the French coast'.¹⁴⁷⁰ Sailing directions, like other volumes, were either supplied in the relevant chart box or individually in a similar manner to charts.

The supply of copies of the *Nautical Almanac* produced by the Board of Longitude¹⁴⁷¹ was a strange one. Surveyors working under the Hydrographer's administration were supplied with copies from the Hydrographic Office, which were purchased in bulk on a yearly basis. Other vessels in the Royal Navy had to apply for them from the Navy Board, which made life a lot easier for the Hydrographer who therefore only had to supply a handful of volumes each year.¹⁴⁷² As Secretary to the Board of Longitude Hurd also found himself writing to Croker in December 1813 with instructions for copies of Mendoza Rios tables of lunar observations to be 'added to all the chart boxes issued . . . to His Majesties ships and vessels of war'.¹⁴⁷³ Other volumes which had been produced by the Hydrographic Office, or approved by the Admiralty, were vital for safe navigation and for accurate surveying. These were often supplemented by privately published volumes for widespread distribution to the Fleet and also specific volumes to survey ships requiring specialist information. For example, in 1829 H.M.S. *Blossom* was supplied with seven different titles from the

¹⁴⁶⁸ UKHO, LP1857 F83, Foster to Croker 20 March 1828.

¹⁴⁶⁹ UKHO, LB1 fos 181-2 Hurd to Saumarez, 24 November 1818.

¹⁴⁷⁰ UKHO, MB1 f.198 Minutes on a 'Coasting Pilot, 4-5 July 1828.

¹⁴⁷¹ Sadler, 'The bicentenary of the Nautical Almanac', 14.

¹⁴⁷² TNA, ADM17/28.

¹⁴⁷³ TNA, ADM1/3458, Hurd to Croker, 6 December 1813; *ibid.*, ADM2/1084 f.84.

Hydrographic Office, including Espinosa's work on the Antilles and Mexico, and 'Laurie's *Memoir*', or sailing directions covering the West Indies, with other volumes concerning technical data relating to astronomy that would have been used for position fixing.¹⁴⁷⁴ This small number of volumes was not a reflection of the state of book supply from the Hydrographic Office, but one that showed just how little data there was in book format that was any use on the voyage. All of those volumes were bought in, and anything published by the Hydrographic Office or the Admiralty should have been supplied to the vessel in its chart box.

Notices to mariners and chart corrections

The concept of notices to mariners warning them of navigationally important information was not a new one, as examples can be seen in the seventeenth century¹⁴⁷⁵ and supplying them to the Fleet was undertaken in four different ways. First, in the form of Admiralty printed and manuscript orders and instructions; secondly, by direct issue from the Hydrographic Office; thirdly, by the less obvious method of supplying new impressions of charts containing small corrections, which had not always been issued as notices to mariners (a methodology which has been covered earlier in this chapter under chart supply);¹⁴⁷⁶ fourthly, by the use of newspapers and journals. Of the first method examples are referred to in Chapter Six and in Illustration 7.6 can be seen a Trinity House notice amended by Croker to be reprinted for circulation to the Fleet.¹⁴⁷⁷ This was typical of Croker's efficiency and insured information was promulgated quickly to those who needed it, although it should be noted how Croker was only acting in an administrative capacity and was not applying any navigational expertise to the significance of the factual content of the notice.

¹⁴⁷⁴ UKHO, SL101/1.

¹⁴⁷⁵ A notice printed in the *London Gazette* of 14 October 1680 informed readers of the erection of a lighthouse on St Agnes, Scilly Isles, stating 'These are to give Notice to all persons concerned, That on the thirtieth day of this Instant October the Fire-Light on the said Light-House will be kindled, and from thence forth continued'.

¹⁴⁷⁶ Although this cannot strictly be classed as a 'notice' the concept of supplying navigationally important information to users of charts having already updated the product effectively achieved the same outcome.

¹⁴⁷⁷ TNA, ADM3/187. The private chart producer J.W. Norie also reprinted Trinity House notices, examples of which can be seen in his 1817 edition of *The new British pilot* . . . (London, 1817).

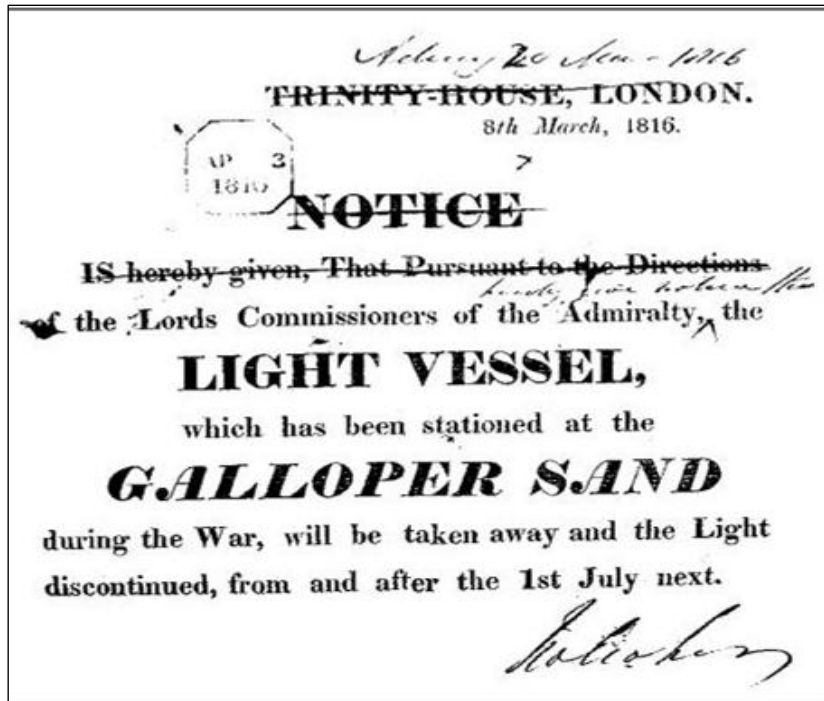


Illustration 7.6 A Trinity House notice of 1816 amended by Croker with instructions for the printer. Note the wartime restrictions put in place to combat enemy activity (TNA, ADM3/187)

The numbers of notices issued directly from the Admiralty, along with the variety of their origin and content, can occasionally be ascertained. A notice concerning a floating light on the Kish Bank in Dublin Bay (originally from the Ballast Office, Dublin) was supplied to twelve recipients, of whom the Nore received the most copies (45) for further supply, compared to Leith and Guernsey who had only 15 each, with the others receiving either 25 or 30; overall at least 210 notices were printed for distribution on that occasion.¹⁴⁷⁸ A notice concerning the Needles, after being heavily amended (and also supplied in 1811), was sent to 23 recipients,¹⁴⁷⁹ showing how geography was the key parameter to the number of notices supplied, as the English Channel saw far more naval shipping movements than the Irish Sea. The Admiralty also issued a notice for Middleburg based on information provided by the Admiralty Surveyor George Thomas in 1813, as well as one to advise transports and merchantmen entering the Port of Passages in 1814. The notice from Thomas made no mention of the Hydrographic Office and suggests how at that time the Admiralty held more responsibility for issuing notices than its Hydrographer. More importantly was the notice issued for the Kykduin in 1814, which had a dual purpose and was not

¹⁴⁷⁸ TNA, ADM2/1083.

¹⁴⁷⁹ TNA, ADM2/1083; *ibid.*, ADM3/172.

exclusively for navigational purposes. It advised mariners of the new lights which had appeared since 1813, but more importantly it gave a clear indication of who had control of the area, stating:

Please inform Masters of Vessels that there are lights shewn from KYKDUIN, which was not the case last year; but they must not, therefore, conclude that the HELDER is in our Possession, as, on the contrary, the French still remain there: The Ships must, consequently, proceed through the VLIE, or to SCHELLING.¹⁴⁸⁰

The Admiralty also issued circulars concerning the fact that accidents relating to poor navigation and not poor charts were still occurring, even though there were pilots on board,¹⁴⁸¹ as well as a request from the Commissioners of Northern Lighthouses for naval officers to report any faults in lights on the coast of Scotland and the Isle of Man.¹⁴⁸²

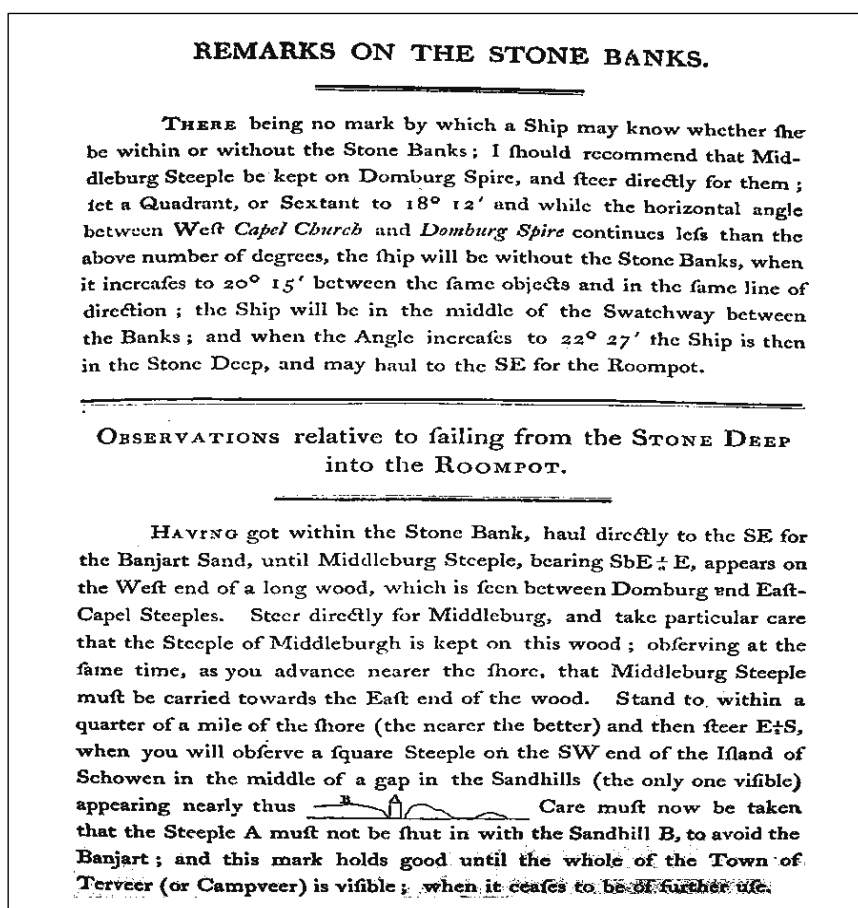


Illustration 7.7 An extract from an Admiralty Order based upon the observations of their Hydrographic Surveyor, George Thomas, dated 17 December 1813 (TNA, ADM2/1084)

¹⁴⁸⁰ TNA, ADM2/1084.

¹⁴⁸¹ TNA, ADM2/1083.

¹⁴⁸² TNA, ADM7/226 Admiralty Office to Moorsom, 19 January 1827.

Of the second method (i.e. by direct issue from the Hydrographic Office), Hurd supplied a notice concerning dangers off the Irish coast to the ‘Commanding Admiral’ on the Irish Station for him to distribute among the several ships or vessels under his command. He was also instructed to place a copy of the notice in all of the unissued chart boxes remaining in store at the Irish Depôt.¹⁴⁸³ This direct method also included the supply of small extracts or sections of charts to be pasted on top of the corresponding chart, known today as a block (as in Illustration 7.8), which was not a new concept but more cost effective than supplying a whole chart.

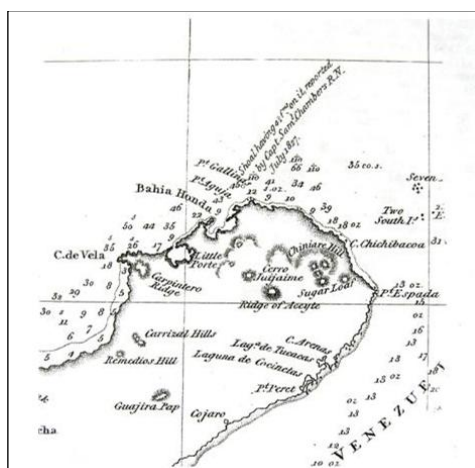


Illustration 7.8 A block or section of a chart issued by Parry for distribution to the Fleet, when it would have been pasted onto a larger chart thus bringing it up-to-date (UKHO, LP1857 C372)

The fourth method was a less direct process than the others, which the Admiralty used to advertise safety critical information to a much wider audience through the publication of notices in official newspapers. Croker used the *London Gazette* in the 1820s for such a purpose,¹⁴⁸⁴ but their appearance in that official publication was dwarfed by notices issued by Trinity House, the Commissioners for Northern Lights, as well as the Ballast Office at Dublin; for the numbers issued see Appendices 19 and 20. There was of course little need for the Admiralty to duplicate the notice, but when the amount of information coming directly in to the Hydrographic Office is considered, it is surprising Croker did not issue more notices through this method. This was surely a failing by Hurd in not passing safety critical information to Croker to pass on to the Fleet and maritime community. Having access to a widely circulated official organ such as the *London Gazette* made the supply of

¹⁴⁸³ UKHO, LB1 fos 481-2, Hurd to unnamed recipient, 10 April 1822.

¹⁴⁸⁴ *London Gazette*, 3 August 1824 a notice concerning the shoals to the north of the Galloper.

corrections to charts far easier than directly issuing them to ships, however there would always be the question of whether the ship had seen the newspaper and if so had it spotted the notice? Notices also appeared in *The Times* from 1816,¹⁴⁸⁵ but it was not until 1825 that they became more regular and included notices not published in *The London Gazette*, such as one concerning the Rundlestone buoy,¹⁴⁸⁶ with others on buoyage also not being included,¹⁴⁸⁷ with local notices also appearing in at least ten provincial newspapers.¹⁴⁸⁸ Horsburgh at the H.E.I.C. used the *Asiatic Journal* in the 1820s to publish ‘Nautical intelligence’, which was similar to notices to mariners but under a different name (see Illustration 7.9). In one issue in May 1825 he not only published three notices but also a list of charts contained in the recently issued atlas of Krusenstern’s voyage.¹⁴⁸⁹ Notices under the heading of ‘Hydrography’ also appeared in *The Naval Chronicle*, such as five which appeared in 1810, two of which were from Trinity House.¹⁴⁹⁰

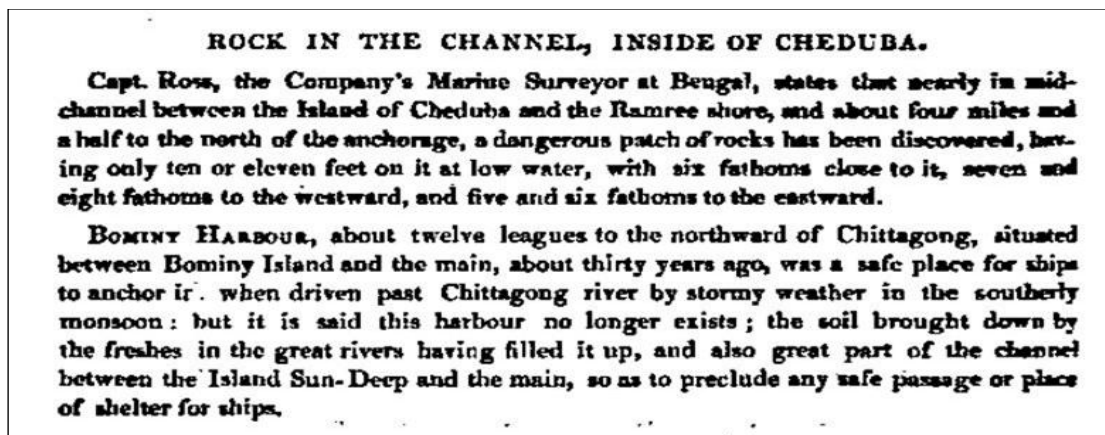


Illustration 7.9 Two notices to mariners issued by Horsburgh in the *The Asiatic Journal and Monthly Register for British India and its dependencies* in 1825

¹⁴⁸⁵ *The Times* 27 January 1816 page 3 column E.

¹⁴⁸⁶ *The Times* 22 August 1825 page 1 column D.

¹⁴⁸⁷ *The Times* 16 November 1826 page 1 column E; 25 October 1827 page 1 column A; 20 March 1829 page 2 column C; 29 April 1829 page 1 column A.

¹⁴⁸⁸ *Liverpool Mercury*, 5 November 1813; *Caledonian Mercury*, 6 January 1816; *The Hull Packet and Original Weekly Commercial, Literary and General Advertiser*, 22 October 1816; *The Aberdeen Journal*, 10 January 1816; *The Morning Chronicle*, 24 October 1817; *The Newcastle Courant etc*, 9 January 1819; *The Bristol Mercury*, 4 September 1820; *Hampshire Telegraph and Sussex Chronicle*, 8 January 1821; *Freeman's Journal and Daily Commercial Advertiser*, 16 July 1821; *Glasgow Herald*, 8 July 1822.

¹⁴⁸⁹ *The Asiatic Journal and Monthly Register for British India and its dependencies* XIX (London, 1825), 793-4.

¹⁴⁹⁰ Anon, *The Naval Chronicle for 1810: containing a general and biographical history of the Royal Navy of the United Kingdom; with a variety of original papers on nautical subjects. Under the guidance of several literary and professional men* XXIII (January-June 1810), 44, 310-11, 415-16, 489-90.

The supply of notices to mariners was hastened by the use of lithography and Parry found it quick and easy to send ten copies of a notice ‘of the rock observed by Captain Dixon’ to Liverpool in December 1828; the notice had already been circulated to all of His Majesty’s ships.¹⁴⁹¹ At that time notices were accompanied by a standard letter that was formalised by the end of December 1828 when the numbers supplied to the different stations were small, such as 33 to the Mediterranean and 16 to South America.¹⁴⁹² An extreme course of corrective action occurred in 1828 when it came to light (and had to be acted upon immediately), that a chart had been published by the office which was drastically incorrect. Based upon a French chart, the soundings were compiled in feet instead of fathoms, thus Parry sent 16 copies of the corrected plan for circulation to the commander-in-chief on the South American Station. Parry asked for the existing copies of the incorrect chart to be destroyed and to be sent a receipt for each new chart issued.¹⁴⁹³ Despite that error Parry’s use of technology was yet another example of an improvement to office procedure.

How widespread Croker’s reworking of Trinity House notices was is unclear, but from an examination of the most likely sources it would appear he was highly selective. There were at least 121 Trinity House notices received in the Admiralty between 1824 and 1829 but only a small percentage appear in the printed Admiralty instructions.¹⁴⁹⁴ Taken with the fact that Parry stated to the Admiralty Board how ‘frequent additions and corrections’ were being made to the office copper plates,¹⁴⁹⁵ this shows how the Fleet were receiving both up-to-date charts from the office as well as corrections in the form of printed notices. But the hydrographic world changed in 1821 when charts were made commercially available to the public, when the expectancy of the public was one of making Admiralty geographic information more widely available. But matters were not greatly improved as A.W.A. Pollock in *The United Service Journal and Military Magazine* wrote in 1830 how he hoped information relating to hydrographic dangers, which were ‘closeted up at the Hydrographic Office’, would be made available in an annual publication by that Office. He further hoped (undoubtedly as did many others who relied on accurate naval information) that ‘the store of useful information now smouldering away on the

¹⁴⁹¹ UKHO, LB2 f.229, Parry to Brocklebank, 19 December 1828.

¹⁴⁹² UKHO, LB2 f.236, notices dated 31 December 1828.

¹⁴⁹³ UKHO, LB2 f.241 Parry to Otway, 9 January 1829.

¹⁴⁹⁴ UKHO, MLP 66, Trinity House notices to mariners, 1805-1840; TNA, ADM7/226-228 Admiralty circular letters and instructions, 1805-30.

¹⁴⁹⁵ UKHO, MB1 f.20, Parry to the Admiralty Board, 18 February 1826.

shelves and in the drawers of the Admiralty would not be lost to the nation'.¹⁴⁹⁶ Lost it was not, as only two years later the *Nautical Magazine* was published in which the promulgation of notices emanating from the Admiralty was put on a more regular footing.

Transportation

The Hydrographer used a variety of methods to transport charts, corrections, instruments and books to their final destination, both direct and indirect. Near to the Admiralty the problem was easily solved as the *Thames* longboat and the *Royal Escape* lighter transported chart boxes for Chatham Dockyard in the latter 1820s.¹⁴⁹⁷ The vast majority of boxes were sent through Portsmouth and Plymouth often by coach but mainly by water, often with notices pasted into the lids so they would be noticed and not easily lost.¹⁴⁹⁸ The cost of transporting charts was often under scrutiny and one officer in 1817 found himself in hot water having incurred a bill of £8 by sending a single letter and chart to the Admiralty, when Hurd had to point out 'the displeasure their Lordships have so strongly expressed' to the officer.¹⁴⁹⁹ In 1818 charts were sent to Chatham, City of London, Margate, Plymouth, Portsmouth, the Navy Office (costing 8s), Sheerness, Southampton and in 1819 to Deal, Edinburgh, Hastings, Leith, Northfleet and Yarmouth, showing how the supply of charts was far from exclusively made from or to the main naval ports. Vessels supplied included the Royal yachts at Northfleet and Holyhead in 1821, who were furnished with their charts from the particular ports they were in rather than having to wait until they were at a chart depot such as Plymouth. Also the different methods of transport varied hugely in cost, with a package sent by coach to Plymouth costing £5 16s 4d and a wagon over the same distance a mere 15s 4d. Another bill in 1821 for cartage, portage and tolls to Portsmouth cost £1 15s 4d, but for the same facilities to Plymouth cost only 15s, suggesting that the weight of the consignment and quantity must have been the two factors determining the cost rather than simply the number of miles travelled from London.¹⁵⁰⁰

¹⁴⁹⁶ Pollock, *The United Service Journal*, 241.

¹⁴⁹⁷ UKHO, MLP 19/1/4, Cunningham to Croker, 16 September 1828; *ibid*, 19/1/5, Cunningham to Parry, 16 September 1828; *ibid*, 19/1/6, Cunningham to Parry, 17 January 1829; *ibid*, 19/1/8/ Cunningham to Parry, 20 February 1829.

¹⁴⁹⁸ UKHO, LB2 f.232, 26 December 1828.

¹⁴⁹⁹ UKHO, LB1 f.121 Hurd to White, 19 August 1817.

¹⁵⁰⁰ TNA, ADM17/28 Hydrographic Office accounts, 1818-23.

In Home Waters transport costs were low and the matter straight forward but further afield their supply was not so simple or direct. Two boxes for Commodore Schomburg and Commander Foster were received after the Master Attendant at Portsmouth had sent them to Commissioner Shield at Plymouth, who had to arrange for H.M. Sloop *Sulphur* to deliver them to the Cape of Good Hope.¹⁵⁰¹ Parry was known to have used the Transport Office at Deptford in 1828 when sending chart boxes to Sierra Leone,¹⁵⁰² rather than use a vessel going from Portsmouth or Plymouth. He also used the *Egginton* Transport to convey a box of instruments to South America in the same year.¹⁵⁰³ Hurd had to send a package of charts for the Danish Hydrographer to Portsmouth to catch a vessel bound for Copenhagen in 1822,¹⁵⁰⁴ all of which are just a handful of examples showing how transport (for the Hydrographer) primarily hinged upon the availability of vessels to take them.

An insight into the costs of transporting charts, instruments and chronometers can be seen in the years 1818-21. During that period Hurd's office accounts record the costs of movements both to and from the office, which show how the numbers of transactions relating to the transportation of charts were between three to six times higher than those for chronometers and instruments. Although the number of payments for chronometer transport was relatively low, with between five and twelve per year, the individual costs were remarkably higher. In 1818 £61 was spent transporting chronometers with only £18 14s 7d on charts, which was a similar story from 1819 to 1821 when the costs for chronometers and instruments was in the region of £70 and £80. Only in 1821 did the cost for transporting charts reach as high as £57 18s 3d, but overall during that period the numbers of charts produced was increasing, as was the number of ships in commission, so therefore more charts had to be moved from the Admiralty to the ports.

One incident occurred in 1816 which highlighted the problems of transporting chronometers to and from Plymouth. Admiral Duckworth, Commander in Chief at Plymouth had to transport a pocket time-keeper to Hurd by coach, but had no official person available to accompany it on its journey. Hurd suggested how the guard on the coach should be paid three shillings for its care and a similar amount 'for each guard through whose hands it may have passed'. With the security of the piece the main

¹⁵⁰¹ UKHO, MB2 f.249 Parry to Shield, 19 January 1829.

¹⁵⁰² UKHO, LB2 f.221 Parry to Young, 25 November 1828.

¹⁵⁰³ UKHO, LP1857 L665, Legge to Parry, 25 March 1828.

¹⁵⁰⁴ UKHO, LB1 f.488 Hurd to Spencer, 30 April 1822.

concern, Hurd's suggestion was down to the fact that he knew 'of no other means of getting it to London unless any officer or trusty person coming this way would be kind enough to give it pocket room'. Once in London the piece could have been delivered to its maker, Arnold at 26 Cecil Street, Strand or to Hurd.¹⁵⁰⁵ This was hardly ideal and the lack of a reliable system for transportation was liable to result in damage to timepieces, or their complete loss.

Conclusion

Supply was not without its problems,¹⁵⁰⁶ but the strategy adopted by Hurd for charts, that was later enhanced by Sheringham and Parry, was a sound one based on the use of boxes and a global network of dockyards. Such a worldwide network was a constant demand on the Admiralty and, with so few resources within the Hydrographic Office, it is not surprising that there was little time for duties outside of matters concerning chart supply before 1815. Despite the Admiralty ordering the Hydrographer to supply all vessels with the charts they needed, there was one flaw that they had not counted on and that was foreign government charts. In Parry's efforts to obtain a regular supply of them in 1828 he lamented how officers 'incidentally mentioning foreign charts of merit which they themselves happen to have met with but which in many cases, have not before been known in the Hydrographical Office'.¹⁵⁰⁷ Thus until a guaranteed regular supply could be obtained there was always some pressure on commanding officers to obtain any such charts for their vessel(s) themselves.

Hurd introduced a reasonably efficient system even though it was not perfect, as boxes were returned by ships changing from one station to another that were then inspected. Upon inspection any charts wanting were inserted, but if the box required no replenishment for superseded charts then it had been a complete waste of time transferring the box back for inspection. As time passed and the system came under the close scrutiny of Parry, Becher and Sheringham, so revisions had to be made in both the format, extent and logistics of supply that brought savings for the Admiralty and a lean and efficient system for Beaufort to build upon.

¹⁵⁰⁵ UKHO, LB1 f.64, Hurd to Duckworth, 29 July 1816.

¹⁵⁰⁶ For numerous examples of issues brought to the Hydrographer on chart supply see the letters from the port officials at the TNA in ADM1/3524 and the letters from the Hydrographer at the UKHO in LB1 and LB2.

¹⁵⁰⁷ UKHO, MB1 f.141, Minute of the supply of foreign government charts, 14 February 1822.

When in 1815 the numbers of ships in commission dramatically decreased so more resources could be put into chart production, which had a knock-on effect for supply as more charts had to be processed and supplied. The drop in number of ships also had a positive effect for the supply of chronometers as there were more to go round. However, to counter this the number of scientific voyages of discovery requiring an ever increasing number of instruments was an added drain on time and resources.¹⁵⁰⁸ Hurd's management of chronometers, before the task was taken away from him, was time consuming, especially before 1815, but after that time was one that brought him an additional revenue, albeit shortlived. With the Hydrographer's involvement with the supply of instruments, the removal of his duties supplying chronometers can be viewed as an ineffective measure by the Admiralty Board, as surely supplying the expensive timepieces and instruments from one location was cheaper than from two. Such changes in administration offered new challenges for the Hydrographer to overcome and Parry certainly mastered any new administrative process brought before him, often after suggesting the changes himself.

¹⁵⁰⁸ Supplying instruments for the 'Discovery' and survey vessels was an expensive business that was accounted for in the Hydrographer's contingent expenses, of £773 1s in 1820 alone, which was more than the cost of engraving and the purchase of timekeepers (House of Commons, *A return in detail of £3,000; charged in the Navy estimates for 1820, for contingencies relating to the service whereon the Hydrographer is employed* (London, 1821)).

Chapter 8

Chart Sales

The decision to sell Admiralty charts satisfied two demands. First, after Dalrymple produced the first Admiralty chart in 1800 and mariners became aware of such a product, they naturally wanted copies to use of the latest information of any waters. Secondly, the financial benefits to the Admiralty could be used to offset the costs of production and increase the wages of the draughtsmen. Dalrymple harboured thoughts of selling Admiralty charts as early as 1804, having written ‘when a substantial Number of Plates are engraved for Publication I intend to recommend an Encrease of Pay to the Artists out of the Produce of the Sale’.¹⁵⁰⁹ However, the actual transition from supplying only the Fleet with charts produced in the Admiralty, compared to a fully functioning commercial venture, relying on a network of agents providing a reasonable revenue to make it all worthwhile, did not happen overnight.

The British Admiralty was behind the pace as other governments, such as France, were selling their charts so why should Britain have been any different?¹⁵¹⁰ Hurd’s efforts to obtain ‘an interchange of Hydrographical charts and knowledge with all the maritime nations in Europe’ saw him confess to his Danish counterpart what was surely one of the main reasons behind wanting to sell charts:

It is necessary that you should keep in mind that many charts are published in this country over which we have no controul [*sic*] – neither can we from the nature of our Government prevent either their publication or sale, notwithstanding their known errors – these however will die a mutual death when our own surveys make their appearance.¹⁵¹¹

Hurd was well placed to make such an analysis as his time on the Chart Committee brought him into contact with hundreds of charts from which a selection had to be made of the most suitable for navigation. From a commercial perspective hindsight lets us see Hurd’s prediction as almost completely correct, as although it took many years for the Hydrographic Office to overtake its competitors, such a position was eventually reached. Therefore Hurd was the main protagonist behind the

¹⁵⁰⁹ Quoted in Cook, ‘Alexander Dalrymple’, 193 from TNA, ADM1/3522.

¹⁵¹⁰ The Dépôt de la Marine had already adopted a policy to sell charts in the 18th century (Pedley, *The commerce of cartography*, 152).

¹⁵¹¹ UKHO, LB1 f.260, Hurd to Löwenörn, 30 December 1819.

commercialism of chart selling within the Admiralty, which is examined in this chapter.¹⁵¹²

Copyright

Before any charts could be sold the issue of copyright had to be overcome. Rivalry between chart producers at the end of eighteenth century manifested itself in a court case, which brought the whole issue well into the public gaze as it was reported in *The Times*.¹⁵¹³ The Royal Danish Nautical Charts Archive (which had been established in 1784) introduced an exceptional copyright clause covering their charts in 1816, whereby they remained in copyright indefinitely even though the normal period was 70 years.¹⁵¹⁴ Hurd knew the position for maps and charts sold in Great Britain could not be the same as in Denmark, due to existing copyright legislation as passed by numerous acts of parliament. Hurd was fortunate in learning very quickly from his contacts at the Ordnance Survey (who were already selling maps to the public), the pitfalls of copyright and sales. Mudge, of the Ordnance Survey, obtained legal advice from Smith and Son in October 1816 relating to his position after the map trade had copied their information and reworked it into new maps under their own reprint. Mudge sent copies of the correspondence to Hurd in which the relevant acts of parliament were recited of 8Geo. 2.c.13, 7Geo.3.c.38 and 17Geo.3.c.57. The final act held the crucial clause for Hurd that if any reproduction was made ‘without the express consent of the proprietor or proprietors thereof’, then a ‘special action upon the case’ could be brought.¹⁵¹⁵ Key to this was establishing who exactly the proprietor was and this is where Hurd took the advice of the solicitors to ‘have engraved on the plate, and printed on each print, the day of the first publishing thereof, and the name of the proprietor’. However, where it all fell down was the lack of an exclusivity clause in any of the acts, leaving them open to the map trade to copy them.¹⁵¹⁶

¹⁵¹² Robinson states that this was one of Hurd’s two greatest achievements in persuading the ‘Board of Admiralty to issue the charts which the Hydrographic Office was preparing for the Navy to the Mercantile Marine’ (Robinson, *Marine cartography*, 127).

¹⁵¹³ *The Times*, 13 March 1789. For supporting documents and account of this matter see R.A. Skelton, ‘Copyright and piracy in 18th century chart publication’, *The Mariner’s Mirror* 46:3 (1960), 207-12 and the follow-up article H.L. Burstyn, ‘Copyright, piracy, and the practical navigators: three notes’ in *The Mariner’s Mirror* 47:3 (1961), 223-225.

¹⁵¹⁴ http://en.wikipedia.org/wiki/Det_Kongelige_danske_Søkortarkiv accessed 5 February 2009.

¹⁵¹⁵ 17 Geo.3 c.57.

¹⁵¹⁶ UKHO, LP1857 G267 Smith & Son to Mudge, 22 January 1817.

The Ordnance Survey's position was one that had complied with the acts and Mudge had never received any direct financial gain from their sale. Mudge had referred to published Admiralty charts¹⁵¹⁷ and thought that Hurd could not be the proprietor and like himself was only acting on behalf of Government. Despite this map sellers claimed that the Ordnance maps and Admiralty charts were 'the property of the public at large' and therefore open to them to do whatever they wished with them. The map sellers had a point, as the surveys from which those two organisations based their products had been paid for out of the public purse, as had their reproduction. To resolve the matter Mudge sought clarification as to what wording he should include on his maps, pointing out how even if maps and charts were protected then it would only last for 14 years.¹⁵¹⁸ The matter was referred to the Attorney and Solicitor General and subsequently directions were given to undertake legal proceedings against those who had copied the Government publications. Fundamentally Mudge was (according to legal advice) on firm ground, from which Hurd could also claim a similar position when the time came to make charts more widely available.¹⁵¹⁹ There was also a slight difference with charts in that the Admiralty had enjoyed many decades during which time they had given approval for naval officers to have their surveys published by the map trade, as they had no capacity to do so. However, that was mainly before 1800 and by 1817 the publishing arm of the Admiralty was in a position to publish them entirely by themselves, even if they had to wait.

Once the issue of copyright was firmly established the Ordnance Board went as far as publishing a notice in *The Times* in March 1817, warning those who had or intended to copy their maps that they would be taken to court for contravening the terms of the Act of Parliament.¹⁵²⁰ From the Government's perspective (including the Admiralty) this was in theory a good move to protect the data which had taken so long to gather and turn into printed maps. However, the reality of the whole issue was one

¹⁵¹⁷ He wrote 'In viewing the case submitted to the consideration of Mr Smith, towards its further elucidation, it is proper I should observe, that when the first maps were printed, and published by the Ordnance, I had recourse to the Admiralty charts, and found that the name of Captain Hurd the Hydrographer was subscribed to each plate with the period and place of its publication; and I naturally took it for granted that if I followed his example, I should give equal security to the Ordnance maps' (UKHO, LP1857 G267 Mudge to Crew, 23 October 1816).

¹⁵¹⁸ UKHO, LP1857 G267 Mudge to Crew, 23 October 1816.

¹⁵¹⁹ UKHO, LP1857 G267 Smith & Son to Mudge, 22 January 1817.

¹⁵²⁰ *The Times*, 28 March 1817.

that did not stop maps or charts being copied, but it was an issue which the Hydrographer did not lose sight of.

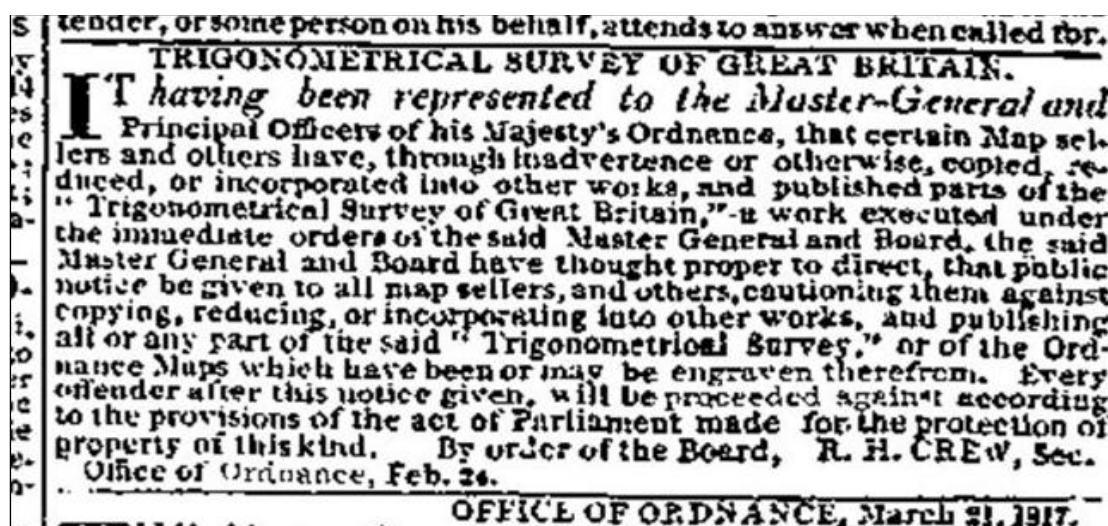


Illustration 8.1 A notice placed in *The Times* of 28 March 1817 warning the copyright pirates that they would be taken to court if caught

Parry found himself having to deal with numerous issues on that subject in the short time he was in office. He sent an interesting combination of data to the mayor of Kings Lynn in 1826, which consisted of two Ordnance Survey sheets containing hydrographic survey data added to them by hand. Both items were in copyright (but technically of different periods) and to cover the release of the hydrographic information before it had been printed Parry included a caveat in his letter.¹⁵²¹ Parry was also offered the opportunity of purchasing the copyright from a French pilot in the latter's sailing directions in 1828, along with all the 260 impressions that were left.¹⁵²² Such a decision was an easy one for Parry as it was not a precedent, as Hurd had purchased Faden's plates and impressions just a few years before, along with the rights to reproduce them.

Both of those issues were relatively straightforward for him to administer but a chart published by the Canada Company involving Admiralty copyright took four months to resolve. The Admiralty Board was approached in June 1826 to let the Company have access to surveys of Lake Huron, and the Board instructed Parry to let them have access. Shortly afterwards someone from the Company was sent to the

¹⁵²¹ UKHO, LB2 f.71 Parry to Mayor of Kings Lynn, 30 March 1826. The instruction read 'I am directed to acquaint you that, as these materials will form the basis of the charts about to be published in this office, you are particularly requested to use your utmost endeavour to prevent the soundings being published or copied in any way whatever, and that you will consider this communication as made solely with a view to further the objects for which your application was made.'

¹⁵²² UKHO, MB1 f.197 Parry to La Barre, 4 July 1828.

Hydrographic Office to examine the surveys executed by Bayfield and then the Company asked Bayfield for an extract from his journal, for which permission had to be sought from the Board. All was quiet until September when it was noticed by Bayfield how a map based on his survey was being advertised in *The Courier*, which Parry brought to the Board's attention as the information originally supplied was for the Company's own information and not to be published and sold. The Board was not happy and instructed their solicitor (Mr Bicknell) to take steps to stop the publication being printed. Subsequently the advertisement for the map was recalled and a copy of the chart was acquired by Bicknell's agents and examined by Parry. The Admiralty Board then asked, as Bayfield's surveys were in preparation for publication in the Hydrographic Office, if Parry had any objection towards them being offered for sale. As he did not, providing the correct acknowledgement was applied,¹⁵²³ the Board sent instructions for the publisher to remove the name of the Admiralty and that of the surveyor, after which the map could be published; the publishers complied with those terms letting the map be published without further delay.¹⁵²⁴ Hurd and Parry therefore showed how aware they were of the implications of the copyright acts. As head of a publishing business, which could claim to be international in that it was using data from other countries in their series, they had to apply those rules accordingly.

The road to commercialism

Approval for something as radical as the actual sale of charts to the public had to be brought before the Admiralty Board. This was a major step towards the demise of the centuries-old chart making businesses based primarily in the London area. But Hurd's first request on 12 October 1816 was denied,¹⁵²⁵ although he later claimed he never received a reply to his suggestion.¹⁵²⁶ His request was not unreasonable when he asked for permission to sell impressions of charts to help recover part of the expense of producing them. After all, the Navy had already received the main benefit from them and any revenue could be ploughed back into the office accounts to defray its

¹⁵²³ Parry stated 'I see no objection to the publication, provided the name of our surveyor, or the Admiralty, be mentioned at all. But I should think it an extremely bad precedent to allow any private persons publishing the work of our surveyors with their names affixed to it' (UKHO, MB1 fos 45-9 minutes relating to a chart published by the Canada Company).

¹⁵²⁴ UKHO, MB1 fos 45-9 minutes relating to a chart published by the Canada Company.

¹⁵²⁵ The digest entry at The National Archives (ADM 12/179) is transcribed in full and quoted in Day, *Hydrographic Service*, 27. This letter was not included in Hurd's letter book (UKHO, LB1).

¹⁵²⁶ UKHO, LB1 fos 407-11 Hurd to Croker, 28 June 1821.

costs.¹⁵²⁷ It is only speculation as to why this suggestion (if they did see it) was not granted and could have been on security grounds, whereby the Board did not want particular charts sold to the public and to their potential military rivals. However, with the Admiralty facing huge cuts, an opportunity to put money back into the coffers would have surely been well received.

All was not lost as Hurd had planted a seed, but it took a commercial chart seller to cultivate it in the form of Thomas Jones of 5 Harrington Street, Liverpool. Little did Jones know how he accelerated the demise of the private chart producer by writing to Hurd, on 23 August 1818, requesting ‘hydrographical works’ produced in the Admiralty for resale. Not surprisingly Hurd’s position at that time regarding the sale of charts had not altered from two years earlier and he wrote to Jones supporting the proposal.¹⁵²⁸ Hurd had to wait until the 16 November 1819 for the Admiralty Board to draw up a minute, when they claimed they were ‘extremely anxious that the present opportunity of peace should be employed in the advancement of Hydrographical knowledge’, even if they were four years too late. That broad-brush approach included ‘For the general use of navigation’ an instruction to the Secretary (but not stating which one) ‘for enabling the public to purchase Admiralty charts at reasonable prices’. However, contrary to what previous writers have claimed it was not as a result of Hurd’s suggestion (even if he knew what Dalrymple was thinking in 1804, which is a possibility),¹⁵²⁹ but from a letter and petition by Messrs Laurie and Whittle, London chart sellers.

As a result of their communication the Board made a decision

that all charts printed at the Admiralty press might be sold at a fair price to any one inclined to buy as is done by the Ordnance – If not then the chart makers to have the use of our Surveys.¹⁵³⁰

That was not the end of the matter as Melville drew up an additional minute. His personal view was that by not selling the charts it was detrimental to the Navy,

¹⁵²⁷ TNA, ADM 12/179.

¹⁵²⁸ Hurd wrote ‘I am however of opinion that it would be a good and advisable policy to adopt such a measure for the use and benefit of the mercantile interest of this great commercial empire. I have long been in the habit of considering all shipwreck’d merchant vessels to be a great national calamity, not only in the sacrifice of useful and valuable subjects to the state, but also a heavy and real loss to the revenue and finance of the country – on which account I should feel delighted in being directed to carry such a measure into effect’ (UKHO, LB1 f.170 Hurd to Jones, 26 August 1818).

¹⁵²⁹ Dalrymple’s thoughts on chart sales is quoted in Cook, ‘Alexander Dalrymple’, 193 from TNA, ADM1/3522.

¹⁵³⁰ TNA, ADM1/3461. Whittle died in 1818 (Fisher, *Blueback charts*, 64).

although he was not altogether happy with giving chart sellers a free rein with the Admiralty's charts, because of the liability issue and not copyright. He was concerned chart sellers would incorrectly copy the Admiralty charts and thereby issue incorrect information which could be wrongly attributed to the Admiralty. Melville finished his minute with a high level governmental view of the benefits to be had from publishing charts:

If Foreign States shall follow the example of publishing their Government Charts the benefit which the British Navy will derive from it will be proportioned to the extent and magnitude of our Naval force and power.¹⁵³¹

From granting permission to sell charts on 16 November 1819, to Hurd's presentation to Croker and the Admiralty Board on 28 June 1821 of the first printed catalogue of charts, must have been an exceptionally busy time in the Hydrographic Office.¹⁵³² This suggests it took Hurd just over a year and a half to prepare the printing of extra charts, the catalogue and setting up the agencies for their sale.¹⁵³³ He was certainly preparing extra charts at the beginning of 1821 as Baily's bill for copperplate printing was for 'office and sale charts', amounting to £122.19.9 for one quarter, ready to supply the agents. Baily was also paid for instruments used to stamp the prices on the charts offered for sale; rather than amend all the plates and dump the existing stock Hurd opted for some sort of stamping device.¹⁵³⁴ Some charts also had the price added by hand in red ink, which may have been quicker than setting up Baily's 'instrument' for applying the price (see Illustration 8.2).

¹⁵³¹ TNA, ADM1/3461. Melville's view on the liability of Admiralty data was well founded as there were many cases of Admiralty charts being cited in the popular press as being at fault. These were particularly damaging when the fault caused the loss of life and property, and the finger was pointed solely at the Admiralty as the cause.

¹⁵³² UKHO, LB1 fos 407-11 Hurd to Croker, 28 June 1821.

¹⁵³³ Ex inf Susanna Fisher, Lt-Cdr A.C.F. David R.N. (ret'd) and Dr Andrew Cook of the British Library have all searched over previous decades for one but never succeeded in actually seeing one. Although an example of that first catalogue has not come to light I discovered a fragment of one page of a pre-1825 catalogue at Orchard Wyndham, Somerset in 2000.

¹⁵³⁴ TNA, ADM17/28 Hydrographer's accounts, 1818-23.

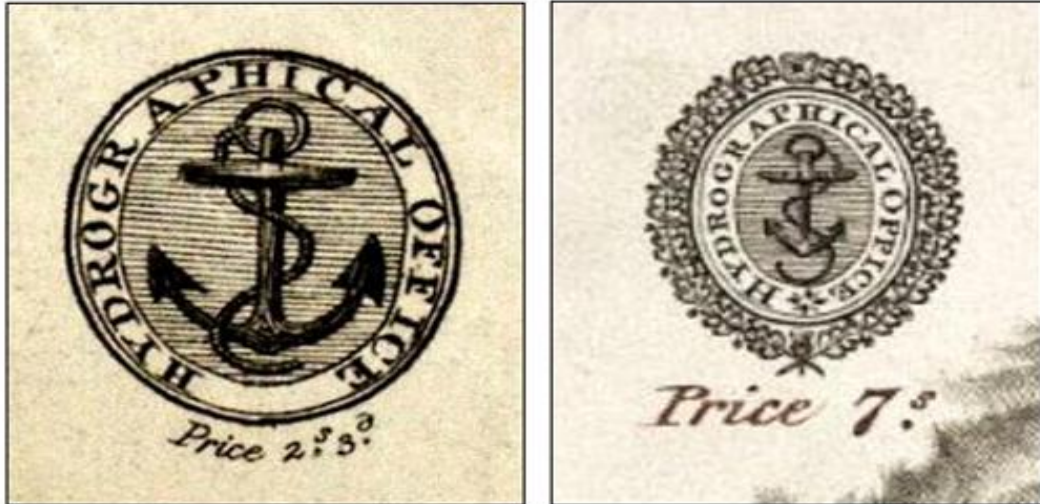


Illustration 8.2 Examples of engraved and manuscript pricing on Admiralty charts (left: Gulf of Carpentaria, 1814 ref: NMM, G262:8/1 and right: a Plan of the harbours and fortifications of Valetta in the island, 1821 ref: NMM, G234:4/10)

Hurd presented not only a catalogue to the Board which would be distributed by him but also a detailed letter, of typical Hurdonian style, containing his view on the (then) current position of chart selling. The sale of charts was in his view ‘for the general benefit of the mercantile interest of these kingdoms as well as for that of navigators in every part of the World’ and their prices had been set at a relatively low price. The reason for such a pricing strategy was not to compete in the market place with the chart trade, because after all what he was selling was unique, but to bring the information into circulation at a price which made it commercially unviable for anyone thinking of copying them.¹⁵³⁵ This was one way at least Hurd thought he could scupper the plans of the chart trade to pirate Hydrographic Office publications, thus avoiding any litigation or bad feeling between the Admiralty and private industry. However, by selling them at a much lower price than their commercial counterparts Hurd had unwittingly placed their marketability on very difficult ground, as the chart sellers made more commission from selling the more expensive charts of Norie, Laurie or Blachford. It was therefore in the agents’ interests to push sales of the privately produced charts rather than those from the Admiralty, even if the latter were superior, the issue was a fiscal one on which their livelihood depended. Coupled with the sporadic coverage of Admiralty charts and with the blueback charts having a

¹⁵³⁵ UKHO, LB1 fos 407-11 Hurd to Croker, 28 June 1821.

longer shelf life, the Admiralty charts offered for sale in the 1820s and 1830s were not such a good marketable product as a whole compared to their commercial rivals.¹⁵³⁶

Hurd also had to overcome the problem of setting the price of Admiralty charts. This was not done on a whim as figures were drawn up using a calculation based upon the cost of engraving, agency fees, an estimate of the number needed to be sold to 'clear the expence of the plate' (exclusive of the cost of drawing) and the cost of paper and printing. Therefore initial prices were determined by the cost of production, rather than the age of the surveys, or how much information was contained on the plate. For example, a chart of Poros (published in 1828) if 300 copies of it were sold then the 'profit', if it can be considered as such, was only £12 10s, almost 30% of the selling price. When Parry prepared his equation for establishing the price of charts he must have expected sales to be high enough to warrant 300 copies being printed, but also that sales would significantly subsidise the production costs of plates from which the Navy would benefit.¹⁵³⁷

Once the prices had been set the catalogue could be completed. As with most areas of hydrographic office administration even the simple issuing of a catalogue caused contention, as Faden claimed that he should have his name inserted on the title page as not only the publisher but the 'sole appointed agent for their sale'.¹⁵³⁸ That claim was based on a decision made by the Admiralty Board after Faden had put forward such a proposal in November 1820, but he was only given the right to be an agent (at the same time Hurd was instructed to prepare a catalogue)¹⁵³⁹ and questions should be asked why Faden thought he had the right to claim he was the publisher. Even though Faden wanted to redistribute Admiralty charts to Messrs Arrowsmith of Soho Square, Laurie of Fleet Street and Norie of Leadenhall Street, who he described as 'secondary dealers of whom they may likewise be purchased', it was possibly his position as King's Geographer that led him to that deluded conclusion as the sole agent. Hurd pointed out to the Board how such a claim would be blatantly obvious to anyone purchasing an Admiralty chart to be incorrect, especially as Admiralty charts

¹⁵³⁶ Board of Trade, *Memorandum relating to the supply and corrections of charts* (London, 1882), 4.

¹⁵³⁷ UKHO, MLP3/6 'Scale of prices for the Admiralty charts'. The chart of Poros became number 212 in the *Catalogue of charts* . . . for 1839 and carries the title *Plan of the Ports of Poros in the Bay of Ægina, Coast of Greece*. As an Imperial size chart, to produce it would have cost 5½d per sheet for paper and printing but, with the cost of engraving, agency fees and a profit margin added, the cost to the public was 3s.

¹⁵³⁸ UKHO, LB1 fos 407-11 Hurd to Croker, 28 June 1821.

¹⁵³⁹ TNA, ADM12/204.

contained the name of the publisher on them, which was certainly not Faden but the ‘Hydrographical Office’! There was also a conflict of interests with Mr. Arrowsmith, who at that time was the King’s Hydrographer. If Arrowsmith decided not to back Faden’s proposal, it would have been detrimental to the sales of Admiralty charts because the number of retailers would have dropped by a third. More damaging would have been the bad feeling which could have arisen between Hurd and Arrowsmith who had been a great supporter of the Hydrographic Office, freely lending documents for Hurd’s use over the years for official purposes.¹⁵⁴⁰ Hurd’s solution to the issue was relatively straightforward and his recommendation for Faden and Arrowsmith to be made agents under equal terms was accepted by the Board.¹⁵⁴¹

Another difficulty occurred when Laurie complained to Hurd of Steel and Company’s blatant advertising of an official sanction from the Admiralty of their status as official chart sellers to the Admiralty Board, including the use of the Admiralty seal on their publications.¹⁵⁴² This was not a false claim as the Admiralty had purchased charts from them as they had from Laurie, who also advertised a similar fact.¹⁵⁴³ However, the Admiralty stopped purchasing charts from Steel in about 1813,¹⁵⁴⁴ and Steel and Company were not included as chart agents by Hurd as they went bankrupt in 1819, after which they were acquired by Norie (who did eventually become an agent).¹⁵⁴⁵ In the clamour to become an agent for the sale of Admiralty charts these were more than trivial issues which had to be resolved, since becoming an agent brought with it an official seal of Government approval from which both sides could benefit but could also have been damaged.

Chart agents

The names of the Admiralty’s agents appeared on the title page of the catalogues issued by the Hydrographic Office until 1829 and demands to become agents came not only from London but also from Liverpool. From Liverpool, Thomas Jones of 5 Farrington Street applied in July 1821 for such an appointment covering the ‘Western

¹⁵⁴⁰ UKHO, LB1 fos 407-11 Hurd to Croker, 28 June 1821.

¹⁵⁴¹ TNA, ADM12/204.

¹⁵⁴² UKHO, LB1 f.230 Hurd to Croker, 14 June 1819; TNA, ADM12/193, Digest entry dated 29 January 1819. See also TNA, ADM1/3460 for the minutes and original correspondence.

¹⁵⁴³ See the publisher’s imprint on J. Purdy’s *Memoir, descriptive and explanatory, to accompany the new chart of the Atlantic Ocean* published by Richard Holmes Laurie in 1820, in which Laurie states he is ‘Chart seller to the Admiralty, &c &c’.

¹⁵⁴⁴ UKHO, LB1 f.195 Hurd to Barrow, 29 January 1819.

¹⁵⁴⁵ Fisher, *Blueback charts*, 89.

and Northern districts of this country',¹⁵⁴⁶ as well as Mr Walker of Pool Lane in November the following year. Both were appointed in December 1822 under the same terms as Faden,¹⁵⁴⁷ being evidence of the commercial importance of the financial rewards that were to be gained from the sale of Admiralty charts. Jones was commercially astute as he asked Hurd for permission to have his charts direct from the Hydrographic Office on the same terms as the two London agents,¹⁵⁴⁸ thus obtaining charts at a much better rate than as a sub-agent. It was most likely that either Jones or Walker supplied John Bywater and Company of the Mathematical and Navigation Warehouse, 20 Pool Lane, Liverpool, with Admiralty charts, as the latter advertised in the *Liverpool Mercury* in February 1823 that they had 643 different Admiralty charts for sale.¹⁵⁴⁹ Bywater had not been appointed by the Admiralty Board as a chart agent, so he must have made his own arrangements with Jones or Walker regarding supply and commission. Having two agents in the same street in Liverpool could not have been a great financial move, but at that stage demand possibly warranted two outlets for charts. However, the popularity of Admiralty charts in the city was not great as in the 1850s when they could not be procured there so that an agent was set up for their sale; it was subsequently found that many Liverpool vessels sailed without the most up-to-date charts.¹⁵⁵⁰

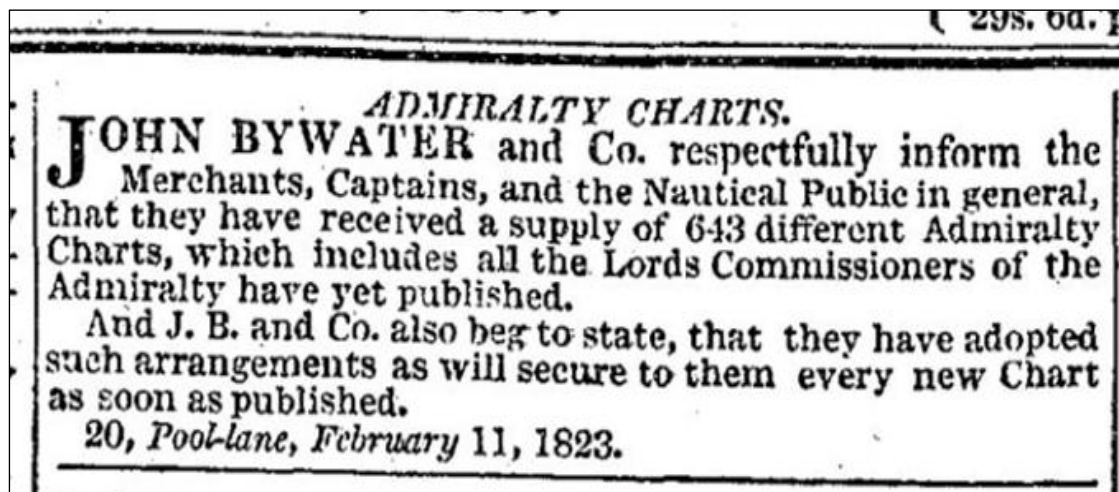


Illustration 8.3 Bywater and Company's advert in the *Liverpool Mercury* of 21 February 1823.

¹⁵⁴⁶ UKHO, LB1 f.421 Hurd to Croker, 25 July 1821; *ibid.*, f.514 Hurd to the Admiralty Board, 20 November 1822.

¹⁵⁴⁷ UKHO, LB1 f.517 Minute concerning chart sellers, 5 December 1822.

¹⁵⁴⁸ UKHO, LB1 f.518 Jones to Hurd, 14 December 1822.

¹⁵⁴⁹ *Liverpool Mercury*, 21 February 1823.

¹⁵⁵⁰ Board of Trade, *Memorandum relating to the supply and corrections of charts* (London, 1882), 20.

With the agencies established and charts starting to be sold, so the business of managing the agents was added to a growing list of duties for the Hydrographer to undertake. In the months leading up to Hurd's death communications with Colby of the Ordnance Survey took place over the issue of the financial terms under which charts were sold. Colby cited the terms on which the Ordnance worked with their agent, Mr James Gardner of Regent Street, who Colby thought would be a good replacement for Faden when the latter retired (on 25 March 1823). Such a move might have attracted more people to Gardner's shop and thus increased the sale of Ordnance maps, but Colby thought that making Gardner a main agent from which the sub-agents could procure their charts a bad move for the Ordnance. His thinking centred around one person undertaking all the distribution of Ordnance maps and Admiralty charts, with the possibility of all sub-agencies selling both products, although he thought 'Agents at the Out ports' were not likely to sell many of the Ordnance maps. The matter was referred to Hurd and a month later a suggestion was put forward for another agency to be opened in London, but at the east end of 'town' so as not to rival the 'House of Arrowsmith' (at Soho Square) and Mr J. Wyld (at Charing Cross). The issue here was a geographical one and Mr Gardner's house in Regency Place was poorly located to take advantage of the trade from 'where Sea faring people generally resort or reside'. Despite this there was no appointment of a 'Chart Agent for the Eastern district of London'.¹⁵⁵¹

After Hurd's death, the business of dealing with the agents' accounts in the Hydrographic Office was taken up by William Nares. He did not have the sole responsibility for accountancy matters as Dyer, the Chief Clerk, prompted him to write to Jones in August 1823 asking for his accounts for the first half of 1823 as all of the other agents had submitted theirs.¹⁵⁵² Jones replied three days later but Nares found the accounts were defective as they included eight errors; Nares wrote to Jones and asked him to explain the matter.¹⁵⁵³ Jones continued his agency ordering all the charts from the surveys of DeMayne in November (which were supplied through

¹⁵⁵¹ TNA, ADM1/3462 Correspondence to Croker, 5 March and 5 April 1823. By the time the 1825 catalogue was issued there were only five agents in the city.

¹⁵⁵² UKHO, LB2 f.8 Nares to Jones, 20 August 1823.

¹⁵⁵³ Nares asked Jones 'You will therefore be kind enough to explain this, as well as to mark the full price in writing against each chart or section sold, which can easily be obtained from the catalogue – 25 pr. cent will then be deducted from the sum total for your agency, and the balance must be paid into the hands of Mr. Dyer by any one you may please to depute, to whom a receipt will be given' (UKHO, LB2 f.9 Nares to Jones, 23 August 1823).

Nories of Leadenhall Street)¹⁵⁵⁴ and a request for any sailing directions by the same officer was not met as none were to be had.¹⁵⁵⁵ All the agents were sent a circular from the Hydrographic Office asking them for their half-yearly accounts on 6 January 1824¹⁵⁵⁶ and a close eye was kept on their dealings.

It was not long before additional agencies were established at Messrs. Kingsbury, Parbury and Allen in Leadenhall Street¹⁵⁵⁷ as well as R.H. Laurie of Fleet Street, both of whom were appointed by the Admiralty Board in February 1824, bringing the number of agencies in London to five. They were subsequently sent two sets of all the charts in the catalogue, along with the latest ones recently advertised in the press, with one set in loose sheets and the other bound in stiff paper covers. More importantly were the terms and conditions under which they had to act as agents: receiving the stock on sale or return and settling their accounts every half year (on 30 June and 31 December) with the Hydrographer, in return for which they received 25 percent of everything sold. They had to hold a ‘standing stock of two copies of each chart . . . which if soiled, or damaged by fair wear, will be received back or exchanged’ and additional stock could be added upon written application. The agents also received all new charts and any corrected editions, when the superseded version had to be returned to the Hydrographer.¹⁵⁵⁸

Whilst Parry was away in the Arctic, responsibility for managing the agents fell on Walker’s shoulders, who sent six copies of the 1825 catalogue to Jones, along with an order of charts, plus all the new charts recently produced in the office, on the ‘Liverpool van’ in April 1825.¹⁵⁵⁹ Shortly afterwards Clerk & Co. of Gracechurch Street became agents,¹⁵⁶⁰ increasing the number of agents in London. In the following January a ‘new arrangement’ was introduced for the cost of charts to agents, when if the whole catalogue was taken in sections the cost was £44 13s 9¾d compared to £50 2s 11d in single sheets. Both options were profitable for the Admiralty as the cost of

¹⁵⁵⁴ UKHO, LB2 f.12 Nares to Jones, 21 November 1823.

¹⁵⁵⁵ UKHO, LB2 f.18 Nares to Jones, 29 December 1823.

¹⁵⁵⁶ UKHO, LB2 f.20 circular letter, 6 January 1824.

¹⁵⁵⁷ UKHO, LB2 f.29 Parry to Messrs. Kingsbury, Parbury and Allen, 17 February 1824; *ibid.*, f.30 minute 17 February 1824. This firm published Gilchrist’s *The General East India Guide* (in 1825) when they described themselves as booksellers to the H.E.I.C. and thus had connections to part of the maritime market.

¹⁵⁵⁸ UKHO, LB2 f.29 Parry to Messrs. Kingsbury, Parbury and Allen, 17 February 1824; *ibid.*, f.30 minute 17 February 1824.

¹⁵⁵⁹ UKHO, LB2 f.52 Walker to Jones, 8 April 1825.

¹⁵⁶⁰ Clerk & Co. approached the Admiralty with a view to becoming chart agents on 16 May 1825 (TNA, ADM12/230).

‘printing and paper for one copy’ was only £13 7s 7d, which gave a healthy mark up for their investment.¹⁵⁶¹ When Parry returned he took back the responsibility from Walker. Whilst he was away it appears there was some confusion over the issue of ‘detached charts’ supplied to the agents. He discovered that some, or possibly all, of the agents had not been accounting for detached charts at the end of each year. Therefore Parry ordered them to be returned, expecting ‘a similar settlement’ to be made in future ‘without further notice to that effect, at the close of each year’.¹⁵⁶² It appears Parry was only dealing with the bigger issues at that time, as Nares had to deal with another issue concerning Jones’s accounts in March 1826.¹⁵⁶³

Whilst Parry was away (again) on his Arctic voyage in 1827 and Becher was dealing with the agents, a review was undertaken of the geographic distribution of the agencies. A decision was made to reduce the number of agents (or depots as they were sometimes referred to) by doing away with those whose sales were the least. Subsequently Jones, who had been an agent for four years was let go in favour of the Walkers; he was informed to hand over all of his charts to his Liverpool rivals on 9 July 1827.¹⁵⁶⁴ His account was not closed until 17 November, over four months later.¹⁵⁶⁵ On 28 July three other agents, Kingsbury, Clerk and Co. and Blachford were also dismissed,¹⁵⁶⁶ but the capacity for selling Admiralty charts was not totally on the decline.

¹⁵⁶¹ These figures can be found pasted in to the 1826 catalogue held at the UKHO.

¹⁵⁶² UKHO, LB2 f.58 Parry to all chart agents, 12 January 1826.

¹⁵⁶³ UKHO, LB2 f.70 Nares to Parkinson and Frodsham, 30 March 1826.

¹⁵⁶⁴ UKHO, LB2 f.82 Becher to Walker, 9 July 1827; *ibid*, Becher to Jones, 9 July 1827.

¹⁵⁶⁵ UKHO, MLP62/1/i Accounts of Thomas Jones, 1823-7.

¹⁵⁶⁶ UKHO, OD814 Becher’s journal, entry 28 July 1827.

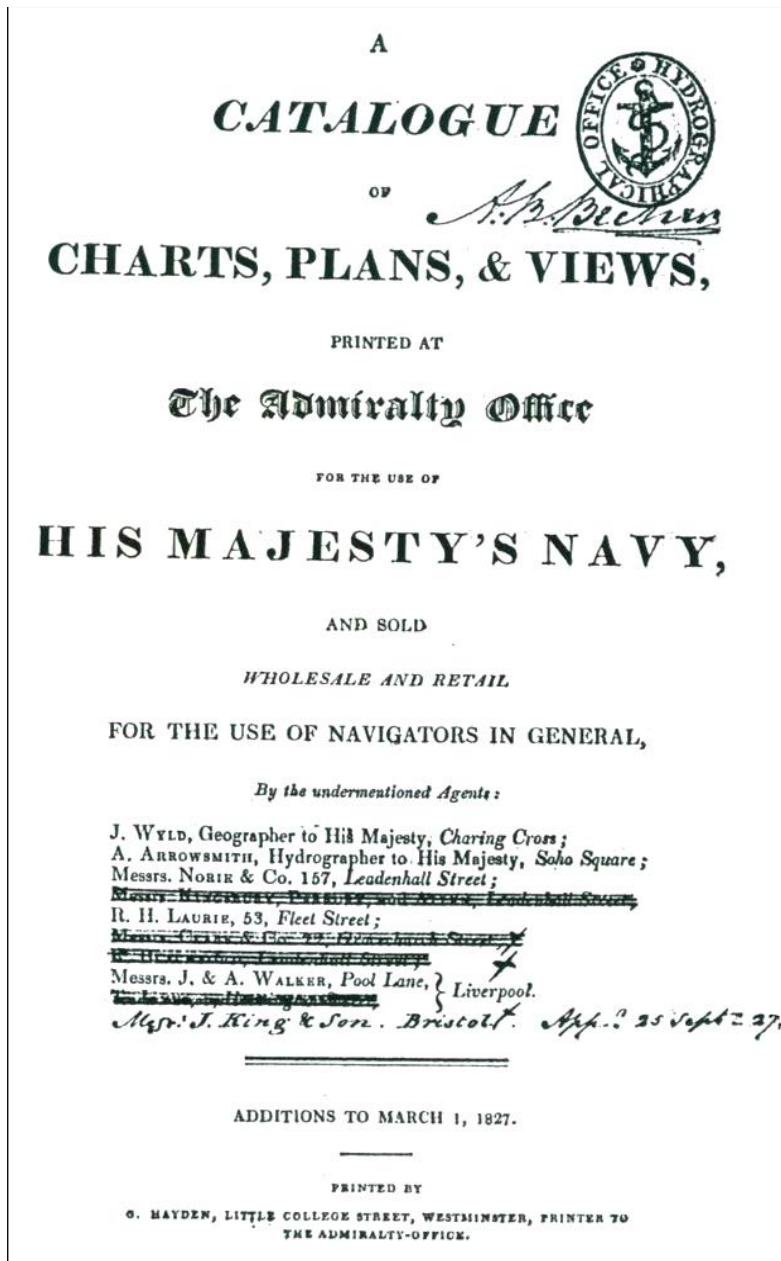


Illustration 8.4 The title page of the office copy *Catalogue of Charts* . . . annotated and signed by Becher to show the changes of agents in 1827 (UKHO)

To try and increase sales the geographic network of agencies was expanded to include Bristol. Messrs King and Son of Clare Street, Bristol, were written to by Becher on 26 September 1827 informing them of their appointment by the council of the Lord High Admiral and enclosing the terms under which they were to operate. The terms had not changed a great deal from those which the existing agents worked under, only that their accounts had to be settled within 14 days of June and December deadlines. One important clause stated ‘when called upon, the agents will be expected to produce the bound sections in good order’, but whether anyone ever checked this

clause was being carried out as far from London as Bristol was, or Liverpool for that matter, has not come to light.¹⁵⁶⁷ The revised terms were also sent to the five remaining agents, Messrs. Norie, Laurie, Wyld, Arrowsmith and Walker in March 1828,¹⁵⁶⁸ bringing all five agencies under the same terms. Regrettably King and Son failed to sell many charts and they were disposed of in August 1828, leaving the four London agents and Walkers in Liverpool.¹⁵⁶⁹ This was a somewhat surprising move as the Hydrographic Office needed an agent in the West of England, but despite Bristol being in the top five ports in the country the agency was short-lived.

As the possibility of selling Admiralty charts and publications became more widely known, so did the demand from businesses wanting to sell them from further afield than Bristol. William Heron and Co. of the Nautical Warehouse, Greenock, asked to become agents in October 1828, pointing out that:

As no agent has been appointed in this part of the country, for the sale of charts published at the Hydrographical Office; and, as mariners trading here have, therefore, no opportunity of obtaining the accurate draughts issued by the Admiralty; and, as ours is the only establishment on the Clyde, which is appropriated solely to nautical science, we beg leave to propose ourselves as agents.¹⁵⁷⁰

They also gave their business credentials, offering Messrs Robert Molyneux chronometer maker of 44 Devonshire Street, Queens Square, Laurie and the Walkers (both existing Admiralty agents), and Mr Troughton of Fleet Street as referees to their good character.¹⁵⁷¹ They were accepted as agents but not on the same terms as the existing ones, as Herons had to select ‘such charts only as you may consider generally saleable at Greenock’,¹⁵⁷² rather than every chart in the catalogue. This was a sensible move by Parry, as it meant less work in the office not having to send them corrected and new charts of areas where there was no interest from the chart-buying community at Greenock. Herons returned the list having only selected ‘those charts which are in

¹⁵⁶⁷ UKHO, LB2 f.84 Becher to Messrs. King and Son, 26 September 1827. Some alterations and erasures were made to the agreement by Mr. Dyer’s. After they received their appointment they wrote to Becher on 29 September (UKHO, LP1857 K82 King & Son to Becher) with their acknowledgement which arrived in the Admiralty on the 3rd of October requesting their charts, when Becher was ‘employed preparing them’ (UKHO, OD814 Becher’s journal, 1827).

¹⁵⁶⁸ UKHO, LB2 f.116 Circular to Messrs. Norie, Laurie, Wyld, Arrowsmith and Walker, 28 March 1828.

¹⁵⁶⁹ UKHO, LB2 f.183 Becher to Messrs. King and Son, 22 August 1828.

¹⁵⁷⁰ UKHO, LP1857 H545 Heron and Co. to Parry, 15 October 1828.

¹⁵⁷¹ UKHO, LP1857 H545 Heron and Co. to Parry, 15 October 1828.

¹⁵⁷² UKHO, LB2 f.218 Parry to Heron and Co., 20 November 1828.

ordinary demand here; some, of course, seldom called for than others'.¹⁵⁷³ Having resolved the logistics of how to settle their accounts the issue of transporting the charts, in the least expensive way, to Greenock had to be addressed and advice was sought from Herons.¹⁵⁷⁴ Like many aspects of Parry's administration the matter was not easily solved, as there was no direct communication between the Clyde and London. The best option was to send packages of charts on a vessel from Carron Wharf, Wapping, every Thursday and Sunday, from which goods were forwarded to Greenock 'at about a third less expence of carriage, than if transmitted by any of the Leith smacks'; Parry subsequently instructed Sheringham to look into the terms under which this could be achieved.¹⁵⁷⁵ On Christmas Eve 1828 the charts were sent and a receipt was asked for, with Herons instructed to make their own arrangements for the payment of their bills through a London banker of their choice.¹⁵⁷⁶ The charts took some time to arrive at Greenock as a receipt for them was not sent until 30 January 1829.¹⁵⁷⁷

Changing the existing system

With the amount of work involving Hydrographic Office staff in dealing with the agents for selling its charts, there must have come a time, possibly as early as 1823,¹⁵⁷⁸ when a decision was made to change the existing system. The capacity within the office for dealing with a large number of agents was not in place and so it made sense to reduce the number of agents who were dealing directly with the office. This meant going back to a suggestion made by Faden in the early 1820s whereby one agent should be appointed from whom all sub-agents obtained their charts. Such a decision was not made on a whim, as Parry undertook some research into the feasibility of that proposal. He consulted his counterpart at the Ordnance Survey (Mudge) as Hurd had done, as well as instructing Sheringham (who was dealing with the supply of publications to the agents at that time) to prepare a feasibility study on the current state of the agency arrangements.

Around that time Becher prepared a report on the subject, calling it an 'Account of chart selling' but added no date to it, although it could not have been

¹⁵⁷³ UKHO, LP1857 H546 Heron and Co. to Parry, 26 November 1848.

¹⁵⁷⁴ UKHO, LB2 f.223 Parry to Heron and Co., 5 December 1828.

¹⁵⁷⁵ UKHO, LP1857 H547 Heron and Co. to Parry, 8 December 1828.

¹⁵⁷⁶ UKHO, LB2 f.231 Parry to Heron and Co., 24 December 1828.

¹⁵⁷⁷ UKHO, LP1857 H550 Heron and Co. to Parry, 30 January 1829.

¹⁵⁷⁸ TNA, ADM1/3462 Correspondence to Croker, 5 March and 5 April 1823.

written until the end of 1828 at the earliest.¹⁵⁷⁹ This was more of a ‘possible’ solution to the accountancy problems associated with chart selling, but nevertheless Becher pulled no punches, opening his account with the issue that needed addressing:

The settling of the accounts with the chart agents on the present system of sale or return, materially interferes with the duties of this branch of the Hydrographic Office, occasioning much unprofitable employment of time by the return of charts at stated periods for the above purpose, and which already in some degree had been productive of the disorder in it.¹⁵⁸⁰

He pointed out how matters were only getting worse due to the increasing number of charts that were being produced, but could easily be remedied by having only one depot in London, Liverpool and Bristol. Instead of an agent who was not a chart producer being the sole agent in London, Becher suggested Mr Wyld should have that position, but this suggestion did not address the issue of Admiralty charts being pirated by the map trade. It also contradicted itself as Becher listed three more agents in London and one in Greenock over and above what he proposed for the three cities.¹⁵⁸¹ Armed with such a suggestion in the first few days of 1829 Parry contacted R.B. Bate of 21 Poultry with a proposal for him to become the sole agent. Bate was not a chart producer, or one of the existing agents, but he was connected with navigation as his main business was as a scientific instrument maker. By 9 January Bate knew of the proposed reduction in agents and asked if he could take over one of them on a trial basis. Bate also hoped Parry would ‘do him the favour to entrust one of his officers to inspect the unexampled means which he proposes for advantageously showing maps and charts’, which was passed to Sheringham.¹⁵⁸²

Sheringham’s feasibility study was completed on 12 January 1829 from which it is clear how the agenda within the office was one that wanted more publicity for the sale of charts, as well as for ‘securing to the Government greater advantages from so valuable a stock of hydrographical information’. It was Sheringham’s view that agents should be made to feel part of the establishment and thus benefit from the

¹⁵⁷⁹ The dating of this note is based on the fact that Herons did not become chart agents until the end of 1828 by which time King and Sons had been dismissed. So it is likely a mistake was made when this list was drawn up late in December 1828 or in the first few months of 1829 that King and Sons’ name was included by mistake.

¹⁵⁸⁰ UKHO, MLP 62/1/v Account of chart selling by Lieut. Becher, c.1829.

¹⁵⁸¹ UKHO, MLP 62/1/v Account of chart selling by Lieut. Becher, c.1829.

¹⁵⁸² UKHO, LP1857 B930 Bate to Parry, 9 January 1829. For a very brief account of his appointment but a very detailed account of his life, including his later dealings with Beaufort, see A. McConnell, *R.B. Bate of the Poultry 1782-1847, the life and times of a scientific instrument maker* (London, 1993).

‘respectability’ which that brought. It was thought this would partially offset the poor financial benefits for the agents, despite the fact they had the charts in their hands ready to include the Admiralty’s data into their own products without having to buy them! Concerns over the way in which agents included the Admiralty’s data into their own products was also highlighted and subsequently Sheringham drew up seven suggestions, first of which was the appointment of only one chief agent to be based in London. Other suggestions included how the chief agent (with the sanction of the Hydrographer) should appoint all sub agents, entering into a bond not to publish any hydrographical matter or to be an accessory to any pirated work, to hold a stock of 30 copies of each item offered for sale, given an allowance for advertising, allowed the charts at 35 percent and the ability to set his own rates with the sub-agents. He also suggested how someone in the Hydrographic Office should take responsibility for making sure any incorrect, or out-of-date charts, were taken out of circulation as soon as possible and how the agents of Lloyds should be encouraged to publicise the existence of Admiralty charts.¹⁵⁸³

Sheringham’s report marked a turning point for chart sales as Parry took up his proposals with great enthusiasm, writing to Mudge two days later concerning the arrangement the Ordnance Survey had with their sole agent, Mr Gardner of Regent Street. In reply Mudge pointed out to Parry the problems with the sole agency under Gardner’s predecessor (Faden), including the lack of incentive to push the sales of Ordnance maps as Faden had his own maps to sell. The Ordnance Board subsequently agreed to a sole agency with Gardner, granting him an allowance of £100 per year for the first three years, as well as ten percent profit, but he was bound ‘not to sell any other maps which would supersede the Ordnance maps’. Mudge was very happy with the agreement as Gardner had to arrange any binding, haulage, accountancy and returns, for which he received 20 percent of the selling price.¹⁵⁸⁴ The Ordnance changed the system shortly afterwards, adopting a rate of commission based on the scale of the map sheet with a fixed fee for selling to the public, which Mudge felt was of little benefit to Gardner’s trade customers.¹⁵⁸⁵

Armed with this information Parry was able to offer Bate terms for a sole agency at the end of January 1829, which critically was based on a 40 percent

¹⁵⁸³ UKHO, MLP 62/1/iv Lieutenant Sheringham’s suggestions for altering the appointment of chart agents, 12 January 1829.

¹⁵⁸⁴ UKHO, MLP 62/1/ii Mudge to Parry, 15 January 1829.

¹⁵⁸⁵ UKHO, MLP 62/1/iii Mudge to Parry, 21 January 1829.

discount. Parry was faced with having to give an extra 15 percent above the normal 25 percent given to the existing agents, because Bate had the ‘occasional necessity of giving credit and incurring risk, the frequent necessity of giving out sets to my own agents, which can only be taken as a total loss’. Bate suggested those terms as he needed to give out charts to his own agents and he drew up a circular (see Appendix 26) announcing his appointment as well as a proposal for the location of his sub-agents at London, Liverpool, Leith, Bristol, Portsmouth, Plymouth, Yarmouth, Dublin, Belfast, Cork, Limerick and Hull. The circular included ideas for the promotion of Admiralty charts at those ports ‘more generally than at present among the mercantile shipping of Great Britain’ and Bate offered the opportunity for ‘all captains, owners, and underwriters to inspect the collections of charts and plans at any of the depots’. He also offered correct charts from the latest Royal Navy surveys ‘as well as the discoveries of foreigners’.¹⁵⁸⁶ Bate’s proactive approach to marketing Admiralty charts was a big step forward compared to the paltry efforts prior to that time and the announcement of his appointment (dated 31 January 1829) appeared in the *Navy List*.¹⁵⁸⁷

Despite the efforts made by Parry in acquiring the necessary information to not only support the idea of how a sole agency was more efficient than having numerous agents, and negotiating with Bate to take on the position, no formal proposal was made to the Admiralty Board until May. The reasons for the delay may have been due to Parry’s disgruntled feelings towards Croker and his decision to resign as Hydrographer, which saw him serve until 18 May 1829. Parry and Beaufort drew up a joint proposal to the Admiralty Board on 27 May 1829 pointing out how there were at that time four agents in London and three at the out-ports, as well as explaining the financial rewards they received from any sales. The two Hydrographers openly stated how they felt the agents benefited more than the Admiralty from the existing arrangement. This may explain why Wyld had made so many sales compared to the other agents who were making and selling their own charts. They went on to highlight the problems Sheringham was having with the agents’ accounts as well as

¹⁵⁸⁶ UKHO, MLP 62/1/vii Bate to Parry, 31 January 1829.

¹⁵⁸⁷ Day, *Hydrographic Service*, 42.

suggesting how a sole agent should be appointed ‘who shall reside in a part of the town favourable for that purpose’.¹⁵⁸⁸

Like the Ordnance Survey model Hurd and Parry also wanted the sole agent to enter into a bond to prevent him, or her, from producing or being involved in the publication of any charts, although they did not mention sailing directions. What was more radical and reflected a big change from the terms under which the existing agents were contracted, was the clause ‘To supply him with charts at his own choice and risk for sale alone, and not on return – and without the deposit of a complete set in his hands as heretofore’. Such a clause left the Admiralty in a difficult position, as if the sole agent decided not to order a particular chart from the catalogue then how was he supposed to advertise it in his premises, or supply it to his customers in a timely fashion. The sole agent could also appoint any sub-agents and he would receive 40 percent on the sales, compared to the existing 25, which Parry and Beaufort justified by stating to the Board how the arrangement was not particularly different from the existing one.¹⁵⁸⁹ Their optimism was shared by Melville who on 1 July approved the suggestions, but Beaufort was not instructed to carry it into effect until the 24th of July, with Bate officially acting in the position on 25 September 1829.¹⁵⁹⁰

Parry’s revision of the system and his appointment of Bate appeared to be for the best. Certainly the length of time for which Bate held the position indicates how the system was a favourable one for the Admiralty, even though complaints were received of the unavailability of charts to Bate’s sub-agents, on one occasion causing a sub-agent to obtain charts direct from the Hydrographic Office,¹⁵⁹¹ which was what Parry wanted to avoid. However, the problem of piracy could not be overcome and there was a clear resentment between the Admiralty and the chart makers, but the expansion

¹⁵⁸⁸ They wrote ‘From the small quantity of charts sold by these agents it is not too much to infer that one of their principal objects in accepting the agency is the advantage of being furnished with the earliest hydrographical information which they immediately insert in their own charts; and it is obvious that the sale of their own charts is far more profitable to them, and therefore more their interest to urge, than the sale of the Admiralty charts’ (UKHO, MB1 fos 357-8 Minute on chart agents, 27 May 1829).

¹⁵⁸⁹ They wrote ‘On due enquiry it does not appear that this would be too great an allowance – in fact no more would be virtually paid than under the present arrangement – the accounts would be comparatively simple – and there seems to be good reason to believe that the sale of the charts would be considerably increased’ (UKHO, MB1 fos 357-8 Minute on chart agents, 27 May 1829).

¹⁵⁹⁰ UKHO, MB1 fos 357-8 Minute on chart agents, 27 May 1829. An advertisement stating Bate’s position dated 15 February 1830 can be found amongst Admiralty Circulars (Admiralty Library, uncatalogued).

¹⁵⁹¹ Fisher, *Blueback charts*, 91.

of the sales operation was one of the factors that ultimately saw the combination of the various chart producing firms into one company and their demise.

Advertising, newspapers and the Catalogue of Charts

One of the reasons for the poor take up of Admiralty charts during the early years was a lack of advertising and it is clear many agents relied solely upon their existing customers noticing them when they were on their premises. As there was no great incentive for the agents to promote their sale then it is not surprising their sales were low. Parry's scheme for the reciprocal exchange of charts with other hydrographic offices, had it actually been put into place, would have been a good way of advertising their existence to foreign hydrographic offices who in turn could have informed their suppliers, but this was another missed opportunity thanks to diplomatic protocol and Croker's interference. By 1821 the Ordnance Survey had opened subscription lists for their maps in many county towns¹⁵⁹² but the Admiralty did not follow their example, relying on the fact they had to produce the charts for Fleet use and even if they sold a few of the surplus the cost of their production became negligible. Whereas the Ordnance Department were unaware of the number of purchasers of their maps!

The Admiralty Board made an official announcement on 30 June 1821 regarding the sale of Admiralty charts, but it appears from one copy of the printed circular that only 30 copies were made, which would barely have covered the usual destinations for Fleet announcements. This meant there were very few, if any, left over to circulate to the public to advertise the launch of this new venture. There is also no indication that the two agents, Faden and Arrowsmith, asked for multiple copies of the announcement for circulation amongst their customers. Nevertheless the launch did have an additional advantage for the Hydrographic Office, as it appears it was an ideal opportunity to sell off a surplus of charts mounted on canvas which had been prepared for use in the 'late war'.¹⁵⁹³ As the number of ships in the Navy had decreased by 1821, so those surplus charts were not in use and would have been of benefit to Hurd in supplying the needs of the agents. Here was one advantage the Admiralty derived from a much smaller Navy.

¹⁵⁹² Owen and Pilbeam, *Ordnance Survey*, 19.

¹⁵⁹³ TNA, ADM1/3461; *ibid*, ADM3/197. For the text of the announcement see Appendix 27.

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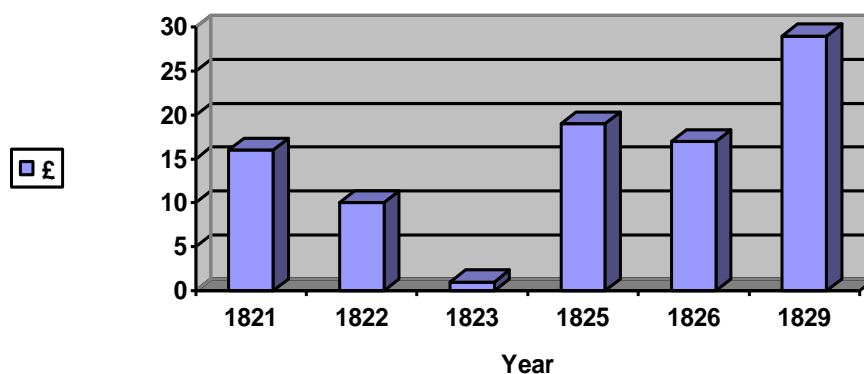
N ^o 1.	{ Coasts of Spain and France from Barcelona, to the Hyeres Isles }	{ Tofino } { Cassini }	0 3 0
2.	{ Coast of France, from Cape Couronne to Cape Sicie—Gulfs of Naples and Gour-Jean }	French Charts	0 6 0
3.	Road and Isles of Hyeres	French Charts	0 5 0
4.	{ Islands of Magdalen and Barolino, with a small Plan of Port Latche }	{ Cpt. G. F. Rye } { Mr. J. Buzel }	0 3 0
5.	{ Plan of the North End of Sardinia and Straits of Bonifacio }	H. O.	0 1 0
6.	{ Part of the East Coast of Sardinia, about Terra Nova }	H. O.	0 1 0
7.	Ogliaster Bay on the Island of Sardinia	H. O.	0 1 0
8.	{ Part of Sardinia, from Asinara to Cape Longo Sardo, with the Harbour of Conte and Bay of Asinara }	{ H. O. } { Mr. Wm. Kirby }	0 1 0
9.	Oristana Bay in the Island of Sardinia	Mr. R. Duxson	0 1 0
10.	Gulf of Palau in Sardinia	{ Mr. T. Atkinson } { Mr. Chas. Boyer }	0 2 0
11.	Bay of Naples	ZANNONI	0 7 6
12.	Tunis Bay	Cpt. S. Finch	0 1 0
13 & 4.	{ Hydrography of Sicily, Malta, and the adjacent Islands }	Capt. Smyth	7 10 0
45.	{ Harbour of Lampedusa } { South Coast of do. } { Isle Gallia }	{ Lt W. Smeary } { John Clancy } { James Noble }	0 2 0
46.	Island of Paros and Port of Naussa	{ Le Comte de Chai } { and Gouffier }	0 2 0
47.	Strait of Scio and Gulf of Smyrna	Mr. J. Wilson	0 3 0
48.	Port of Tchesme in the Strait of Scio	{ Le Comte de Chai } { and Gouffier }	0 1 0
49.	Port St. Antoine in the Isle of Lemnos	Ditto	0 1 0

Illustration 8.5 The extract from the a pre-1825 catalogue showing a mixture of printed and manuscript entries (Somerset Record Office)

The main medium for advertising was the catalogue of published charts (printed using letterpress technology) by G. Hayden of Little College Street, Westminster, who had been used by Hurd to print Beaufort's *Memoir of a survey of the coast of Karamania* in 1820. The earliest surviving complete catalogue (from 1825) is also in a similar size and format to one produced by Faden, which was also

divided into sections with the price in the right-hand column.¹⁵⁹⁴ When the first catalogue was printed by Hayden they submitted a bill of £16 6s (dated 28 December 1821) having produced a catalogue ready for the following year (*i.e.* 1822). In December 1822 the cost of printing the catalogue for 1823 fell to £10 6d, suggesting how, although it would most likely have contained more charts (and hence more pages), the vast reduction was due to fewer catalogues being printed. This could have been symptomatic of the lack of demand for Admiralty charts, especially as no catalogue was printed by Hayden in 1823, only an addenda in February costing £1 8s.¹⁵⁹⁵ With Hurd's death in April and Parry's appointment not until December, it is likely there was no catalogue of charts printed for 1824, with the catalogue dated '1825' (on the title page) being printed in March or April¹⁵⁹⁶ that same year at a cost of £19 2s.¹⁵⁹⁷ With Parry back in the office the production and printing of the catalogue was put on a regular footing, with the catalogue for 1826 prepared in January to commence from the 1st of February.¹⁵⁹⁸ Hayden's continued to print the catalogue through the 1820s, and a large jump in price (by 1829) was caused by the considerable number of new charts that were brought in to print, mainly thanks to the efforts of Clarence providing enough resources to partially clear the backlog.¹⁵⁹⁹

Figure 8.1 The costs of printing the chart catalogue and addenda, 1821-9



Source: TNA, ADM17/28; UKHO, MLP5/5B.

¹⁵⁹⁴ W. Faden, *Part I. Catalogue of the geographical works, maps, plans, &c* (London, 1822).

¹⁵⁹⁵ TNA, ADM17/28 Hydrographer's accounts, 1818-23.

¹⁵⁹⁶ UKHO, LB2 f.52 Walker to Jones, 8 April 1825.

¹⁵⁹⁷ UKHO, MLP 5/5B Abstract of accounts, 1825.

¹⁵⁹⁸ UKHO, LB2 f.58 Parry to all chart agents, 12 January 1826.

¹⁵⁹⁹ UKHO, MLP 5/5B, Hydrographic Office accounts, 1826-8.

It is known that the 1821 catalogue contained 575 charts and the 1825 catalogue 791; however *A catalogue of the Library of the Department of State of the United States* printed in 1825 shows how their library had 679 Admiralty charts. They were divided up into 18 sections, which was the same number of sections in the 1825 catalogue published by the Admiralty. If the United States obtained those charts before 1825 then it is highly likely if they ordered everything from the Admiralty catalogue then it could have contained 679 charts in 1823 (or in 1823 with the addenda), both of which had the same number of sections as in 1825.¹⁶⁰⁰ As Bywater and Co advertised in February 1825 that they had 643 different Admiralty charts for sale,¹⁶⁰¹ it is highly likely the Library of the Department of State acquired their charts some months after February. It is from the 1821 or 1823 catalogue that a fragment survives amongst the papers of a former naval officer which, although only a portion of one page, shows that the layout was similar to that used in 1825.¹⁶⁰²

Although the catalogue was essential it was not the sort of advertising which you could put up in a shop to draw people's attention, or reprint in a newspaper. It appears there was a mixture of responsibilities concerning newspaper advertising, falling on both the Hydrographer and the agents. When the Walkers received confirmation of their status as agents they took out (and presumably paid for themselves) an advert in January 1823 in a Liverpool newspaper (Illustration 8.6).¹⁶⁰³ In February 1824 Parry arranged for an advert in *The Morning Chronicle* (in London) to show the latest publications brought into print, including Smyth's *Atlas of the Islands of Sicily and Malta* and surveys of Cape Verde, part of the English Channel and the Gulph of Florida (Illustration 8.7).¹⁶⁰⁴ As a result of that advert one of the recently appointed agents, Messrs. Kingsbury, Parbury and Allen, were supplied with a parcel of new charts on 17th of February.¹⁶⁰⁵ Although *The Morning Chronicle* was not solely produced for the Merchant Fleet's use, there was some benefit in using newspapers for advertising the publication of new works.

¹⁶⁰⁰ *A catalogue of the Library of the Department of State of the United States* (1825), 65.

¹⁶⁰¹ *Liverpool Mercury*, 21 February 1823.

¹⁶⁰² Somerset Record Office, DD/WY/260/1/1. See Illustration 8.5.

¹⁶⁰³ *Liverpool Mercury*, Friday 10 January 1823.

¹⁶⁰⁴ *The Morning Chronicle*, Saturday, 7 February 1824; TNA, ADM12/223.

¹⁶⁰⁵ UKHO, LB2 f.29 Parry to Messrs. Kingsbury, Parbury and Allen, 17 February 1824.

ADMIRALTY CHARTS.—J. and A. WALKER,
 Sons of J. WALKER, Assistant Hydrographer to the Admiralty, most respectfully inform Commercial Gentlemen and the Public in general, that they have been appointed Agents by the Lords Commissioners of the Admiralty, for the sale of Charts published under their authority; and having received complete sets, they are now open for inspection, and to which they solicit attention.
 Counting-houses, Ships, &c. supplied with Stationary and all kinds of Mathematical and Nautical Instruments, at their Warehouse, 33, bottom of Pool-lane, Liverpool.

Illustration 8.6 The Walker's advert in the *Liverpool Mercury* of Friday 10 January 1823

BOOKS PUBLISHED THIS DAY.

By Authority of the Lords Commissioners of the Admiralty,
A NEW ATLAS of the ISLANDS of SICILY
 and MALTA, with the adjacent Coasts, being a complete Pilot for that dangerous Part of the Mediterranean. By Captain W. H. SMYTH, R.N.—Price 7s. 10c. in sheets, or eight guineas in boards.
 A SURVEY of the CAPE VERDE ISLANDS, with the adjacent Coast of Africa, under the direction of the late Captain Bartholomew, R.N.
 A NEW SURVEY of the BAYES and SOUNDINGS for entering into, and sailing up, the ENGLISH CHANNEL, with Plans of the Islands of Guernsey and Jersey. By Captain Martin White, R.N.
 A SURVEY of the GULF of FLORIDA, with Ports of the Bahama Islands, and one of the Island of Jamaica, with the surrounding Dangerous. By Mr. De Mayne, R.N.
 To be had of the following Agents:—Wald, Charing-cross; Arrow-smith, Solihull-square; Laurie, Fleet-street; Norris and Co., and Furber and Co., Leadenhall-street; Walker and Co., and Jones, Liverpool.
 MEDICAL JURISPRUDENCE.—In one vol. octavo. price 15s.

Illustration 8.7 An advert in *The Morning Chronicle* of Saturday, 7 February 1824 showing the latest publications offered for sale through the chart agents

Entering into the world of commerce meant some commercial acumen was needed. Both of the Liverpool agents were very astute and knew the value of advertising, as Thomas Jones took out an advert in an American publication, which was widely read by those who should have been using charts. His advert in *The new American practical navigator: being an epitome of navigation . . .* in 1821 would have achieved a wider audience for him to sell to than many of his rivals had. Jones offered a way into the American market for Admiralty charts that was not so obviously available through the other chart agents. The Admiralty also benefited by the occasional reference to charts in the papers, such as one mentioning a chart of the Gulf Stream that was prepared to be transmitted to the Hydrographic Office for

publication in September 1821.¹⁶⁰⁶ Appearances such as those in the papers would have generated additional sales, although the extent to which this was fed back to the Hydrographic Office appears to have been minimal.

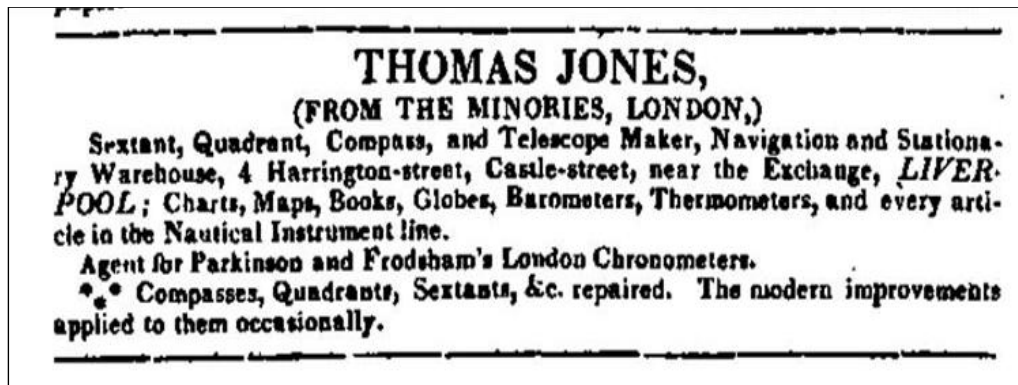


Illustration 8.8 An advert in Bowditch's *The new American practical navigator: being an epitome of navigation . . .* published at New York in 1821

Sheringham identified that lack of advertising, as he suggested in January 1829 that the agents be allowed catalogues at a reduced price to stimulate interest in Admiralty Charts, but a much better idea was his recommendation for Lloyds of London:

to furnish their agents with instructions to promulgate to the shipping world, by placing in a conspicuous part of their office proper notices, naming the principal as well as the different branch agencies.¹⁶⁰⁷

His proposal was certainly an improvement on the current scenario and sales could have been very different had a more proactive approach to advertising been undertaken in 1821. If the Admiralty had written to all the shipping agents and harbour authorities in Great Britain demand may have been to the level they expected. However, if Admiralty charts had been more popular it is unlikely the network of agents could have coped with such demands, or the office for that matter. Figure 8.2 shows how sales were relatively low and, despite the fact new charts were issued every year, sales took a dive in 1826 to their lowest level between 1824 and 1828.¹⁶⁰⁸

One question that should be asked concerning the whole business of chart selling and Hurd's wish to prevent the publication and sale of charts the Government had no control over, is why did the Admiralty not buy out the private chart producers?

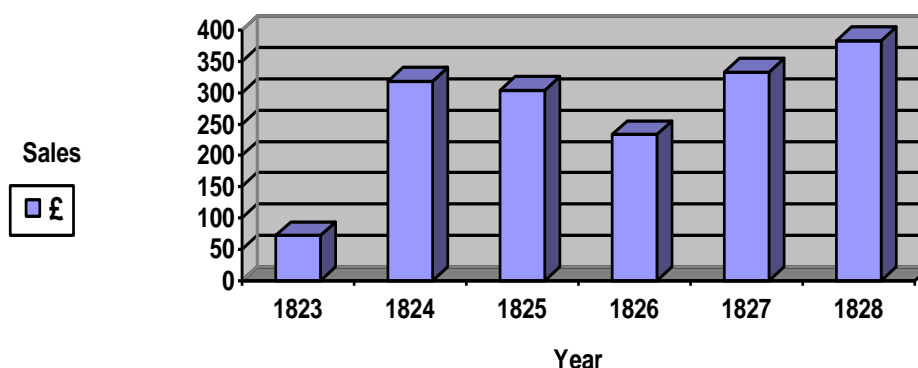
¹⁶⁰⁶ *The Times*, 27 September 1821.

¹⁶⁰⁷ UKHO, MLP62/1/iv Lieutenant Sheringham's suggestions for altering the appointment of chart agents, 12 January 1829.

¹⁶⁰⁸ UKHO, MLP98.

Such a commercial venture would not only have removed the problem identified by Hurd, but also the competition from producers such as Laurie and Norie.¹⁶⁰⁹ The Admiralty effectively bought out Faden by accepting his offer for his plates and impressions in 1823,¹⁶¹⁰ which would have been an ideal time to acquire the same from other producers. Acquiring all the plates and impressions from the chart trade would have been a bold move, but dependent on the likes of Laurie wanting to give up his livelihood from that source of revenue. Both Hurd and Parry can be blamed for not taking such a course of action, but it is possible the size of the competition was such that it was impracticable. Especially when you consider how the chart trade in England, principally based in London was a strong one, which at the time the Admiralty launched itself into the market was dominated by Laurie and Norie.

Figure 8.2 Revenue from chart sales, 1823-8



Source: UKHO, MLP98.

A reflection of the dominance of British charts in Europe can be seen in the number of charts offered for sale in Germany and France in 1817. Out of 451 individual charts for sale 326 were published in Great Britain or of British origin, 71 in Paris and 44 in Germany, with the remaining 10 from Spain, Portugal, Sweden, Russia, Denmark or the Netherlands.¹⁶¹¹ There were also a growing number of publications coming out of the United States through men such as Edmund Blunt,

¹⁶⁰⁹ Robinson states how by 1839 there was ‘an unfavourable climate existing for the private chart publisher’ due to ‘more than ever . . . competition from the Hydrographic Office’ (Robinson, *Marine Cartography*, 124).

¹⁶¹⁰ UKHO, MLP196.

¹⁶¹¹ *Catalogue des cartes et ouvrages géographiques qui composent le cabinet de Simon Schropp & Compe* (Berlin, 1817).

although this was no real competition for the British market. So when the Admiralty launched its catalogue in 1821 containing 575 charts there must have been some rumblings of discontent amongst the London chart makers, as Laurie only had 320 and 3 pilots on offer in his 1821 catalogue, accompanied by 16 volumes of sailing directions.¹⁶¹² The competition from the other main producers was not as great, but Norie had at least 137 charts and 37 pilots,¹⁶¹³ Faden had 43 charts and one pilot,¹⁶¹⁴ whereas Blachford just over a dozen charts.¹⁶¹⁵ If all four producers had combined forces they still would not have had enough charts to be able to claim to have been the largest producer, but in numbers alone they would have been a good rival for the Admiralty to compete against.

Conclusion

Even though Parry knew that the chart sellers were well connected to their suppliers, as they were able to procure foreign charts 'long before' they were obtained by the Hydrographic Office,¹⁶¹⁶ he had the one thing they lacked. Parry could call on a growing number of officers to undertake new surveys, backed by funds from the British Government which were unavailable to the private chart trade; his position was exceptionally strong and must be viewed now, if not then, as the predominant one. To get to such a position was not an overnight achievement; even obtaining permission to sell charts took over 15 years from Dalrymple's initial suggestion. It is therefore not surprising to find demand for Admiralty charts was not huge.

It is difficult to assess the take up of chart sales, as there are no complete year-on-year figures available for each agency. One undated account shows Norie to have been the most successful seller (£191 5s 6d), followed by Arrowsmith (£132 17s 0d) and Wyld (£125 18s), with Laurie only managing £78 2s 6d, less than half of his competitor Norie.¹⁶¹⁷ In the first half of 1824 sales show a remarkable gulf between

¹⁶¹² R.H. Laurie, *Catalogue of pilots, charts, and other nautical works, printed for, and published by, Richard Holmes Laurie, chart-seller to the Honourable Boards of Admiralty, Trinity-House, and East-India Company* (London, 1821).

¹⁶¹³ Ex inf Susannah Fisher from a list dated 1816.

¹⁶¹⁴ UKHO, MLP196.

¹⁶¹⁵ Ex inf Susannah Fisher from a list dated 1816.

¹⁶¹⁶ UKHO, MB1 f.130 Minute on communications with foreign hydrographic offices, 18 January 1828.

¹⁶¹⁷ An undated list with no heading shows four London agents as having probably sold £528 3s worth of publications, but it is not clear whether that was in one year, or since they had been appointed (UKHO, MLP62/1/iv). This was most likely a drawn up to show who was selling the most charts out of the London agents.

Wyld (£97 8s 6d) and Norie (£35 15s 10d) whereas Walker, Jones, Kingsbury, Arrowsmith, Clerk & Co. and Laurie did not get into double figures. Sales picked up during the second half of the year as Jones and Walker managed to get into the twenties and Walker the forties, although Wyld had dropped to the thirties.¹⁶¹⁸ Of charts sold between 1 January and 1 July 1828 it was Norie who once again sold the most (£102 10s 2d), with Walker (£52) and Arrowsmith (£49 7s) roughly achieving half as many sales. Wyld (£27 18s) and Laurie (£18 18s 6d)¹⁶¹⁹ were a long way behind and questions must have been asked as to whether it was worthwhile selling them at all. Despite there being a wealth of new information available to the public, the take up of Admiralty charts was slow. Matters did not improve as the decades passed by, as in almost every year between 1857 and 1882 merchant vessels were either lost or damaged because they were not carrying the latest Admiralty chart and sailing directions.¹⁶²⁰ However, it was ironic that the private chart trade by agreeing to sell Admiralty charts instigated the demise of its own industry in 1819, which ultimately saw the Admiralty as the pre-eminent chart producer and seller in the twentieth century. If the Admiralty Board had not agreed to charts being sold to the public in 1819 then the British charting system would have been very different, with Admiralty charts retaining their secrecy and inaccessibility to the public.

From an administrative perspective the additional work brought about by sales put an extra emphasis on the whole ethos of priorities in the Hydrographic Office. Whereas before 1821 the Navy was the main focus, after that time, as Parry put it in 1826 when one survey was considered for printing, it should be ‘struck off [i.e. printed] for the immediate use of the trade on the coast’.¹⁶²¹ There were also considerations for storage as by 1827 charts were stored in five different locations on the second floor of the Admiralty,¹⁶²² which must have been difficult in an already cramped office; by 1830 some 746 shelves were packed three abreast with charts.¹⁶²³ Thus the involvement in making charts more widely available caused an inevitable, if

¹⁶¹⁸ UKHO, MLP 5/5B Charts sold from 1 January to July 1824. Caution should be used with these accounts as it is not clear whether these are the amounts for the cost price or the commission, although it is highly likely it is the former.

¹⁶¹⁹ UKHO, MLP 5/5B Account of charts sold between 1 January and 1 July 1828.

¹⁶²⁰ Board of Trade, *Memorandum relating to the supply and corrections of charts* (London, 1882), 20-6.

¹⁶²¹ UKHO, MB1 f.52 Minute on producing a chart of the Leman and Ower shoals, 24 August 1826.

¹⁶²² Day, *Hydrographic Service*, 73.

¹⁶²³ The copy of the Hydrographic Office’s own *Catalogue of charts ... for 1830* (retained in the UKHO archive) was annotated by Becher recording the location of the charts on 746 shelves.

unconscious, eye to be taken off the naval requirements in order to make the commercial venture a success. Although attention was drawn towards fulfilling the needs of the trade they were not always supplied with every chart that was in the office.¹⁶²⁴ It would have been interesting to see what the effects were if commercialism had been brought in during the 1800s or early 1810s, which points to why it was not introduced until Britain was no longer at war with France and had the capacity to venture into a commercial exercise backed by public money. Combined with the post-war interest in reducing Government expenditure, the commercial venture into the world of chart selling was one that hindsight allows us to see as a sound one, although like other processes not without its teething problems.

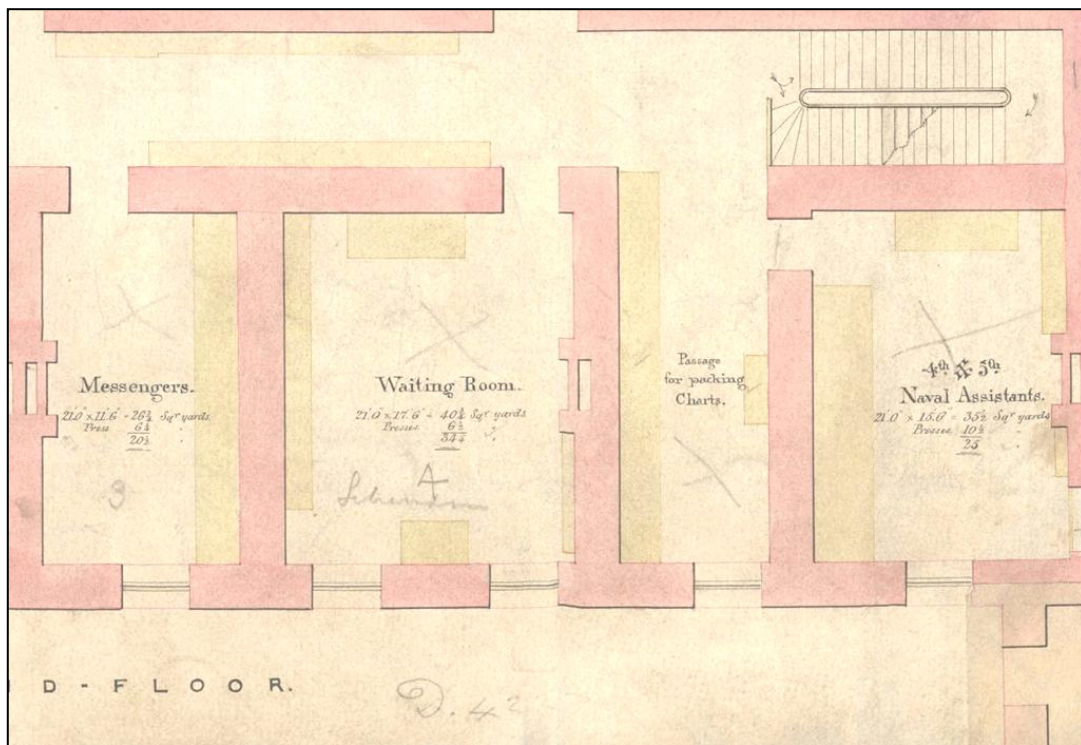


Illustration 8.9 A plan of the Admiralty, which although drawn up in 1859 shows rooms referred to in 1827 such as the 'Room next Messengers', the 'Passage' for packing charts and Mr Becher's Room as one of the Naval Assistants. Other rooms used in 1827 included Mr Nares' Room and the Model Room (UKHO)

¹⁶²⁴ UKHO, MB1 f.204 Minute on charts of the Canadian Lakes, 6 August 1828.

Conclusion

This thesis set out to answer the question whether or not the Hydrographer was capable of running an efficient acquisition, production and supply unit, being directly answerable to the Admiralty Board. It is in these areas that my thesis concentrates on. It demonstrates that Hurd and Parry's contribution to modern hydrography, both in the Admiralty and abroad, was one of continual revision, improvement and expansion despite the prevalence of war, post-war pressures for economy, and shortages of staff. Such a strategy made the office ready for the challenges it faced, as well as pushing standards higher as time progressed.

Efficiency and internal economy were key underlying principles for the Hydrographer and his staff to abide by, which were prevalent throughout the period. Such principles predated the greater Benthamite revolution in the administration of Victorian offices of state and as far as the Hydrographic Office was concerned they can be credited to the Hydrographer and his staff.¹⁶²⁵ Hurd, Walker senior, Becher, Parry and Sheringham all put ideas forward that can be viewed as improving office efficiency and therefore fitting nicely into the Admiralty's drive for internal economy, especially in the post-peace era. All of this helped to keep the Hydrographic Office functioning as a chart production and supply outfit, at one level or another throughout the period.

Facilitating the three key elements (acquisition, production and supply) were a myriad of factors, individuals, circumstances and parameters which affected their success or failure. The breadth and extent of those wider connections were things which continued to expand, partly through the hard work and initiative of the Hydrographer, and also through factors over which he had no control, such as the global increase in trade and shipping following the Peace of 1815. The war against France and Spain saw a huge amount of resources put into the supply of charts to the Fleet which, coupled with the decision to supply ships with all the charts they needed (and the introduction of that system), left little time for much else. The advent of

¹⁶²⁵ O. MacDonagh, 'The nineteenth century revolution in Government: a reappraisal', *Historical Journal* i (1958), 52-67; H. Parris, 'Nineteenth century revolution in Government: a reappraisal reappraised', *Historical Journal* iii (1960), 19-57; D. Roberts, 'Jeremy Bentham and the Victorian Administrative state', *Victorian Studies* ii (1959), 193-210; H. Strachan, 'The early Victorian army and the nineteenth century revolution in Government', *English Historical Review* 95 (1980), 782-809; Morriss, *Naval power*, passim.

peace saw the number of boxes of charts in circulation fall dramatically freeing up capacity in the office and within the Navy to concentrate on the acquisition of hydrographic materials. This in turn caused additional work for production and, when the decision was finally given to sell Admiralty charts to the public, reorientated the main focus of the office from defence to commercialism, albeit temporarily.

The decision to sell charts, Hurd's death shortly afterwards and the intermittent appearance of Parry in the office, set the agenda for Parry's three terms as Hydrographer. If Hurd can be considered as having laid the foundations for the expansion of specialist hydrographic surveying capabilities and chart selling, then Parry must be credited with revising the logistics and sorting out the problems resulting from Hurd's footings. It is imperative to understand that, although Parry was away from his post as Hydrographer for two extended periods, he was in a far better position than Hurd ever was to undertake those revisions as he came to the position of Hydrographer unencumbered with the hang-ups of previous administrations. These had handicapped Hurd when he took over from Dalrymple, but there were no great challenges facing Parry, such as a new system of chart supply to the Fleet, or setting up a commercial venture to sell charts to the public. Parry was therefore in a good position to revise the existing way of doing things, which was (and is) a much easier task than having to set them up from scratch. Parry also had the assistance of Becher (and later Sheringham) to fall back on, which Hurd did not, and the stimulus given to the office by the Duke of Clarence provided further impetus for revision and reform.

Clarence may have been viewed by some as a cuckoo in the nest, but from a hydrographic perspective he was the best thing that had happened in governance terms since the Chart Committee was set up in 1807. This is not to say the following twenty years were fallow in terms of ideas and stimulation, but Clarence had a genuine interest in the work of the Office and the ability to take advice from his subordinates and carry it quickly into effect, without favouritism or worries over finance. His introduction of additional resources and the efforts to standardise elements of production showed what could be achieved in real terms in a very short space of time. Despite his time in charge at the Admiralty being relatively short, his efforts, along with Parry's reforms, showed to Beaufort how small injections of enthusiasm and resources could make significant differences. However, his actions did not tip the balance between success and failure as, even after Clarence lost control

of the Admiralty, surveys were being undertaken and charts produced in ever increasing numbers.

The underlying ethos of continual revision, brought to the Hydrographic Office by Parry, was part of a wider gradual transformation of government. Nevertheless it was Parry's own initiative and desire to run the office in the same way as he ran ships under his command which aimed at the most efficient and cost-effective way possible. This can be seen in the report he prepared on the state of world charting, his letters to the Admiralty Board, the figures he gathered as hard evidence to support his reforms, as well as the encouragement he gave to Becher, Walker and Sheringham to see his proposals through. This was in the face of the 'occasional' obstacle to his initiatives in the form of First Secretary Croker who may have viewed them as radical. The two men clearly did not see eye to eye on all matters and there may have been some personal or political difference between the two of them, but there was one saving grace in their dealings in the shape of the Admiralty Board. Although Parry had few opportunities to present his ideas in person to the Board, which gave Croker an advantage in pushing his own agenda, Croker was not alone in making the decisions which Parry had to act on.

The Admiralty Board held a tremendous amount of power although it consisted of a relatively small number of individuals. Their power extended not only across the Navy but into international, political, social, commercial, scientific, engineering and fiscal circles; being one of the most powerful departments of state meant the Hydrographer had access to those circles. Being in a such a position offered more advantages than disadvantages to Hurd and Parry.

On the plus side there was no lengthy chain of command to go through in order to obtain a decision, as was found in other branches, especially at the Navy Board. Also, being based at the Admiralty, meant the Hydrographer was on occasions able to put his ideas verbally to Board members before submitting them in writing, thus ensuring he would get support for them when they were brought before the Board. If such ideas were meritorious and other achievements in the Hydrographic Office of a favourable nature, this would have reflected well on the Hydrographer and have been beneficial, more so for Parry who had his career in front of him and needed support from people in high places. Even Hurd found some small pecuniary advantage from keeping in with the Board despite his well advanced years, showing how age discrimination in Admiralty Board appointments was not always an issue

when it came to hydrography. On the negative side, having to go to the Board for answers to even the most trivial of decisions must have been wearing, even tedious at times. Having the Board in such close proximity meant the office was often under scrutiny and this must have caused pressure and anxiety. However conscientious officers like Hurd and Parry had little to worry about, unlike Dalrymple whose fondness for sleeping in the office did him few favours in the Board's eyes.

The Hydrographer had to administer the resources granted to him by the Board, relying on his own experience and ingenuity to advance hydrographic surveying, science, chart compilation, printing, supply, international relations and the sale of office publications, not only in naval circles but in a broader field which offered many greater opportunities. As time progressed so the amount of responsibility placed on the Hydrographer's shoulders grew, in which managing both civilians and naval personnel was central. In the first years Hurd was in post the concept of him being in charge of a small group of scientifically minded officers answerable to him alone may have been only a dream. Only after the Peace of 1815 could he try to implement such a notion, although at no point during his term as Hydrographer did such a position ever become a reality. However, there were certainly ways in which the Admiralty Board recognised the fact that it had amongst its officers a certain number of specialist hydrographic surveyors. One of these ways was to reward them with a commensurate rate of pay. The Board also recognised the specialist survey vessels in the *Navy List*. Nevertheless each officer was still answerable to the Board and was not exclusively under Hurd's control.

Many of the senior surveying officers only corresponded directly with the Board, as they knew full well that to lay their successes before their Lordships was more beneficial than to send them to a captain in an over worked post who did not always recognise, or push forward, such achievements. Therefore Hurd's role was more of an advisory one to the Board, suggesting areas to be surveyed, drawing up sailing instructions, offering technical advice, supplying hydrographic information and equipment, administering the growing knowledge base of geographic information and adding to it whenever opportunity offered. Only in the later years of Parry's third term can the concept of the Hydrographer as the 'Head of service' be recognised. Although throughout the period both men held individual responsibility, it was not until 1828 when that responsibility grew towards something resembling total control. It was also only after charts were sold to the public that the concept of public trust can

be applied to the content of Admiralty charts and publications, as only then could the public scrutinise and use what was available.

One contemporary writer looked back on the period of this study and stated how little could be ‘done to advance Hydrography’ during war time but that ‘since the cessation of hostilities, . . . the leisure of peace has not, in this particular, been neglected’. He looked forward to the results of those efforts and how they would be of benefit should Britain go to war once again.¹⁶²⁶ It was thanks to Hurd, Parry and the Admiralty Board that such a halcyon position had been reached, even though roughly half of Hurd’s time in post was during a time of war. Through Hurd’s ‘disciples’ in surveying, like Cook and Bligh¹⁶²⁷ before him, the years of hard won knowledge were passed on to future surveyors through men like Smyth, Graves and Denham, ensuring high standards in hydrography were achieved, maintained and developed further.

A measure of Hurd’s achievements as Hydrographer, in expanding the Navy’s hydrographic capacity and thus providing more jobs for surveyors at a time when the Ordnance Survey was being run down,¹⁶²⁸ can be seen in the number of geographical features named after him. For a man with no obvious wealthy lineage, or of a particularly high rank, it is fair to conclude that his achievements were recognised by surveyors leaving their mark on the map, or chart, as a mark of respect and recognition to him. Lieutenant Oxley, Surveyor General of Lands, named a ‘remarkable peaked hill’ Hurd’s Peak during his surveying in Australia during 1817 and 1818;¹⁶²⁹ Commander Philip Parker King, with whom Hurd had a much closer relationship than Oxley, gave the names Port Hurd and Mount Hurd to a harbour and a ‘round-backed hill’ he surveyed in Western Australia in memory of ‘the late Captain Thomas Hurd’;¹⁶³⁰ in 1819 Parry named not only a headland in the Arctic¹⁶³¹ after Hurd, but also a channel (or strait).¹⁶³² It did not end there as Lieutenant William Langdon R.N. named the feature ‘Captain Hurd’s Point’ for what is now called Hurd

¹⁶²⁶ Anon, *The United Service Journal and Naval and Military Magazine* 1829, part 1 (London, 1829), 84.

¹⁶²⁷ Darby, ‘Bligh’s disciple ...’, 411.

¹⁶²⁸ Ex inf Dr Richard Oliver, August 2009. Although the Ordnance Survey reduced the number of surveyors the standards it employed were improved.

¹⁶²⁹ J. Oxley, *Journals of two expeditions into the interior of New South Wales, by order of the British government in the years 1817-18* (London, 1820). Hurd asked Croker if Oxley could undertake particular survey duties whilst in Australia identified by himself and Flinders (TNA, ADM1/3458 Hurd to Croker, 10 April 1812).

¹⁶³⁰ P.P. King, *Narrative of a survey of the intertropical and western coasts of Australia* 2 vols (London, 1826).

¹⁶³¹ Parry, *Journal of a voyage*, 49.

¹⁶³² Parry, *Journal of a second voyage*, 59.

Point in Antarctica in 1822.¹⁶³³ Lieutenant Bayfield and Midshipman Collins named a cape on the east side of Lake Huron after their Hydrographer in July 1820¹⁶³⁴ and another Cape Hurd exists in the Arctic, with Hurd Deep, or Hurd's Deep, in the English Channel also bearing his name. Hurd's Bank lies off Malta.¹⁶³⁵ It was not just naval officers who acknowledged the first captain to serve as Hydrographer in the modern era, but Purdy, by changing the name of Hope Island (in the north Pacific) to Hurd Island, ensured navigators would not forget Hurd's name.¹⁶³⁶

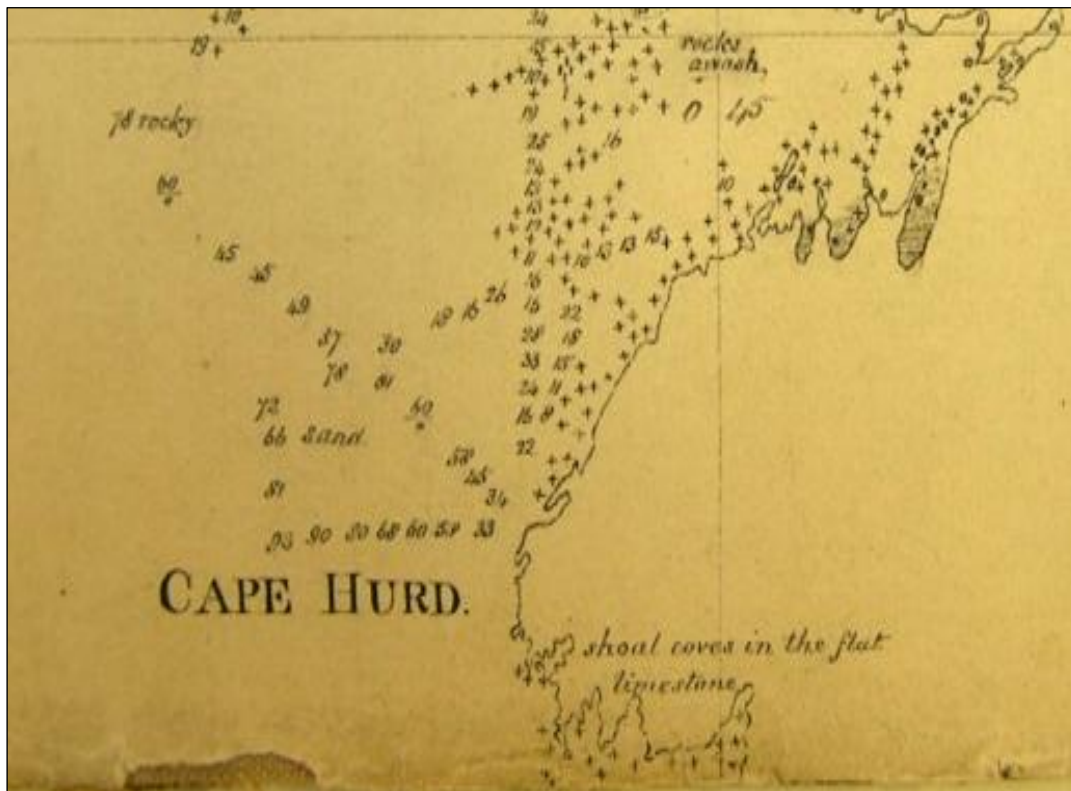


Illustration 9.1 Cape Hurd on the east side of Lake Huron, named by Lieutenant Bayfield and Midshipman Collins after their Hydrographer (UKHO)

Despite such recognition, both Hurd and Parry were equally involved in a great number of management issues, which certainly show how their leadership skills and experience at sea paid dividends on land. Their dealings with civilians (both inside and outside of the office) were both fair and cordial, even though there was no specific naval regulations for such interactions. It is clear how in the years before the Admiralty allowed the public access to its published charts there was a reliance on the merchant fleet, the H.E.I.C. and even foreign governments for information. Both

¹⁶³³ http://data.aad.gov.au/aadc/gaz/display_name.cfm?gaz_id=2575 (accessed 18 June 2009). In location 54° 46' 35.5" South, 158° 50' 16.8" East.

¹⁶³⁴ UKHO, E347/9 15f.

¹⁶³⁵ UKHO, D6521 shelf St.

¹⁶³⁶ Hurd Island, Kiribati can be found in latitude: 2° 37' 60 South, longitude: 176° 49' 0 East.

Hydrographers had to manage those suppliers, as well as civilians employed within the office, insuring there were enough resources to meet the demands of supply, dealing with dismissals and recruitments, but also promoting the worth of those men by championing their wage disputes to the Admiralty Board. Parry's selfless act in doing so, after he had resigned for the last time as Hydrographer, shows how he valued civilians and how he believed their pay should be equal to the task. Such a stance shows how Parry was clearly not always interested in his own self-promotion, but prepared to put himself out on behalf of the lesser paid workers in the Admiralty. These were important issues which were dealt with fairly, if not always immediately.

Managing naval personnel was another matter. Hurd and Parry found themselves having to deal not only with specialist surveyors but many commanding officers throughout the Fleet. This was partly due to the responsibility they had administering navigational remarks returned to the Admiralty which, although they caused a lot of work in correspondence terms, did have two important positive effects. First, the need for commanding officers having to submit navigational remarks in order to collect their pay meant that data poured in from all the strategic hot spots. Secondly, the Hydrographic Office and the demand to collect navigational information was brought into the minds of commanding officers and masters. Those two factors generated a wealth of information and an ethos within the Fleet for data gathering that sat well within the broader world of scientific collecting and expansion, especially after 1815. The down side of this was the apparent lack of use of the data once it had arrived in the Hydrographic Office, coupled with the problem of duplication and dissemination. It took Croker and one of Parry's many reforms to resolve the situation, by cataloguing and organising the remarks so they could be systematically worked through and then brought into print as sailing directions. Parry's vision for an all encompassing process not only solved the problem but also improved the quality of the resulting publications. This in turn meant commanders could easily see what was already known and then only return new remarks to the Hydrographic Office for processing. For Home Waters such a process had been partly in place in the 1760s and 1770s when officers used Captain Collins' *Coasting Pilot* as a benchmark, though it is unlikely Parry or Becher drew any such comparisons. Parry's agenda was nevertheless one of expansion, efficiency and broader scientific activity.

Underpinning the high level requirements to execute surveys and produce charts was a scientific community, within which several survey practitioners were heavily involved. A handful were involved in committees and organising scientific activities from which the Hydrographic Office benefited; Parry was one of the most prominent of those officers, even more so after becoming Hydrographer. Surveying voyages offered great opportunities not only for data collection, but widened British Government interests in scientific and diplomatic fields. Beneath those prominent officers were many who found themselves involved in scientific work (mostly data collection) across many different fields, such as natural history and astronomy. Due to Hurd's determination, every entrant taking up a career as an officer surveyor had to have as a prerequisite (to being accepted) a solid education in the science of mathematics. This ultimately saw the demise of the 'non-scientific' master from the ranks of those in charge of surveys emanating from the Hydrographer's desk. Thus surveying evolved into a closed shop for educated men with scientific leanings who showed the potential to make it to a command position. Although this deprived competent men, without sufficient education, money or patronage, of a career as a surveyor, it did bring broader benefits not only for the Hydrographic Office but also for the Royal Navy. Benefits such as more accurate charts, as well as an ability to embrace new technology to enhance navigation and charting. It involved surveyors in experimental work, and required the Hydrographer to assess new inventions in those fields that were brought before the Admiralty Board.

All of this was not achieved in isolation and required collaboration. It was the Royal Society who were the closest collaborators with the Admiralty. But by the time Parry resigned as Hydrographer the (Royal) Astronomical Society had been established, of which, as of the Royal Geographical Society, survey officers were at the forefront. This was thanks in part to both Hurd and Parry.

Both could count themselves as men of science, but it was the latter's appointment as Hydrographer that paved the way for the great scientific advances in naval hydrography (later expanded upon by Beaufort). Hurd was in a position (from a hydrographic perspective) to be the leading protagonist to venture into the many fields of science associated with his office, especially during those opportunistic years after 1815. Even though he was not a Fellow of the Royal Society he nevertheless had associations with Sir Joseph Banks, predominantly through Flinders and the secretaryship of the Board of Longitude, and he was not put off being involved with

science. Hurd's involvement with the acquisition and supply of chronometers saw his further involvement with that particular branch of science, as well as astronomy that underpinned position fixing for every mobile vessel in the Fleet.

There were also other events to be considered, such as the establishment of the Scientific Branch of the Admiralty in 1821, which was partly a result of the Hurd / Parry era. Parry's own voyages and their scientific nature brought a great deal of worth to the Hydrographic Office that was not always obvious. He showed what could be achieved in terms of science and hydrography, which drew in oceanography, meteorology and natural history. This was widely publicised when his journals were printed, subsequently raising the profile of the work hydrographers undertook and ultimately the work of the office.

Science undoubtedly opened many doors and its position in the world of international relations was no exception. This was fundamentally due to the underlying ethos of the benefits accurate charts had to all nations, even if they were at war. One of the primary benefits was the safety of life at sea, or as Hurd put it 'the salvation of lives and property'. To enhance those objectives, both Hurd and Parry used those fundamental elements to make approaches towards other hydrographic offices. In all the developed maritime nations of the Western World there was a navy and some form of hydrographic function, ranging from a noted individual to a fully functioning service. However, in hydrographic terms, the relations with those nations were varied and there was no consistent approach or agreements in place in 1808 for wide ranging international co-operation. This is where Hurd can be credited with developing exchange agreements, thus ensuring the supply of the most recent data to the Admiralty. Countries such as Denmark were very keen to enter in to the spirit of international co-operation and Parry promoted relations with Spain and France, thanks to political upheavals and scientific measurements around the Atlantic. Therefore the combined efforts of both men cemented collaboration with some of the major players in world hydrography.

In the context of international relations the scientific community played a much bigger role than that played by the diplomats at the Foreign Office in advancing hydrography. This was where the Admiralty Board failed to cash in, not only on its connections to the diplomatic service, but also through its dominant position after 1815. Had it been more proactive after the Peace and more supportive of Parry's

suggestion, then collaboration would have been more fruitful than it was and data more freely flowing.

The Admiralty could have been more pro-active by planning surveys in the long term. For, as well as that reliance on data from outside the Hydrographic Office, there was also the production of data from within the Admiralty which resulted in publications. This often involved new methods, such as lithography, but the Hydrographer needed to plan their production, often based on schemes of charts of particular geographical areas founded on a mixture of Royal Navy surveys and external sources. All of this was part of the cycle of hydrographic administration that expanded during the period as the number of Admiralty charts in print expanded.

All of those factors resulted in a cultural change within the Navy concerning the reliability of the Hydrographic Office, not only in supplying all the Admiralty charts and publications the Fleet needed, but in the accuracy of their content. A captain receiving a box of charts from the Commissioner's Office at Portsmouth Dockyard in 1809 had to rely on a large proportion of charts surveyed and compiled under no control, or standards, of the Hydrographer. An officer receiving a box in 1829 could put a much greater reliance on its contents. This was due mainly to Hurd's efforts in pushing for more mathematically orientated officers to undertake surveys, from which the resulting charts produced in the Hydrographic Office were mainly superior to their commercial counterparts, the purchase of which was subsequently discontinued. Parry contributed to that success by putting in place improvements in the publication process, resulting in a reduction in the time it took to produce charts and continued Hurd's agenda for expanding the Navy's hydrographic capability.

Hurd and Parry could therefore count the number of achievements they made as being a major contribution to safety and the expansion of the specialist hydrographic capability within the Navy. Less obvious contributions included the accumulation and organisation of a vast amount of geographical information, which grew year on year through planned surveys, donations, reciprocal arrangements with other hydrographic offices, purchases and bequests. Such a body of information was a great asset not only to the Hydrographic Office but also to the British Government, whose colonial and foreign planners often referred to the Admiralty's 'Geographic Record Office' for vital information. All this was the more creditable when the pressures from the Admiralty Board and the Navy are considered; demands for charts and information, the logistics of survey planning, preparing materials for the Board,

dealing with an almost continual flow of correspondence, production and sales, all of which had to be dealt with in a timely manner.

Although the two men were different in age, experience, background and patronage, they both were progressive as Hydrographer to the Admiralty Board, setting an agenda for expansion rather than contraction, as Croker would have had it at times. Both men continually looked for ways to improve methods and resolve problems. But the question must be asked whether they failed in any way to undertake what was expected of them, or missed any opportunities for contributing to the hydrographic world? Hindsight lets us compare the achievements of the last 200 years in world hydrography against the period when Hurd and Parry were in charge of the Hydrographic Office. Some of the big issues for a successful modern office (which are comparable) are standards, data supply, its assessment, compilation into products, their production, marketing and distribution. Two hundred years ago both men had all of those elements in place, although marketing was undoubtedly the weakest and most under-developed area, which ultimately can be partly blamed for the poor take-up of charts by the public in those early years.

Gould very aptly described the Hurd and Parry years as a ‘transitional period’.¹⁶³⁷ Nevertheless this study shows that period to have been one that witnessed expansion and improvements in all of its primary functions. This is clear from a comparison of the capacity of the office and its achievements in 1808 and in 1829. In the management of the office (in 1808) Hurd was the only naval officer and outnumbered by civilians, but in 1829 Parry had the luxury of naval personnel as naval assistants and editors of sailing directions who he could rely upon for support. A similar expansion was witnessed in the number of specialist hydrographic surveyors in work under the Hydrographer’s umbrella, which rose from nothing to fifteen different surveys in execution when Parry resigned and continued rising during Beaufort’s time.¹⁶³⁸ Although data came into the office from various sources, it was the quality of Admiralty sponsored surveys that improved throughout the period. This was due to more detailed instructions and standards being introduced, which were

¹⁶³⁷ See the title of chapter two of Cdr R.T. Gould’s unpublished typescript ‘A history of the Hydrographic Department of the Admiralty’ (UKHO, MLP4).

¹⁶³⁸ The number of surveying units continued to grow under Beaufort as there were 19 in 1840 and 22 in 1850 (Day, *Hydrographic Service*, 348). It is also worth noting how the number of clerks in the Admiralty dropped from 55 in 1813 to 24 in 1822, showing the importance surveying had over administration, although there was less filing work to be done in 1822 compared to 1813 (Brightfield, *John Wilson Croker*, 75).

used by men who had the appropriate mathematical background to apply them. This also had implications for science, which witnessed a growing number of different types of information being recorded and instruments being used, something which Parry was predominantly responsible for but not exclusively. Men such as Flinders, Smyth and White used their own initiative to collect and observe science in virtually every form, ranging from oceanography to astronomy and much that fell in between. Thus an agenda was set throughout the period for expanding the types of data collected by surveyors from all over the globe, even though all of that information was not used.

Internationalism was something that was inevitable in the maritime world, but from an administrative perspective both Hurd and Parry were equally responsible for expanding contacts in this area. Although examples are few, they were nevertheless very important, especially those with France and Spain who were two major charting nations. Considering all these factors it is not surprising that the number of Admiralty charts produced vastly expanded by 1829, but the boost given by the Duke of Clarence to the capacity of the office was a very big influence on those numbers. Subsequently the number of different charts supplied increased, but in 1808 Hurd had an equally challenging time supplying more multiples of charts due to the vastly larger number of vessels in the Fleet. Only when the Peace came in 1815 did the number of naval vessels dramatically decrease, allowing Hurd to turn his attention to expanding the Admiralty's capacity to undertake more surveys. With the number of charts produced and surveys increasing, as well as a large number in store after 1815 that were not being used, Hurd's idea for selling charts to the public came at exactly the right time. From Hurd's commercial framework, Parry was able to revise that strategy into a more efficient and manageable system for Beaufort to work to. Both men contributed greatly to the administration of the office, which in turn had benefits for the Admiralty and the Navy alike.

Hurd and Parry found themselves head of an Admiralty department involved in producing charts faced with a backlog of material to process, an ever growing supply of new charts and surveys, and the necessity to keep Admiralty charts corrected. The demands of these tasks meant only one thing and that was expansion. Yet in the post-war era of cuts and efficiency drives the overwhelming need to expand the production capability of the office meant a conflict of interests between the Admiralty Board and its Hydrographer. When the Board tried to reduce manpower it

compromised the future capability of the office and, had they done so, the office's capability would have been reduced. Fortunately those cuts in manpower never materialised, but the office had to rely predominantly upon temporary staff to keep up with the ever increasing demands. Only the intervention of the Lord High Admiral and his advisory council (in 1827-28) put matters on a more even keel, and proved what could be achieved if the office was manned to an appropriate level.

Hurd and Parry's 'model' therefore laid the foundations for the modern hydrographic office, one that many nations copied. Both men had their strengths, which is reflected in the experience they brought to the office of Hydrographer. For Hurd it was in his dealings with the Admiralty Board on matters of manning, data acquisition, internationalism and supply. For Parry, a man who led men in extreme conditions, it was in the areas of production, sales, management and science that he excelled. He was anything but the 'poor Hydrographer' alleged by Lambert.¹⁶³⁹ Between them, through continual revision, improvement and expansion, Hurd and Parry created an efficient Hydrographic Office, establishing a framework that Beaufort found unnecessary to change.

¹⁶³⁹ A. Lambert, *Franklin tragic hero of Polar navigation* (London, 2009), 93.

Appendix 1

Persons employed in the Hydrographic Office, 1808-1829

No.	Name	Rank	Date started	Date finished	Duties	Reference
1	John Walker	[civilian]	1797	d.1831	Assistant Hydrographer	ADM1/3470.
2	Francis Higgins	[civilian]	c.1799	>26 Apr 1849	Draughtsman	UKHO, MLP 5/3ii and 24/6.
3	W. Brown	[civilian]	<1808	Dismissed 16 Aug 1823 but reinstated	Packing chart boxes and mounting charts	TNA, ADM1/3523; UKHO, MLP2, 5/3ii and 5/5B.
4	Thomas Hurd	Captain	28 May 1808	d.23 Apr 1823	Hydrographer	Sainty, <i>Office holders ...</i>
5	Michael Walker	[civilian]	1809	1861	Draughtsman	UKHO, MB1 f.256. See
6	James Anderson	[civilian]	n.k.	Dismissed, 16 Aug 1823	Packing chart boxes	UKHO, MLP2, 5/3ii, 5/5Aiii.
7	Thomas Walker	[civilian]	1810	Resigned 1864	Draughtsman	UKHO, MLP 5/3ii.
8	John Frembley	Master	Winter 1810	Winter 1813	Making fair copies of surveys	UKHO, LB1 f.373
9	Richard Baily	[civilian]	<22 Sep 1817	d. June 1824	Clerk. Draughtsman and printer	UKHO, LB1, I fol.124; <i>ibid</i> , MLP2, 4.
10	Anthony Lockwood	Professor of Hydrography	<21 January 1818	c.31 January 1818	'Rendering his works compleat' (<i>sic</i>)	UKHO, LB1 f.134
11	John Bushnan	Lieutenant	>8 Jan 1821	<8 May 1821 ¹⁶⁴⁰	Preparing charts	UKHO, LB1 f.359. Died 13 August 1824
12	A.B. Becher	Lieutenant	May 1823	1865	Naval Assistant, Curator, Temporary Hydrographer	UKHO, MLP 5/3va.
13	William Edward Parry	Captain	8 Dec 1823	19 May 1829	Hydrographer [absent twice]	Sainty, <i>Office holders ...</i>
14	George A. Frazer	Midshipman	18 Nov 1825	24 May 1827	Draughtsman	TNA, ADM 12/230; UKHO, MB1, f.74.
15	H.W. Bayfield	Lieutenant	18 Nov 1825	24 May 1827	Draughtsman	TNA, ADM 12/230; UKHO, MB1, f.74.
16	William Henry Smyth ¹⁶⁴¹	Captain	n.k.	14 October 1826	Draughtsman	UKHO, MB1 f.61.
17	C.G. Robinson	Midshipman	2 Oct 1826	c.2 Dec 1826	Draughtsman	UKHO, MB1 f.60.
18	James Badgeley	Lieutenant	2 Oct 1826	c.2 Dec 1826	Draughtsman	UKHO, MB1 f.60.

¹⁶⁴⁰ The date Parry set sail with Bushnan on his Arctic voyage.

¹⁶⁴¹ According to Gould he was allowed room in the Hydrographic Office to prepare his surveys but was dismissed by Croker, although no dates are given (UKHO, MLP4, R.T. Gould, 'A history of the Hydrographic Department of the Admiralty', chapter 2 (n.d.), 13).

19	Capt. W.F.W. Owen	Captain	>6 Oct 1826	c.27 Oct 1826	Draughtsman	UKHO, LB2 f.95.
20	John Anderson	[civilian]	1827	1828		UKHO, MLP 5/5B.
21	William Nares	[civilian]	<28 Jun 1816	13 June 1827	Draughtsman	UKHO, LB1 I fol.56; <i>ibid</i> , MLP 4, 5/3ii; <i>ibid</i> , OD814.
22	Lieutenant W. Sheringham	Lieutenant	13 June 1827	1830	Naval Assistant	UKHO, OD814; Tizard, 15.
23	Captain Mudge	Captain	11 June 1827	15 September 1827	Draughtsman	UKHO, OD814.
24	Captain Boteler	Captain	11 June 1827	>15 September 1827	Draughtsman	UKHO, OD814.
25	Lieutenant Roberts	Lieutenant	11 June 1827	25 July 1827	Draughtsman	UKHO, OD814.
26	Lieutenant Bullock	Lieutenant	11 June 1827	>15 September 1827	Draughtsman	UKHO, OD814.
27	Lieutenant Hanns	Lieutenant	11 June 1827	>15 September 1827	Draughtsman	UKHO, OD814.
28	Lieutenant Denham	Lieutenant	11 June 1827	25 July 1827	Draughtsman	UKHO, OD814.
29	Lieutenant Edward Barnett	Lieutenant	11 June 1827	>15 September 1827	Draughtsman	UKHO, OD814.
30	Lieutenant Fraser	Lieutenant	11 June 1827	25 July 1827	Draughtsman	UKHO, OD814.
31	James Nye (boy)	Boy	29 September 1827	n.k.		UKHO, MB f.116.
32	Captain Mudge	Captain	c. January 1828	c. January 1828	Survey planning	UKHO, MB1 f.28.
33	Lieut. Roe	Lieutenant	2 April 1828	<13 January 1829	Sailing Directions Editor	UKHO, MLP 5/5B.
34	J.F. Dessiou	Master	2 April 1828	1847	Sailing Directions Editor	UKHO, MLP 5/5B; <i>ibid</i> , LP1857 D70.
35	Mr. Wolfe	Midshipman	17 Nov 1828	16 Dec 1828	Draughtsman	UKHO, MB1, f.214
36	Peter Heywood ¹⁶⁴²	Captain	c.1820	c.1825	Draughtsman	UKHO, MLP4
Men engaged on office work but who worked outside the Admiralty (excluding surveyors)						
37	St Amand	[civilian]	1812	c.1823	Draughtsman and Translator	TNA, ADM1/3458.
38	Captain W. Symonds	Captain	22 Apr 1828	1830	Sailing Directions Editor	UKHO, MB1 f.185.

¹⁶⁴² According to Gould he was allowed room in the Hydrographic Office to prepare his surveys but was dismissed by Croker, although no dates are given (UKHO, MLP4, R.T. Gould, 'A history of the Hydrographic Department of the Admiralty', chapter 2 (n.d.), 13).

Appendix 2

First Lords and Secretaries of the Admiralty Board, 1808-1829

Year	First Lord	First Naval Lord	First Secretary	Second Secretary
1808	Lord Mulgrave	9 May. Sir Richard Bickerton	William Pole	Sir John Barrow
1809	↓	↓	12 October. John Wilson Croker	↓
1810	4 May. Charles Yorke	↓	↓	↓
1811	↓	↓	↓	↓
1812	25 March. Robert Dundas, Viscount Melville	25 March. William Domett	↓	↓
1813	↓	23 October. Sir Joseph Yorke	↓	↓
1814-17	↓	↓	↓	↓
1818	↓	2 April. Sir Graham Moore	↓	↓
1819	↓	↓	↓	↓
1820	↓	13 March. Sir William Johnstone Hope	↓	↓
1821-6	↓	↓	↓	↓
1827	2 May. William, Duke of Clarence ¹⁶⁴³	2 May. Sir William Johnstone Hope	↓	↓
1828	↓ Robert Dundas, Viscount Melville	19 September. Sir George Cockburn	↓	↓
1829	↓	↓	↓	↓

N.B. Dates are given where part of a year is served.

¹⁶⁴³ In May 1827 Clarence became Lord High Admiral at the invitation of the incoming Prime Minister, George Canning (M. Brock, 'William IV (1765–1837)', *Oxford Dictionary of National Biography*, Oxford University Press, 2004 [accessed 27 Nov 2007]).

Appendix 3

Minute for the regulation of the Hydrographic Office, 1825

Minute for the regulation of the Hydrographical branch of the Office.
At the Board November 18th 1825.

1. The Hydrographical branch is under the immediate controul of the Hydrographer as the other branches are under that of their clerks of the first class, and like them, under the general superintendence of the Chief Clerk of the Office.

Separate letters are not to be address'd to or from the Hydrographer, but the intercourse with the Board room and other branches to be conducted by the usual official course of minutes, but the Hydrographer may communicate by letter or personally with all officers employed in hydrography and all other persons on subjects particularly connected with his own duties, but whenever any such communication seems of any importance he is to communicate it to the Secretary. All such papers are to be considered as on H.M.S. and to belong to the Office.

In the appropriation of his own services and those of his assistants and in all the details (not connected with the pecuniary expence) of the branch the Hydrographer will exercise his own discretion except when the Board or the secretaries may give any special direction.

2. All the pecuniary transactions of all kinds are to pass thro' the Chief Clerk, subject to such regulations as the Board may authorise the secretary to make.

3. No persons shall be appointed to any duty in the Hydrographical branch but by the minute of the Secretary to the Chief Clerk who will keep a list of the various persons employed their occupations and salaries.

4. When any officer having been employed on surveys shall be permitted to continue to work on them in this office for the purpose of completing their surveys or shall be called into the office for any particular service they shall be liable to the same controul as to attendance and the execution of their work as the other persons employed in the Hydrographical branch, they shall [prior to fol.1] be under the superintendence of the Chief Clerk, as to their regular attendance and as to their payment, and under that of the Hydrographer as to the employment of their time and the mode their work is executed.

5. No officer shall be employed but to the Secretary's minute to the Chief Clerk which he will communicate to the Hydrographer and at the same time arrange with him as to the most convenient place for the intended work.

6. Officers so employed shall be paid for every day they are so actually employed as follows (over and above their half pay) –

Captains 20s

Commanders 15

Lieutenants 12

Midshipmen 7

7. If any office on full pay be so employed the Board will consider the special circumstances of the case.

8. The Chief Clerk will furnish the Hydrographer with a copy of this minute.

By the command of their lordships

Sign'd, Jno: Crocker

N.B. Officers occasionally employed are to signify their attendance by a line in their own writing to the Hydrographer, who will transmit it to the Chief Clerk.

Source: UKHO, MB1 page prior to folio 1

Appendix 4

Identification of the origin of a sample of key ideas relating to the governance of the Hydrographic Office, 1808-1829

Date of minute	Synopsis of idea	Origin of idea			
		Civil other	Military other	Admiralty Board	Hydrographic Office
1809	Hydrographic Office to supply all the charts to the Fleet [ADM1/3522]		Y		
c.1811	Lithographic press to be kept constantly in use [UKHO, MLP3i]			Y	
1814	Employment of extra surveyors in peace time [Scottish Record Office, GD51/2/517]		Y		
1816	Sell charts to the public [TNA, ADM12/179]				Y
1817	Re-employment of surveyors on further survey work [UKHO, LB1]				Y
1818	Creation of office of Keeper of Admiralty Timekeepers with salary [ADM1/3460]			Y	
1819	Consistent rates of pay for surveyors [UKHO, LB1]				Y
1823	Reduce the number of draughtsmen in the Hydrographic Office [UKHO, MLP2]			Y	
1825	Regulation of the Hydrographic Office [UKHO, MB1]			Y	
1826	Water-proof charts [UKHO, MB1]	Y			
1826	Proposal to produce sailing directions in the Hydrographic Office [UKHO, MB1]				Y
1827	Print a chart of Bermuda [UKHO, MB1]		Y		
1827	Becher to keep a journal in Parry's absence [UKHO, OD814]			Y	
1828	Communications with foreign hydrographic offices [UKHO, MB1]				Y
1828	Security of nautical and astronomical instruments [UKHO, MB1]	Y			Y
1829	Improvement in the geographical coverage of chart boxes [UKHO, MB1]				Y
1829	Improvement to the <i>Nautical Almanac</i> [UKHO, MB1]	Y			
1829	Revision of the chart agents [UKHO, MB1]				Y
Total		2	2	5	10

Appendix 5

Minute for the regulation of the Hydrographic Office, 1819

At the Board
Novr 16th 1819

Present

Lord Viscount Melville
Sir George Warrender Sir Graham Moore
Sir George Cockburn

Their Lordships being extremely anxious that the present opportunity of peace should be employed in the advancement of Hydrographical knowledge &c in the arrangement and classification of the information which may exist in the office are pleased to decree

1. That the Hydrographer do make a quarterly report of the proceedings of the several surveyors and surveying vessels as far as they may have reach'd him – the first report to be made at the conclusion of the present quarter and to include all proceedings of this year the future reports to contain the proceedings which have arrived since the last report.
2. That the Hydrographer shall lay before the Board every new work completed in his department as soon as it shall be in a state for their Lordships inspection.
3. That altho in the scientific branch his department in the selection of materials, the preparation of charts and instruments and the assorting them into proper stations the Hydrographer is as the head of that branch of the office and received the directions of the Board immediately – yet their Lordships are of opinion that the inappropriate charts themselves and the various materials and documents relative to hydrography are part of the official records and ought to be made subject to the same principles of custody and arrangement what have been so eminently successful with regard to the other records of the department, the Secretary is therefore to take proper measures that the Chief and other clerks in the Record Branch shall take the charge of arranging the hydrographical materials in the principles already directed in several minutes of the Secretary and shall be responsible for the care and good orders of these papers. The Hydrographer having power and authority to view, examine extract and make use of all these documents in the fullest manner he may find necessary for the public service – and for that purpose the Hydrographer is to be furnished with a key to all the places in which the charts and papers may be deposited and the original arrangements and all future alterations and additions are to be made in communication with the Hydrographer who will give Mr Finlaison every assistance in his power in the execution of this system.
4. The arrangements already made by the Secretary with regard to the prepared boxes of charts are to continue to be carried into effect.
5. Mr Dyer to give Capt Hurd a copy of this minute and to see that Mr Finlaison executes their Ldp's instructions.
6. For the general use of navigation as well as to most part of the expences of the Hydrographical department the Secretary is to take such measures as he may judge proper for enabling the public to purchase Admiralty charts at reasonable prices

JW Croker

Source: TNA, ADM1/3461

Appendix 6

Estimate and actual expenditure within the Hydrographic Office, 1811-1829

Year	Estimate of contingencies (in £.s.d)	Contingent expenses claimed (in £.s.d)
1811	2759.2.0	
1812	2000	
1813	2500	
1814	5000	
1815	2000	
1816	2000	
1817	1500	
1818	2500	2003.9.11
1819	2500	3752.4.10
1820	3000	3976.2.11½
1821	5000	4083.10.11
1822	3000	4127.3.6½
1823	3000	1923.12.3 3/2
1824	2000	
1825	3000	1610.16.0
1826	3000	2208.16.7
1827	3000	2680.4.8
1828	4000	
1829	4000	
Total	51259	Not known
Avg	2697	[3139]

NB For purposes of calculating the above figures in bold have been rounded down.

Source: The estimated contingent figures are taken from the Navy estimates, taken from the on-line versions of the Parliamentary returns (<http://parlipapers.chadwyck.co.uk>). The actual figures are taken from TNA, ADM17/28 for the period 1818-23 and from 1825-7 from UKHO, MLP5.

Appendix 7

Chart Committee's survey of commercial charting, 1807

[p.1]

Hydrographical Office, Admiralty,
10th October 1807

Sir

Be pleased to inform their Lordships, that in pursuance of the directions I received, in the Secretary's Letter of 22d May, and permission, on the 27th to purchase for the Hydrographical Office, a compleat set of all Charts published in England; I have at last made that Collection, so far as is practicable; for many Plates have been destroyed, of which Plates, Impressions are no longer to be found but in private Collections.

Their Lordships desired me to make a Selection "of the best and most necessary Charts and Plans of Ports": I must beg leave to observe that it seldom happens, in England, that any Memoir is given with a Chart, to explain on what authority it is constructed, and, consequently, no means exist to ascertain, by inspection, the intrinsck value of any Chart.

In the present circumstances, therefore, I cannot presume to decide on the merits of the various Publications; for which the Officers of H.M. Navy at the Board of Admiralty &c must, in most cases, be better qualified to judge than I am.

That distinguished Character, the late Admiral Kempenfelt, so long since as 1780, strenuously recommended, that all Publications of Charts, should undergoe an Official Examination, and observed that "The Good being stamped with the Authority of The Board, would direct the Purchaser to avoid those erroneous Charts, which, instead of serving to avoid dangers, too often fatally lead to them."

It would, certainly, be of very good Publick Utility, if the Data, on which all Original Charts are constructed, [p.2] were delivered into the proper Office, and a Certificate of Originality expressed thereon, by such Person, or Persons, as may be appointed to receive, and examine, such Data.

In case of publishing Copies of Foreign Charts, The Originals should in like manner be delivered, to examine if the Copies are exact, and the correctness of the Copy certified.

As General Charts must be constructed, at least in part, from Particular Ones, proper Persons should determine, what proportion of the Property, belongs, in rights, to The Original Publisher of the Particular Charts, of which the General Chart is composed; and the Publisher of such General Chart, should be required to make a Special Declaration of the Materials used in constructing such General Chart: at present Property in Charts is very insecure, and pirated Publications are made, to the Loss of the Original Proprietor, and often to the serious disadvantage of the Publick, by obtruding erroneous Charts upon them.

I thought it expedient to separate The Charts into Classes, viz

General Charts

- Class 1. The World.
- [Class] 2. North and South Atlantic Oceans.
- [Class] 3. Indian Sea, to the Eastward of Cape-Good-Hope, to Java, Sumatra, & Bay of Bengal. The Oriental Islands, Malaya to China, Papua, New Zealand &c.
- [Class] 4. Pacific Ocean.

[p.3]

Particular Charts

- Class 5. a Great Britain in general
b From strait of Dover, westward, including the English Channel with the Coasts on both sides
c Ireland, St. Georges Channel, and West Coast of Scotland
- [Class] 6. a North-sea, including Iceland, Feroe Islands, Norway, Shetland, Orkneys, & North Coast of Scotland, from Cape Wrath to Duncansby Head.
b East Coast of Scotland & East Coast of England & Coast of Holland and Germany
- [Class] 7 Baltick & Its Entrances
- [Class] 8 Bay of Biscay and Coasts of France, beyond the English Channell, Spain and Portugal to Gibraltar.
- [Class] 9 Mediterranean Sea
- [Class] 10 W. Coast of Africa to Cape Good-Hope Tristan da Cunha, St. Helena, Ascension, Cape Verde Islands, Canaries, Madeira, Porto-Santo, & Azores.
- [Class] 11 E. Coast of North-America
- [Class] 12 West Indies
- [Class] 13 a South America from Trinidad, Southward
b West Coast of America
- [Class] 14 East Indies to the East of Cape Good-Hope, in detail
- [Class] 15 Polar Charts

Of Class 1.2.3.4 I do not think any yet published are sufficiently correct, as a body of Hydrography, for the use of H.M. Navy: although Ships, on particular Service, should not be dispatched without such as are now published; but with them a Caution should be given that “They do not merit implicit confidence”.

Class 5 & 6. It is a Disgrace to This Country that the Hydrography of our own Coasts is not accurately delineated; [p.4] Those parts of The Coast of England which were surveyed by the Two McKenzies and Mr. Spence, are engraved, or are engraving in the Hydrographical Office; and That recently surveyed by Licut Murray.

The Charts of Ireland, from the survey of Mr. Murdoch McKenzie Senr. published as private property, are represented to be, in many parts, extremely erroneous in the Latitudes; a Memorandum of some of those Errors (from Dursey Island to Urris Head, amounting to from 10’ to 12’ too far South) observed by Thomas George Shortland Lieutenant of H.M. Ship Melpomene, communicated to the Hydrographical Office by Sir Thomas Troubridge, is printed for the use of H.M. Navy: These Surveys of Ireland, instead of being laid down by the True North, are absurdly laid down by the Magnetical Meridian, which is always changing; They are also of an unwieldy size, so as not to be of convenient use. They are not now to be

purchased; The Plates I am informed, having been sold and sent to Ireland. I have in my own Collection a Copy of his Sailing Directions. There are 5 Plates, the Outline from Mackenzies with corrections by Capt. Drury; and one more, the Outline from Coll. Vallancey's with Sailing Directions published in Dublin in 1789, of which there is a Copy in the Hydrographical Office.

The Charts of the Orkneys, by Mr. McKenzie Senior are represented to be very exact: They are not made at the Public Expence, and are private property, but I conceive the single Sheet Chart of these Islands will be sufficient for common use.

I do not believe there is any exact Chart of the Shetland Islands, although I have some enlarged Sketches by Captain Columbine, of the R.N. of parts of these Islands, taken occasionally by Him when an Officer on that Station. There is a Book of Remarks of the Shetland Islands by C. Lowenorn printed at Copenhagen in 1787 in English as well as Danish, but he makes the Skg of Unst 9'30" less than C. Bligh.

M. Kerguelen, in a Work that was suppressed, alledges that 500 Men would secure to France Larwick, against any Force that could be sent to retake it, and that it would afford a Station greatly to annoy our Trade.

[p.5] Great part of the Coasts of Iceland has been surveyed and published by the Danes; as well as the greater part of the Coast of Norway, with Books of Nautical Instruction in the Danish Language, but I have never been able to get them translated; a Person once offered to translate them, but his demands were so exorbitant, and his ability so questionable, that I could not recommend that he should be employed: tho' I think a Person, or Persons, competent to translate Dutch, Danish and Swedish Nautical Books, as well as French, Spanish, Portuguese and Italian would be very useful, at a reasonable fixed Salary: The only way of finding such a Person, or Persons, would, in My opinion, be by a Public Advertisement.

There is in my own Collection a MS of the Feroe Island; and there is a printed Chart and a Book, in Danish, of Nautical Instruction of these Islands.

I have, on a former occasion, recommended a Survey of the Banks at the Mouth of the Thames, to be executed by the Quincunx, which is the only way of laying down Soundings out of the sight of Land: This Recommendation was referred by Their Lordships to The Trinity Corporation, who sent a letter, dated 27th January 1807, in reply "That the Corporation of the Trinity House have never yet been engaged on Surveys, and have not the means of effecting them, having neither Vessels, nor any Maritime Surveyor attached to their Institution: That the Surveys of the Owers &c have been carried into execution by the Maritime Surveyor of the Admiralty," and here the Matter rests: Objection has been made to such a Survey as exposing our Ports to an Enemy! But altho' this Objection might be made against all Surveys or Pilotage! It cannot be admitted to have any weight in this Instance, as the Survey may begin at, and extend outwards from, the exteriour Banks. The Navigation, into Ports, must be pointed out by Buoys, and Beacons; which can be removed, as often as occasion require.

[p.6] The Survey of the Islands of Guernsey &c was begun by Mn. Lockwood, a Master in the Royal Navy, but, owing to some difference with the Commanding Officer on that Station, The Survey was not completed: I presume the most expedient mode of getting it completed, would be by recommendation to The Commanding Officer; and a Communication of the Treatise of Nautical Surveying which has been printed in the Hydrographical Office: Directing that the Progress should be sent to England weekly: When the Weather is too bad for taking the Soundings, The Surveyor may be employed in ascertaining by the Hadley on Shoar, the exact position of all the Rocks &c that are visible from the Land.

Class 8. Surveys of the Coasts of France and Spain have been published in those Countries; and parts have been copied and engraved in the Hydrographical Office: but there is great reason to suspect These Surveys have not been made with the exactness which might be wished for, if we may rely (as I have no doubt we may) on Capt. Hurd's Survey in the vicinity of Brest; but his Survey is not yet completed, nor can such Surveys be competently executed, without an Establishment of proper vessels to form a Quincunx.

I believe there are no accurate Charts of the Coast of Portugal: a Plan of the Port of Lisbon, communicated by Earl St. Vincent to the Hydrographical Office, is almost finished.

Class 9. Many Pieces of the Mediterranean were sent to the Hydrographical Office, by the ever to be lamented Lord Nelson, and have been engraved: and some from others, especially from Capt. Joseph Edmonds: but the Documents received into This Office are not sufficient to make an exact Chart of That Sea.

There are in my possession, two printed, Spanish Charts, from the Observations of Brigadier D. Dionisio Galiano, extending from the Strait of Gibraltar to the West Coast of the Morea: and There [p.7] is another Sheet by the same Officer, comprehending the Greek Archipelago, The Coasts of Asia Minor, Syria, Egypt and Lybia; but I do not know whether it is yet published. Notwithstanding the many Men of War that were on the Coast of Egypt during the last War There is no complete Chart of That Coast received into the Hydrographical Office, nor even an exact Plan of Aboukir Bay.

In my letter of 28th February 1807, in consequence of Lord Collingwood's very judicious Remarks on the Loss of H.M. Ship Athenien, on the Esquirkes, I pointed out the essential importance of Views of Land, and of Chronometer Observations, and recommended an exact Survey to be made of those Shoals; but I am ignorant whether any thing has been done in consequence.

I have had a List, made in the Hydrographical Office, of all the Rocks and Shoals in the Mediterranean, according to the different Charts, which List I mean to print for the use of H.M. Navy. The Plan of Formigas, near the Island of Elba, by Capt. Joseph Edmonds, and the Plan of part of the Esquerkes by Capt. Durban have been engraved in the Hydrographical Office; and some Memorandum printed of Dangers, received from Lord Keith: but very few Communications are made to the Hydrographical Office, and The Reports, ordered by Their Lordships on 17th February 1804 are very seldom (almost never) given in: I beg leave, on this occasion, to suggest the propriety, of enforcing the Delivery of Regular Reports, in the manner directed, and recommended circulating The Essay on Nautical Surveying, which has been printed in this Office, as it may promote and facilitate correct Hydrographical Information.

Class 11. The Surveys of Newfoundland, Nova Scotia, Gulph and River of St. Lawrence and Coast of Florida, made (I believe) at The Publick Expence, have been engraved and published as Private Property. I am informed Des Barres's Plates of Nova Scotia and to the Southward are no longer to be purchased; but the French have published them and Newfoundland is a commodious size. Class 12. The Spanish Surveys of the West Indies, are reported to be very exact, but the whole are not yet published. [p.8] The Spanish Government undertook that Survey on a Great Scale! Instruments, to the value (I think) of £1500 were ordered from this Country; There were two Sets of Vessels, each Set of two Vessels, supplied with Astronomical Quadrants, Chronometers, Telescopes &c. The Person who received the Order was desired to show the Order to me, and to send any other Instruments I might suggest,

except Compasses, which I presume, they thought could be well executed in Spain; It was declared They meant to make Surveys of all The Coast of Spanish America, for Publication. many of these are published; and in a Supplement to the Madrid Gazette of Tuesday 19th June 1804 there is a printed Catalogue not only of Them, but of Tofino's Charts &c. Since then a Plate containing Porto Cabello, La Guayra and Barcelona has been published, and a General Chart from Trinidad to the Gulph of Honduras in 1805. I have not heard of any since.

Class 13. What I have said above refers partly to this Class: a very elegant Set of Charts of great part of Trinidad by Capt Columbine of H.M. Navy has been prepared for engraving at the Hydrographical Office: These Charts are accompanied with Views of the Land, drawn in a Masterly Stile.

The Dutch have published Charts of Guayana, and the Mouths of the Amazon River, by G. Hulst Van Keulen 1785 which have the appearance of great precision: The late Mr. Jeffreys published Plans of the French and Spanish Ports; and in 1799 I published, in two Sheets, a Reduction of the Dutch Charts, with some additional Soundings, of The Coast of Brazil, from Cape St. Roque to St. Thomas. I have also re-engraved a Portuguese Chart, from the Bay of St. Ann to the Northward of Cape Frio, along the Coast, Westward to the Bay of Isla Grande: These Three are included in the 100 copies purchased by the Admiralty. I have heard of other Portuguese Charts of parts of that Coast, but have never been able to procure Copies, or even to get a sight of them. It would be useful to recommend attention on this Subject to Our Ministers and Consuls in Foreign parts.

[p.9] There is lately published, by Mr. Faden 1807, a Chart of part of the Coast of Brazil, said to be from a Survey, made by order of the late Admiral Campbell, in the Portuguese Navy, from 23°.45' to 26° So. Latitude. It has all the appearance of precision, and contains also particular Plans of Santos, Marpequeno or Iguape, Canea, Paranagua and Guaratuba, I think it would be adviseable to purchase for The Publick a number of Impressions of This, and such other Private Plates before the Plates are worn out.

Class 14. The Lords Commissioners of The Admiralty having purchased 100 Copies of all that I have published, It is unnecessary to say any thing on that Subject except that the Nautical Memoirs are in progress or re-printing and that Capt. Horsburgh has published some valuable Charts and a Book of Nautical Instruction: The Neptune Oriental of M. D'Après is a very valuable Work, tho Modern Observations have added to our knowledge of those Seas.

Hereto is annexed a Catalogue of the various Charts in each Class; which Catalogue I think it would be useful to print, as it would facilitate the obtaining the Character of the different Charts, from The Officers of H.M. Navy, who have had an opportunity to observe their merits or demerits.

I beg leave in the strongest terms to recommend Uniformity in the Scale of Charts and Plans, because, It, insensibly, conveys great knowledge and precision of Ideas, concerning the relative distances and magnitudes of Places. The Mind readily can conceive the proportion of Half, Quarter, Eighth &c. but when it is distracted with fractional comparisons, Men do not carry along with them, that knowledge which Uniformity would have produced: I have, in the many Charts & Plans published by me, conformed to this Rule, of making them encrease and diminish in Duplicate Proportion.

The smallest Scale I use for Particular Charts is 1½ Inch to 1° or 1/40 of an inch to 1' progressively encreasing 1/20 to 1' or 3 Inches to 1° 1/10 to 1' or 6 Inches to 1° 2/10 to 1' or 12 Inches to 1° 4/10 to 1'; 8/10 to 1'; 16/10 or 1 Inch, 6 to 1'; 32/10

or 3 Inches, 2 to 1; 64/10 or 6 Inch, 4 to 1'; 128/10 or 12 Inch, 8 to 1'. Thus making all the Particular Plans of Ports &c a proportionate Scale to the particular Charts; which is a great convenience for inserting them into the Chart: and I have a Scale of 3 Inches divided into 120 parts so that each division on it is 1' on the smallest Scale of 1½ Inch to 1°. Half a Nautic Mile on the Scale of 3 Inches to 1°. One Quarter of a Nautic Mile on the Scale of 6 Inches to 1°. One Eighth of a Nautic Mile, or about a Cables-length, on the Scale of 12 Inches to 1°. I have chosen 3 Inches to 1° as the Scale, having found That the most convenient for my common Chart-Scale.

The Scale, I have adopted, for the largest General Chart, is 8/10 of an inch to 1° diminishing progressively 4/10 to 1°; 2/10 to 1°; 1/10 to 1° &c. I have a Scale whereon 8/10 of an inch is divided into 30 parts; so that every Minute, or Mile, being the middle Space between the divisions, is readily distinguished on that Scale: more readily than if 8/10 had been divided into 60 parts.

When it is considered that all Plans have an actual relation to the delineation necessary for Charts of Coasts; but that General Charts are not meant to convey the Hydrography, but the General Form and Position upon the Globe. The propriety will appear obvious of making General Charts relative amongst themselves only; and not proportionate to the Particular Charts, which could not have been done without fractional Numbers; for Half of 1 Inch, 5 progressively would be 75/100; 375/1000; 1875/10,000 &c.

For Surveying Harbours of considerable extent, or Portions of Coasts, the most commodious method to get a Base is by Sound; A Plummet on a thread of 11 Inches, 24/100 of an inch, measuring from the Loop of Suspension to the heaviest part of the Plummet, for every Swing of the Plummet, from sight of the Explosion to hearing the Report will shew 1/10 of a Nautic Mile, I assume 6120 feet or 2040 yards as a Nautic Mile (5280 feet or 1760 yards is a Statute Mile) I think the Nautic Mile is the best for Sea use.

[p.11] The Measure of a degree in Latitude is not exactly the same in all Latitudes, nor positively determined in any (The measurements that have been made not agreeing) Norwood's Measurement has been adopted in England, and I have thought it better to adhere to his Measurement, than to assume any other uncertain proportion, as Uniformity is of much greater consequence than Minute Precision, which would be of no real use in the Scale of a Plan altho' it may be in the admeasurement of a degree.

Whether the disagreement, in the Measurements that have been made, arises from inaccuracy in Measuring, from Attraction of Mountains, or from the Surface of the Globe being not uniform, is of no consequence in Hydrography; as the Base which can be measured on Land by a Navigator, will not be of sufficient length to produce any Error worth attending to, in the Scale of a Plan: and in great distances, the difference of Latitudes observed will give a better Base than he can, probably, obtain by admeasurement.

I presume it will not be amiss in this Place, to give a List of the Instruments requisite in Nautical Surveying, besides the Azimuth-Compass, Leads and Lines for Sounding, with which it is supposed every Ship in H.M. Navy is supplied, and Chronometers and Nautical Almanacks, proper for all Ships on Foreign Service viz

A small Hadley, 3 Inches Radius.

A pair of Compasses, inverting into themselves

A Parallel-Ruler, The best for Nautical Purposes, is Echarts on Rollers, with a scale of equal parts on the Edge: The most commodious case of Instruments is That, where the Parallel-Ruler is formed into a Case for the Compasses.

A Scale with line of Chords on one edge, and a line of semi-tangents on the other edge.

That same Scale, on the other two edges (or another Scale) divided into equal parts 3 Inches to 1° and 8/10 of an Inch to 1°.

A Protractor – Incomparably the best, is that invented by Hadeus 150 years ago, being two concentric graduated Circles: The [p.12] lower fixed & the upper moveable; The lower has one half cut out, with a chamfered edge that always remains fixed on the Line from whence the Angles are to be laid off; to This Instrument, I added two projecting Arms, for drawing the lines at once.

Instead of This, a graduated Semi circle of transparent Horn, with parallel Lines across at the divisions of every 10° will be found very convenient.

I have had a Plate engraved of a Circular Protractor to be printed on transparent Paper. Their Lordships may have the use of This Plate for taking off some Impressions if They wish it.

As several Charts were in the Hydrographical Office, I did not think it proper to put the Publick to the Expence of Duplicate; but this occasions some Embarrassment in stating The Expence of a Set which was necessary to form an Estimate of the Expence of a General Supply to the Royal Navy.

I have the Honour to be

Sir Your most obedient Servant

ADalrymple

Hydrographer to the Admy.

Hon. W.W. Pole

Secretary to the Admiralty

&c &c &c

P.S. In addition to my letter of 10th Sept 1807 I beg leave to observe that H.M. Ship Ariadne Capt. Joseph Ellison, with the Sun Flower Lt. H.L. Ball were the Vessels sent to examine the Bank of Soundings on the Coast of Ireland, & that Capt Ellison in a letter dated “Ariadne, Lough Swilly, 15th Sept 1783” mentions enclosing the Chart of their Soundings, made by Lieut William Bradley but the Chart is not now with the Letter there being a slip of Paper on it “NB The Chart was sent to The Board”. The Ariadne’s Journal mentions Soundings about 20 leagues to the Westward and Northward of Tory Island but the Journal is not so circumstantial as to allow of laying down the Soundings. And Capt Ellison’s Recollection does not agree with the Journal. This Bank I conceive would be of the utmost advantage in thick weather, to Ships going to Glasgow & Liverpool by the North of Ireland if the Extent of the Bank with the depths and qualities of the ground were accurately determined in close Traverses by runs from the Land to the extremity of Soundings: The Extremities of the Traverses being corrected by Chronometrical Observations, and the Chart of These Traverses will be competent to shew whether it would be requisite to make a Survey by the Quincunx. AD

[p.13] 2d. P.S. In the following list It will appear that several Charts and Plans have been made by Officers in H.M. Navy have been published altho’ no such have been sent to The Admiralty viz

Class 5b

Boulogne by J. Tapper, Master H.M. Ship *Immortalite*

Owers Light to Plymouth

Wm. Price, Master H.M. Ship *Theseus*

Coast of Sussex & Hants, from Selsey to Christchurch J Knight R.N.

Selsey to Poole

Do

	Spithead, St. Helens &c.	Do
	Spithead &c	<u>Francis Owen</u> , Master R.N.
	Portland	<u>J. Knight</u> R.N.
	Torbay & Dartmouth	Do
	Plymouth Sound	<u>Willm. Price</u> , Master R.N.
Class 5c	Cork Harbour	<u>J Knight</u> R.N.
	Bear Haven &c	Do
Class 6a	Sketch of Orkney, Shetland, & Faroe Islands.	<u>Ross Donnelly</u> H.M. Ship <i>Pegasus</i>
Class 6b	South part of North Sea, chiefly Foulness	<u>J Knight</u> R.N.
	Yarmouth to Folkestone	<u>Thos. Fotheringhame</u> , Master R.N.
	Thames & Medway	<u>J Knight</u> R.N.
	East Swale	<u>J Knight</u> R.N.
	Downs	<u>John Stephenson</u> , Master R.N.
Class 8	Bay of Biscay &c	<u>J.F. Dessiou</u> Master R.N.
	Ushant to Saints	<u>J. Knight</u> R.N.
	Christian I. to Parquelle	Do
	Saints to Bec du Raz	Do
	Glenan Isles	Do
	Howat	Do
	Quiberon Bay	<u>Wm. Price</u> , Master H.M.S. <i>Theseus</i>
	Entrance of Tagus	<u>William Chapman</u> , Master R.N.
Class 9	Mediterranean	<u>J Knight</u>
	Do	Do
	Leghorn	<u>John Jackson</u> R.N.
	Coast of Portugal, Spain & Barbary	<u>J. Knight</u> R.N.
	Zaffarine Islands	<u>W. Wolseley</u> R.N.
	N. part of Corsica	<u>J. Knight</u> R.N.
[p.14]	Gulph of Ajaccio	by <u>J. Knight</u> R.N.
	Bastia	Do
	Road of Leghorn	<u>John Jackson</u> , Master R.N.
	Bay of Aboukir	<u>Thomas Atkinson</u> R.N.
Class 10	Mogador	<u>W. Sydney Smith</u> R.N.
	Porto Santo	<u>C. Woolley</u> , H.M.S. <i>Arethiusa</i>
Class 11	East Coast of Newfoundland from Cape Spear to Cape St. Francis	<u>Joesph Sydney Yorke</u> R.N.
	St. Johns	<u>Francis Owen</u> , Master R.N.
	Harbour Great Placentia	Do
	Sandy Hook	Lt Hills R.N.
Class 12	West Indies	<u>J. Knight</u> R.N.
	Endymion Shoal	D. Woodriffe R.N.
	Windward Passage	<u>Charles Roberts</u> , Master, R.N.
	Caribbee Islands	<u>E.H. Columbine</u> , R.N.
	Harbour St. Johns &c	Do
Class 14	Plan of St. Lucia on Madagascar	<u>John Young</u> , Master, H.M. Ship <i>Garland</i>
	Plan of a Bay between Itapere Point & St. Clare	Do
	Tellicherry to Calicut	<u>Lt. Lewis</u>
	Plan of Negombo	<u>M Forten</u> Master of H.M.S. <i>Heroine</i>

In consequence of omitting to send these Plans & Charts to The Admiralty, It becomes a question whether any use can be made of them in the Hydrographical Office without infringing on Private Property.

The Amount of the whole is £s 168.3.6

But there were in the Hydrographical Office

Charts &c to the Amount 9.1.0

So that The Amount now due to The Chart Sellers is £159.2.6

I have the honour to be

Sir Your most obedient Servant

ADalrymple

Hydrographer to the Admy.

Honble W.W. Pole

Secretary to The Admiralty

&c &c &c

[p.15 nn]

		£	S	D
Class 1	Charts of the World	4	6	6
2	North & South Atlantic Oceans	6	9	0
3	Indian Seas to the Eastward of the Cape of Good Hope &c to China Papua & New Zealand	4	14	0
4	Pacific Ocean	2	12	6
5a	Great Britain in General	1	6	6
5b	English Channel from the Straits of Dover	12	9	0
5c	Ireland St. Georges Channel & West Coast of Scotland	9	0	0
6a	North Sea including Iceland, Feroe Islands, Norway Shetland Orkneys & N. Coast of Scotland	3	11	6
6b	German Sea East Coasts of Scotland & England & Coast of Holland & Germany	15	5	6
7	Baltic & Its Entrances	6	16	0
8	Bay of Biscay & Coasts of Spain & Portugal to Gibraltar	6	18	0
9	Mediterranean	15	0	0
10	Coast of Africa to Cape of Good Hope	4	15	9
11	Coasts of North America	14	15	6
12	West Indies	21	5	3
13a	South America to Southward of Trinidad	7	3	6
13b	West Coast of America	2	15	0
14	East Indies to Eastward of the Cape of Good Hope	29	0	0
		168	3	6

List of English Charts

NB. Those without price are in the Hydrographical Office & are not now to [be] purchased singly

Class 1 Charts of the World

Scale	[Description]	No. of Sheets	By whom Published	[Year]	£	S	D
0,2=1°	Chart of the World on Mercators Projection	8	Arrowsmith	1790	1	11	6
0,15=1°	Mercators Chart of the World	2	Heather	1803	0	12	0
0,1=1°	Chart of the World on Wrights or Mercators Projection	2	Laurie & Whittle	1805	0	10	6
0,1=1°	Variation Chart of the World, improved from Dr. E. Halley by W. Mountain & James Dodson	2	Laurie & Whittle	1794	0	5	0
0,2=1°	Outline Chart extending from Cape Good Hope to New Zealand & from Cape Good Hope to New Zealand & from China to America	2	Heather	1802	0	10	6
0,2=1°	A Chart of the N. & S. America, including the Atlantic & Pacific Oceans &c by John Green New Edition	6	Laurie & Whittle	1800	0	12	0
0,2=1°	Track of the Earl Talbot from England to Madras 1785.6.7	1	Faden	[blank]	0	5	0
				[total]	4	6	6

Class 2d North and South Atlantic Oceans

Scale	[Description]	No. of Sheets	By whom Published	[Year]	£	S	D
0,45=1°	Atlantic Ocean, by T. Jefferys; vide East India Pilot in the H.O.		Sayer & Bennett	1777			
0,2=1°	Southern Ocean &c from the Equator to Cape Hon & Cape Good Hope	1	Laurie & Whittle	1794	0	2	0
0,45=1°	Chart of the Atlantic Ocean from 60°N Lat to the Equator [with inset of] Hudsons Bay 1,13=1°	4	Laurie & Whittle	1794	0	6	0
0,3=1°	Atlantic or Western Ocean	1	Heather	1797	0	3	6
0,45=1°	South Atlantic, and round Cape Horn	2	Heather	1799	0	6	6
0,2=1°	England to St. Helena, Capt. Bligh, & Remarks	1	Arrowsmith	1800	0	5	0
0,45=1°	Atlantic Ocean from 60°N to the Equator (Fleurieu &c)	4	Laurie & Whittle	1803	0	10	6
0,5=1°	Atlantic Ocean from 62°N to the Equator	2	Steel	1804	0	10	0
1,0=1°	Atlantic Ocean	4	Arrowsmith	1805	1	5	0
1,0=1°	South Atlantic Ocean	4	Arrowsmith	1805	1	5	0
0,45=1°	General Chart of the Western Ocean 2nd Edition with Improvements	2	Heather	1807	0	6	6
0,45=1°	Chart from the British Isles to America & Cape of Good Hope & Views [with insets of] Plan of Port Praya South side of St. Yago 0,15=1° [and] Coast of Brazil from Cape Frio to Gavea 0,1=1°	4	Laurie & Whittle	1807	0	10	6
0,45=1°	South America & the Southern Ocean, including the West Coast of Africa from Cape Verd to Cape Good Hope & Views [with inset of] Coast of Brazil from Cape Frio to Gavea 0,1=1°	3	Laurie & Whittle	1807	0	10	6
				[total]	6	9	0

**Class 3 Indian Seas to the Eastward of the Cape of Good Hope to Java, Sumatra & Bay of Bengal.
The Oriental Islands to China & Papua New Zealand &c**

Scale	[Description]	No. of Sheets	By whom Published	[Year]	£	S	D
0,25=1°	Indian Ocean, shewing the comparative Tracks in the different Monsoons by B. Lacum [with inset of] Supplemental Sketch exhibiting the Sea Engagements in the Bay of Bengal between the English & French Fleets from 1758 to 1783	1	Laurie & Whittle	1794	0	6	0
0,5=1°	Indian Ocean & Views [with insets of] Plan of False Bay by Joseph Huddart 0,15=1' [and] St. Augustins Bay 0,73=1' [and] Bay of Johanna 0,95=1' [and] Fortune Bank ascertained by the Surat Castle in 1789 No Scale [and] Straits of Sapy 0,07=1' [and] Plan of Kalatoa 0,1=1' [and] King George 3rd Sound 0,15=1' [and] SE Part of Van Diemens Land from Jno Hayes 1791 0,05=1'	6	Laurie & Whittle	1798	0	15	0
0,9=1°	Indian Ocean & Views [with inset of] Brava 1,55=1'	2	Heather & Williams	1799	0	10	6
0,25=1°	Indian Ocean & Views [with insets of] Isle of Norfolk 0,25=1' [and] Ansons Road Tinian 0,55=1'	2	Laurie & Whittle	1800	0	10	6
0,95=1°	Indian Ocean	4	Arrowsmith	1802	1	5	0
0,25=1°	Indian Ocean Anemo Hydrography of the Monsoons by Brenier	1 1/2	Faden	1803	0	12	0
0,45=1°	Indian Oceans & Views	3	Heather	1806	0	15	0
				[total]	4	14	0

Class 4 Pacific Ocean

Scale	[Description]	No. of Sheets	By whom Published	[Year]	£	S	D
0,5=1°	Pacific Ocean	9	Arrowsmith	1798	2	12	6

Class 5a Particular Charts Great Britain in General

Scale	[Description]	No. of Sheets	By whom Published	[Year]	£	S	D
2,0=1°	England Ireland & Scotland with the coasts of France Spain & Portugal & Views [with insets of] Oporto 0,25=1' [and] Lisbon & St. Ubes 0,15=1' [and] Cadiz 0,4=1' [and] Gibraltar 0,2=1'	4	Heather	1793	0	10	6
1,5=1°	Coasts of Great Britain & Ireland &c	1	Laurie & Whittle	1794	0	2	0
4,0=1°	United Kingdom of England Ireland & Scotland &c [with insets of] Southern Isles of Orkney 0,5=1' [and] Ferrol 0,95=1' [and] Corunna 1,1=1' [and] Lisbon 0,1=1' [and] Cadiz 0,45=1' [and] Gibraltar 0,4=1'	4	Steel	1806	0	16	6
				[total]	1	9	0

Class 5b English Channel, from the Straits of Dover

Scale	[Description]	No. of Sheets	By whom Published	[Year]	£	S	D
1,4=1°	Channel & Bay of Biscay by de la Rochette 3d Edition	1 1/2	Faden	1794	0	5	0
4,0=1°	Channel & Bay of Biscay by J.F. Dessiou with Directions	3	Faden	1804	0	12	0
5,9=1°	Channel by Jefferys with Directions	6	Laurie & Whittle	1794	0	10	6
4,1=1°	Channel by John Stephenson, Master	1 & Slip	Laurie & Whittle	1800	0	5	0
5,0=1°	A Trigonometrical Survey of the Channel with Directions [with insets of] River Thames Royal Sovereign Shoal no scale [and] Owers, Spithead & Isle of Wight 0,45=1' [and] Plymouth Sound 0,9=1' [and] Falmouth 0,65=1' [and] Scilly Islands 0,95=1'	4	Laurie & Whittle	1800	0	7	6

4,3=1°	Channel with the Coast of Ireland to the Shannon with Views & Directions [with insets of] Downs 0,45=1' [and] Portsmouth 0,25=1' [and] Portland 0,75=1' [and] Plymouth Sound 0,075=100 yards [and] Fowey or Foy 1,45=1' [and] Mevagizey 0,8=1' [and] Falmouth 1,0=1' [and] Mounts Bay 1,2=1' [and] Baltimore Harbour 0,9=1'	4	Laurie & Whittle	1800	0	6	0
4,5=1°	Channel & Views [with insets of] Downs 0,55=1' [and] Portsmouth 0,3=1' [and] Torbay 1,0=1' [and] Dartmouth 3,6=1' [and] Plymouth 1,1=1' [and] Falmouth 1,25=1' [and] Cork 0,45=1' [and] Dublin 0,75=1' [and] Liverpool 0,35=1'	4	Heather	1805	0	13	0
5,0=1°	Channel and Views [with inset of] Downs 0,45=1'		Laurie & Whittle	1805	0	10	6
4,9=1°	Knights Channel, with Directions & Views [with insets of] Sheerness 0,7=1' [and] Spithead 0,85=1' [and] Portland 0,55=1' [and] Exmouth 1,05=1' [and] Dartmouth 2,15=1' [and] Mounts Bay 0,65=1' [and] Lands End 0,65=1' [and] Scilly Isles 1,1=1' [and] St. Vincents Channel, Ushant 0,65=1'	3	Steel	1806	0	14	0
1,0=1'	Boulogne [with insets of] Havre de Grace 0,55=1' [and] Cherbourg 1,2=1' [and] Owers to Poole with Spithead 0,3=1' [and] Needles Passage 0,85=1' [and] Torbay 0,85=1' [and] Jersey &c 0,25=1' [and] Plymouth 1,95=1' [and] Falmouth 1,45=1' [and] Fowey 3,3=1' [and] Cork 1,0=1'	1					
22,8=1°	Channel	7	Arrowsmith	1807	2	2	0
11,0=1° Long	Coast of France &c from Calais to Belle Isle with Plans [with insets of] Havre de Grace 0,35=1' [and] St. Malo 1,3=1' [and] Morlaix 0,4=1' [and] Brest 0,4=1' [and] L'Orient 2,7=1'	2	Heather	1796	0	5	0
23,4=1°	Strait of Dover &c	1	Arrowsmith	1805	0	5	0
0,85=1'	Varne & Ridge by Christopher Collins Master of H.M.S. Cumberland 1793	1	Laurie & Whittle	1794	0	2	0
1,2=1'	Dungeness by James Johnstone	1	Arrowsmith	1806	0	2	6
1,05=1'	Coast of Kent from Dim Church [sic] to Rye Harbour by John Stephenson	1	Laurie & Whittle	1794	0	2	0
3,9=1'	Harbour of Rye	1	Laurie & Whittle	1794	0	2	0
22,0=1° Long	Chart from the Owers Light to Plymouth Sound by William Price Master of HMS <i>Theseus</i> with Views & Plans [with insets of] Torbay [with] Start Bay no scale [and] Marks for Spithead & St. Helens [and] Marks for Falmouth Sound	3	Laurie & Whittle	1799 & 1800	0	10	6
0,85=1'	Coast of Sussex & Hants from Selsey to Christ Church by Capt. J. Knight	1	Faden	1797	0	4	0
33,2=1°	Coast from Selsey Park to Poole Harbour J Knight Views	2	Steel	1804	0	6	0
38,0=1° Lat	Arundel Haven to St. Aldans Head with Isle of Wight by Joseph Avery in East India Pilot Vol. 1st		Laurie & Whittle		0	3	0
0,6=1'	Spithead & Isle of Wight	1	Heather & Williams	1797	0	3	6
1,85=1'	Road of Spithead, St. Helens, &c J. Knight R.N.	1	Faden	1799	0	5	0
2,2=1 St.mile	Spithead from the East End of Hayling Island to Stokes Bay with Directions by Francis Owen, Master R.N.	1	Laurie & Whittle	1801	0	4	0
1,45=1'	Race of Portland [with insets of] Plymouth Sound 2,45=1' [and] Falmouth & Views 2,25=1'	1	Heather	1798	0	3	6
3,0=1'	Portland Race &c	1	Laurie & Whittle	1794	0	2	0
1,35=1'	Portland & Views J. Knight R.N.	1	Steel	1802	0	4	0
14,8=1° Long	Chart of the Coast of France from Cherbourg to Brehatt including Jersey &c by Joseph Dessiou	1	Laurie & Whittle	1805	0	4	0
12,0=1°	Brehatt including Jersey &c and Views by M de la Rochette	1	Faden	1781	0	4	0
15,2=1° 21,8=1° Long	Chart of the Islands of Guernsey, Jersey &c from Dobrees' Charts [with inset of] Plan of Alderney & the Caskets 1,05=1'	1	Laurie & Whittle	1794	0	2	0
1,45=1'	Islands Jersey, Guernsey &c from the French Surveys	1	Heather	1806	0	4	0
1,35=1'	Island of Guernsey &c from Dobree	1	Laurie & Whittle	1794	0	2	0
1,35=1'	Island of Jersey by Clement Lempriere	1	Laurie & Whittle	1796	0	2	0
0,7=1'	Coast of Devonshire from Exmouth Bar to the Stoke Point [with inset of] Dartmouth & Views 2,25=1'	1	Laurie & Whittle	1794	0	2	0
2,5=1'	Torbay and Dartmouth J Knight R.N.	1	Faden	1792	0	3	0
4,0=1'	Torbay Jos. Dessiou	1	Steel	1804	0	4	0
0,85=100 yards	Dartmouth J Dessiou	1	Faden	1804	0	4	0

3,5=1'	Plymouth Sound, Hamoaze & Catwater	1	Laurie & Whittle	1798	0	2	0
4,4=1'	Plymouth Sound, Hamoaze & Catwater & Views by William Price master RN	2	Laurie & Whittle	1800	0	4	0
0,72=1'	Yealme River	1	Laurie & Whittle	1795	0	2	0
7,0=1'	Road & Harbour of Fowey or Foy & View by Lieut James Cook RN	1	Laurie & Whittle	1794	0	2	0
2,8=1'	Polkerris & Mevagizey Bays & Views	1	Laurie & Whittle	1794	0	2	0
1,8=1'	Falmouth & Carreg Road & Views [with inset of] Helford Sound 1,95=1'	1	Laurie & Whittle	1794	0	2	0
1,2=1'	Mounts Bay from the Lizard to the Lands End Cape Cornwall & Views by John Thomas & William Denys &c	1	Laurie & Whittle	1794	0	2	0
13,8=1° long	Chops of the Channel to the South of the Scilly Islands & Views New Edition	1	Laurie & Whittle	1795	0	2	0
2,2=1'	Scilly Islands & Views by A Tovey & N. Ginver	1	Laurie & Whittle	1794	0	2	0
2,6=1'	Scilly Islands & Views by A Tovey & N. Ginver	1	Heather	1803	0	3	6
				[total]	12	9	0

Class 5c Ireland, St. Georges Channel & West Coast of Scotland

Scale Long	[Description]	No. of Sheets	By whom Published	[Year]	£	S	D
7,4=1°	St. Georges Channel [with insets of] Waterford 0,5=1' [and] Dublin 0,95=1' [and] Lamlash 1,0=1' [and] Liverpool & Chester 0,35=1' [and] Milford Haven 1,0=1' [and] Tenby 0,8=1' [and] Carmarthen & Burry Harbours 0,5=1'	2 & a slip	Steel	1800	0	7	6
14,1=1°	Bristol Channel [with insets of] Kings Road 1,9=1' [and] Carmarthen Bay by M. Mackenzie 0,35=1'	1	Heather	1803	0	3	6
18,4=1°	Bristol Channel & Views [with insets of] Padstow No scale [and] Kings Road 1,9=1' [and] Tenby & Caldey 1,05=1'	2	Laurie & Whittle	1794	0	3	0
9,2=1°	St. Georges Channel & Views by Joseph Huddart with additions [with insets of] White Haven 0,5=100 yards [and] Lamlash 1,5=1'	6	Laurie & Whittle	1803	0	10	6
6,2=1°	St. Georges Channel Reduced & Views by Joseph Huddart [with inset of] Lamlash 1,05=1'	2	Laurie & Whittle	1794	0	5	0
5,3=1°	Ireland St. Georges Channel & West Coast of Scotland & Views [with insets of] Fishguard by Capt Bland 2,3=1' [and] Cork by H Mackenzie 0,55=1'	3	Heather	1798	0	7	6
8,0=1°	St. Georges Channel & Views [with insets of] Liverpool 0,35=1' [and] Lamlash 1,65=1' [and] Clyde 0,45=1'	3	Heather	1804	0	10	6
1,7=1'	Milford Haven	1	Laurie & Whittle	1794	0	2	0
0,75=1'	West Coast of England from Lynus Point to Formby Point in Lancashire with Views	2	Laurie & Whittle	1794	0	4	0
0,75=1'	West Coast of England from Formby Point to Black Comb in Cumberland with Views	2	Laurie & Whittle	1794	0	4	0
2,05=1'	Harbour & River of Waterford & Tramore Bay with Views	1	Laurie & Whittle	1794	0	2	0
2,45=1'	Cork Harbour & Views by John Knight RN	1	Steel	1801	0	5	0
8,8=1°	South Coast of Ireland [with insets of] Cork by R Salkield 0,7=1' [and] Bear Haven 1,2=1'	2	Heather	1807	0	6	0
15,2=1° lat	S & SW Coast of Ireland - Vide East India Pilot Vol 2d	3	Laurie & Whittle	[blank]	0	6	0
11,2=1°	West Coast of Ireland by S.A. Arnold [with insets of] Waterford 0,95=1' [and] Cork 0,8=1' [and] Kinsale 1,65=1' [and] Shannon 0,35=1'	2	Steel	1800	0	7	6
16,8=1°	Coast of Ireland from Kerry Head to Kilmurray Views & Directions [with insets of] Cork 0,85=1' [and] Kinsale 1,45=1' [and] Glendore & Castlehaven 0,8=1' [and] Baltimore, Cape Clear, Crookhaven 0,8=1' [and] Dunmanus 0,8=1' [and] Bantry Bay Glengar 0,8=1' [and] Bear Haven 0,8=1' [and] Kenmare 0,8=1' [and] Valentia 0,8=1' [and] Larn Main 0,8=1' [and] Ventry & Dingle 0,8=1' [and] Tralee 0,8=1'	2	Steel	1800	0	7	6
1,25=1'	Bear Haven, Bantry Bay & Harbour & View by J Knight RN with additions by J. Stokes Master in RN	1	Steel	1801	0	5	0
25,2=1°	Slyne Head to Kerry Head with Directions [with insets of] River Shannon 0,7=1' [and] Greatmans Bay &c 0,8=1'	2	Steel	1800	0	7	6

16,8=1°	Coast of Scotland Ballicannel to Slyne Head with Views & Directions [with insets of] Banowen 0,8=1' [and] Ardbear 0,8=1' [and] Ballinakeel 0,8=1' [and] West Port & Newport Pratt 0,8=1' [and] Achilhole Harbour 0,8=1' [and] Blake Sod & Broadhaven 0,8=1 Statute Mile [and] Kilalla 0,8=1' [and] Sligo 0,8=1'	2	Steel	1800	0	7	6
17,6=1° lat	W. Coast of Ireland from the Shannon to Sligo Bay Vide E. India Pilot Vol. 2d.	1	Laurie & Whittle	1781	0	3	0
8,85=1° long	West Coast of Ireland & Views	1	Heather	1807	0	4	0
1,0=1'	River Shannon Vide Et. India Pilot Vol 2d.	3	Laurie & Whittle	1781	0	6	0
16,7=1° lat	Coast of Ireland from the Skerries to Ballicannel & Views with Directions [and insets of] Milk Harbour 0,76=1' [and] Ballishannon 0,8=1' [and] Donegal &c 0,8=1' [and] Arran More 0,9=1' [and] Mulroy &c 0,9=1' [and] Port Rush 0,9=1'	2	Steel	1800	0	7	6
9,5=1° long	North Coast of Ireland from Sligo Bay to Rachlin Sound & Views [with inset of] Loch Foyle 0,45=1'	1	Heather	1807	0	4	0
14,8=1° lat	North & West Coast of Ireland from Sligo Bay to Roughland Sound vide Eat India Pilot vol. 2d.	1	Laurie & Whittle	1781	0	3	0
27,8=1° long	Drogheda to the Skerries with Views & Directions [with insets of] Carlingford 0,85=1' [and] Strangford 0,7=1'	2	Steel	1800	0	7	6
8,3=1°	North Coast of Ireland & West Coast of Scotland & Views by Joseph Huddart	3	Laurie & Whittle	1800	0	10	6
7,5=1°	Hebrides or Lewis Islands & Views	2	Heather	1804	0	7	6
14,8=1° lat	Hebrides or Lewis Islands by S.A. Arnold &c	2	Steel	1800	0	7	6
14,8=1°	West Coast of Scotland from the Mull of Galloway to Dunan Point Vide East India Pilot Vol 2d		Laurie & Whittle	1781	0	4	0
14,0=1°	West Coast of Scotland from Ardnamurchan Point to Cape Wrath with the Western Isles East India Pilot Vol 2d		Laurie & Whittle	1781	0	4	0
3,85=1	William Obrien Drurys Plans in Ireland in the Hydrographical Office. Butland & Road of Arran [and] Black Sod & Broad Haven incompleat [and] Valentia 1,9=1 Statute Mile [and] Bear Haven 1,9=1 Statute Mile [and] Corke 1,9=1 Statute Mile [and] Waterford 1,9=1 Statute Mile and Directions		R Marchant Dublin	1789			
				[total]	9	0	0

**Class 6a North Sea, including Iceland, Feroe Islands Norway Shetland Orkneys
& North Coast of Scotland**

Scale Long	[Description]	No. of Sheets	By whom Published	[Year]	£	S	D
0,4=1°	Northern Seas from Great Britain to Spitsbergen & White Sea & Views [with insets of] Mayen Islands 0,15=1' [and] Magdalena Bay, Spitsbergen 1,05=1' [and] Fair Haven 1773 0,8=1' [and] Kilduyn Island 0,35=1' [and] White Sea 0,8=1' [and] Swijatou Nos Bay 0,5=1' [and] Gorodecka Bay 0,2=1' [and] Entrance of Meshen River 0,175=1' [and] Onega 0,15=1'	2	Laurie & Whittle	1796	0	6	0
0,5=1°	Chart from England to Greenland [with inset of] Spitsbergen 0,2=1'	3	Steel	1800	0	12	0
0,5=1°	Northern Coast of Europe from England to the White Sea	1 & a slip	Steel	1801	0	3	0
0,9=1°	Coast of Norway & Views [with insets of] White Sea 1,55=1' [and] Sweetnose Bay 0,65=1' [and] Gorodecka 0,3=1' [and] Cross Island 1,0=1' [and] Onega 0,075=1' [and] Purlachta 0,5=1' [and] Archangel 0,15=1' [and] Mesham 0,2=1'	2	Heather	1801	0	7	6
8,7=1°	Northern Coast of Norway from Halten Sound to Christiansund	1	Laurie & Whittle	1797	0	3	6
2,45=1°	White Sea [with insets of] Kilduin 0,7=1' [and] Sweetnose 0,55=1' [and] Gorodecka or Lambascho 0,2=1' [and] Cross Island 0,85=1' [and] Puszlochta 0,25=1' [and] Archangel 0,085=1' [and] Entrance of Mesham 0,1=1'	2	Steel	1800	0	7	6
2,95=1°	Sketch of the Orkney Shetland & Feroe Islands by Ross Donnelly of HM Ship Pegasus [with insets of] Stromness 1,15=1' [and] Brassa Sound 0,35=1' [and] Thorshaven 2,15=1'	1	Laurie & Whittle	1797	0	4	0
13,8=1°	NE Coast of Great Britain including Shetland & Orkney by John Chandler [with inset of] Plan of Larwick by JF Desiue 6,0=1'	2	Steel	1804	0	7	6

19,2=1° lat	Islands of Shetland & Views by Thomas Preston [with insets of] Plan of Faroe 5,1=1' [and] Valley Sound 2,2=1'	2	Laurie & Whittle	1794	0	4	0
0,5=1'	Orkney Islands with Directions by George Eunson [with inset of] Part of Shapinsha 1,5=1'	4	Steel	1800	0	7	6
21,0=1° lat	Orkney Islands, with the North Coast of Scotland & Views [with inset of] Holms Sound & Water Sound 0,95=1'	1	Laurie & Whittle	1794	0	4	0
12,7=1° long	Orkney Islands & Views	1	Heather	1804	0	5	0
				[total]	3	11	6

Class 6b German Sea East Coasts of Scotland & England and Coast of Holland & Germany

Scale Long	[Description]	No. of Sheets	By whom Published	[Year]	£	S	D
2,8=1° lat	North Sea, by John Hammond	2	Laurie & Whittle	no date	0	3	0
2,8=1°	North Sea improved by Capts Price & Watson with Directions	2	Laurie & Whittle	1794	0	4	0
1,25=1° long	North Sea with the Kattegat, by De la Rochette	1	Faden	1796	0	6	6
3,7=1° lat	North Sea Thompson improved by Price & Watson with Directions & Views [with inset of] Christiana Fiord 1782	4	Laurie & Whittle	1797	0	6	0
4,25=1° long	South Part of the North Sea. & Views [with insets of] Ulie 0,5=1' [and] Heilgoland 1,25=1'	3	Laurie & Whittle	1800	0	6	0
2,4=1°	North Sea, Views with Directions	2	Heather	1801	0	6	6
2,35=1°	North Sea with Views by Knight & Downie with Directions	2	Steel	1803	0	9	0
8,7=1°	South Part of the North Sea & Views chiefly by J Knight RN [with inset of] Plan of Flushing 0,5=1'	2	Steel	1805	0	9	0
2,3=1°	North Sea or German Ocean, Views with Directions [with insets of] Christiansand [and] Bergen 0,35=1'	2	Laurie & Whittle	1806	0	8	0
2,95=1° lat	North Sea by Capt Hammond [with inset of] Plan of Flushing &c 0,5=1'	1	Heather	1807	0	2	6
7,7=1° lat	Coasts of Holland & England [with inset of] Plan of Texel 0,25=1'	1	Heather and Williams	1799	0	3	6
5,2=1° long	Coasts of Holland & England, Views [with insets of] R. Elbe by J. Lang 0,2=1' [and] Texel & Vlie 0,3=1' [and] Scheld from Flushing to Antwerp 0,55=1'	2	Heather	1805	0	6	6
15,6=1° lat	North & East Coast of Scotland to Buchan Ness	1	Laurie & Whittle	1794	0	3	0
17,4=1°	East Coast of Scotland from Buchan Ness to Fife Ness [with insets of] Aberdeen 0,8=1' [and] Montrose [and] Tay 0,55=1'	1	Laurie & Whittle	1794	0	3	0
2,25=1° long	East Coast of Scotland from Duncansby Head to the Staples M Downie [with insets of] Cromarty 1,0=1' [and] Aberdeen 3,9=1' [and] Montrose 3=1'	2	Steel	1792	0	6	0
36,2=1° lat	East Coast of Scotland from Red Head to St. Abbs Head	1	Steel	1792	0	3	0
13,0=1° lat	East Coast of Britain from Buchan Ness to Flamborough Head by John Chandler [with insets of] Aberdeen 2,0=1' [and] Montrose 1,5=1' [and] Firth of Forth 0,55=1' [and] Berwick 1,8=1' [and] Holy Island &c 1,0=1' [and] R. Tyne & Newcastle 0,7=1' [and] Sunderland 1,8=1' [and] R. Tees 0,35=1' [and] Whitby 1,7=1'	2	Steel	No date	0	7	6
1,05=1 St. M	Edinburgh Firth 1788, 9, 90 by Murdo Downie [with inset of] Tay 1789	1	Steel	1792	0	3	6
0,7=1'	Firth of Forth [with inset of] River to Stirling 0,45=1'	1	Laurie & Whittle	1794	0	3	0
7,5=1° lat	East Coast of Great Britain from Aberdeen to the Humber [with inset of] Aberdeen by R Mackenzie 1,15=1' [and] Holy Island & Staples Capt Frazer 0,6=1' [and] R. Tyne by Andrew Stuart 0,9=1' [and] R. Humber by Capt Robert Mitchell 0,35=1'	1	Heather	1798	0	2	6
18,0=1° lat	East Coast of Britain from Perth to Lynn by Joseph Enovy [with insets of] Berwick 1,8=1' [and] Holy Island 0,65=1' [and] Sunderland 1,9=1'	4	Laurie & Whittle	1804	0	7	6
11,5=1° long	East Coast of Britain from St. Abbs Head to Flamborough Head [with insets of] Berwick 1,8=1' [and] Holy Island & Staples 0,65=1' [and] sunderland 1,95=1' [and] R Tyne to Newcastle 1,45=1' [and] R Tees 0,65=1'	2	Laurie & Whittle	1794	0	4	0
2,0=1 St. M.	Berwick to Holy Island & the Staples by Murdo Downie 1791	2	Steel	1792	0	3	6
1,05=1	River Tees by Joseph Dobson	1	Laurie & Whittle	1802	0	2	0

mile							
8,1=1 St M	Hartlepool Bay & Views by R Dodd, Engineer	1	Laurie & Whittle	1802	0	2	0
3,45=1 St M	Coast of Yorkshire from Staiths to Robinhoods Bay by Jonathan Pickernell 1791 [with inset of] Plan of Whitby with Views 12,4=1 St M	2	Laurie & Whittle	1794	0	2	0
16,9=1° long	East Coast of England from Flamborough Head to Boston Deepes	1	Laurie & Whittle	1794	0	2	0
16,8=1° lat	East Coast of England from Scarborough to Lowestoft by John Chandler [with inset of] Blakeney Harbour 2,8=1'	2	Steel	No date	0	7	6
	Charts from London to Hull by John Diston London Bridge to I of Dogs 13,5=1 St M [and] London to the Nore 0,6=1' [and] Prittlewell to Orfordness 0,6=1' [and] Orfordness to Lowestoft 0,95=1' [and] Yarmouth Roads 0,7=1' [and] Hassboro to the Humber	6	Laurie & Whittle	1797	0	6	0
19,4=1° long	East Coast of England from the Spurn to Yarmouth Roads	2	Laurie & Whittle	1794	0	4	0
16,1=1° lat	Coast of England from the Spurn to Orfordness	1	Heather	1802	0	2	6
1,0=1'	Coast of Norfolk from Stuky to Foulness & View [with inset of] Blakeney Harbour & View 5,0=1' S Watson 1793	1	Heather	1793	0	2	6
0,75=1'	Foulness to Lowestoft by Joseph Huddart & J Knight Views	1	Steel	1801	0	4	0
1,05=1 St M	Foulness to Lowestoft by Thomas Fotheringhame Master in RN	1	Steel	1804	0	4	0
0,75=1'	Hasboro to Orfordness & Views	2	Laurie & Whittle	1798	0	4	0
0,5=1'	Yarmouth to Folkstone J Knight &c & Views [with insets of] R Thames 0,8=1' [and] Ramsgate Harbour by J Smeaton 1,2=700 feet	2	Steel	1803	0	7	6
0,35=1'	Smiths Knowl & Coast [with inset of] Smiths Knowl at large 1796 1,6=1'	1	Laurie & Whittle	1798	0	2	0
0,6=1'	Orford Ness to the South Foreland with Mouth of Thames by George Burn &c	4	Laurie & Whittle	1807	0	5	0
13,63=1°	Orfordness to the South Foreland with the River Thames to London by JF Dessiou RN.	1	Faden	1807	0	5	0
0,65=1'	Mouth of the Thames by J Grosvenor & John Bean	2	Laurie & Whittle	1794	0	5	0
0,35=1'	Sketch of [the] Mouth of the Thames & North South & Middle Channels by John Bean 1782	1	Robert Sayer	1786	0	2	0
0,35=1'	Entrances of the River Thames [with inset of] River Thames 0,9=1'	1	Heather	1801	0	2	6
1,4=1'	Harwich Harbour &c by George Burn	1	Laurie & Whittle	1794	0	2	0
0,45=1'	Situation of the Sunk Light &c with Directions	1	Laurie & Whittle	1802	0	2	0
1,2=1 St M	Thames & Medway J Knight & Views	1	Steel	1802	0	5	0
3,9=1'	River Thames from London to Woolwich	1	Steel	1802	0	4	0
2,5=1 St M	River Medway by John Perriman	1	Steel	1800	0	3	0
1,15=1'	Sands & Channels from the Nore to Margate by James Grosvenor	1	Laurie & Whittle	1794	0	2	0
1,5=1'	East Swale by Jno. Stephenson Master RN	1	Laurie & Whittle	1794	0	2	0
1,15=1'	Downs & Margate Roads	1	Heather	1797	0	3	6
1,25=1'	The Downs by J.F. Dessiou Master RN	1	Faden	1805	0	4	0
2,5=1'	The Downs & Views	1	Laurie & Whittle	1800	0	2	0
1,13=1'	The Downs & Margate Roads	1	Mason	1807	0	4	0
4,0=1° long	Coast from the Naze to the Texel by Joseph Brodie with Directions & Views [with insets of] Christiansand 0,45=1' [and] Swine & Naze of Norway 0,45=1' [and] Shetland 4,0=1° long [and] Elbe 0,25=1' [and] Texel 0,2=1'	2	Faden	1798	0	12	0
7,7=1° lat	Coast of N & S Jutland from the Skar to Helegoland improved by W Price & G Watson & Views	1	Laurie & Whittle	1794	0	2	0
13,9=1°	Hiver to Camperdown & Views [with inset of] Heiligoland with Directions 1,7=1'	2	Laurie & Whittle	1805	0	6	0
14,9=1° lat	Mouths of the River Elbe & Weser improved by W. Price & G Watson	1	Laurie & Whittle	1794	0	2	0
0,25=1'	Rivers Elbe & Weser &c with Directions & Views [with inset of] Helegoland 2,2=1'	1	Heather	1795	0	4	0
[blank]	Heiligoland	1	Arrowsmith	1801	0	2	6
27,4=1° long	Elbe with the Mouths of the Weser & Jade [with inset of] River Elbe 0,25=1'	1	Arrowsmith	1806	0	5	0

0,9=1'	The Jade & Mouth of the Weser by C.A. Beherens 1799	1	Arrowsmith	1799	0	5	0
18,9=1° lat	Norway Island on Friesland to the Texel corrected by W Price	1	Laurie & Whittle	1801	0	2	0
0,45=1'	Coast of Holland &c from the Texel to the Downs by Cornelius Vanderneer	8	Laurie & Whittle	1794	0	10	6
0,5=1'	From the Texel to Schowen by Stuart Amos Arnold	2	Steel	1800	0	7	6
0,6=1'	Walcheren to Gravelines by Stuart Amos Arnold	2	Steel	1800	0	7	6
0,25=1'	Coast of Holland	1	Heather	1802	0	3	6
1,75=1'	Western Scheld from Sea to Antwerp from the Survey by Beautemps Beaupré [with inset of] Plan of Bergen-op-zoom	2½	Steel	1804	0	14	0
				[total]	15	5	6

Class 7 Baltic & its Entrances

Scale Long	[Description]	No. of Sheets	By whom Published	[Year]	£	S	D
3,55=1°	Skager-Rack & Views	1	Laurie & Whittle	1794	0	2	0
4,6=1°	The Sleeve or Gulf of Jutland 2d Edition	1	Faden	1807	0	7	6
16,8=1° lat	Cattegat, New Edition, from Lous [with insets of] Marstrand Haven 0,85=1' [and] Gothenburg 0,8=1' [and] Malo Sound 0,85=1'	2	Laurie & Whittle	1794	0	4	0
0,25=1'	Cattegat from Lous [with inset of] Sound 0,3=1'	1	Heather	1801	0	3	6
7,5=1° long	Kattegat & Directions, from Lovorn	1	Steel	1803	0	12	0
1,3=1'	Sound	1	Laurie & Whittle	1794	0	2	0
0,4=1'	Sound	1	Faden	1801	0	3	0
0,5=1'	Sound & Grounds	1	Heather	1801	0	4	0
0,6=1'	Sound & Grounds	1	Steel	1801	0	4	0
9,1=1°	Baltic Straits [with insets of] Kiel 0,15=1' [and] Stettin 0,9=1'		Laurie & Whittle	1794	0	3	6
4,55=1°	Baltic Straits with Directions, Two Sheets Views of Nyborgh, Sproe, Callanborg, Sayer, Samsøe &c	3	Faden	1803	0	12	6
5,5=1° lat	Cattegat & Baltic and Views [with insets of] Gothenburgh 0,45=1' [and] Stockholm 1,35=1' [and] Stettin 0,1=1' [and] Riga 1,45=1' [and] Rogerwyck 0,35=1' [and] Revel 0,35=1'	2	Heather	1801	0	6	6
6,0=1° lat	Baltic or East Sea from Lous &c [with insets of] Sound 0,2=1' [and] Danish Grounds 0,55=1' [and] Stockholm 0,15=1' [and] Gottland 0,2=1' [and] Riga 0,95=1' [and] Rogerwyck 0,25=1'	4	Laurie & Whittle	1794	0	6	0
4,55=1° long	Baltic & Gulf of Finland & Views with directions, from Nordenankar [with insets of] Copenhagen 0,55=1' [and] Coast Ahus to Lando haven 0,95=1' [and] Carlshaven 1,2=1' [and] Landhavens Inlet 1,7=1' [and] Stettin 0,1=1' [and] Riga 1,45=1' [and] Rogerwyck 0,35=1' [and] Revel 0,45=1' [and] Kango 0,75=1' [and] Lovisa 0,6=1' [and] Frederickshaven 0,35=1' [and] Wiburg 0,35=1' [and] Uto Inlet 0,75=1' [and] St. Petersburg 0,3=1'	8	Laurie & Whittle	1796	1	1	0
2,1=1° long	Baltic & Gulf of Finland with Directions [with inset of] Cronstadt 0,2=1'	1	Heather	1797	0	3	6
1,3=1°	Baltic or East Sea with the Gulfs of Botnia & Finland [with insets of] Revel 0,4=1' [and] Petersburg 0,2=1'	1	Faden	1803	0	7	6
3,0=1°	Baltic or East Sea & Views from Nordenankar with Directions [with insets of] Kiel 0,65=1' [and] Sandhaven Inlet 1,4=1' [and] Gotland 0,1=1' [and] Riga 0,9=1' [and] Rogerwyck 0,55=1'	4	Steel	1804	0	7	6
0,3=1'	Gulf of Finland	4	Faden	1785	0	10	6
9,85=1° lat	Gulf of Finland Geo. Watson [with insets of] Revel 0,35=1' [and] Kasperwick Bay by Geo. Watson [and] Aspo Islands by Geo. Watson [and] Petersburg 0,5=1'	3	Laurie & Whittle	1794	0	4	0
13,25=1° lat	Gulf of Finland [with insets of] Kango 0,85=1' [and] Lovisa 0,55=1' [and] Frederickshaven 0,4=1' [and] Wyburg 0,35=1' [and] Cronstadt 0,3=1'	2	Heather	1802	0	5	0
[blank]	Gulf of Finland	2	Steel	1804	0	6	6
				[total]	6	16	0

Class 8 Bay of Biscay, & Coasts of Spain & Portugal to Gibraltar

Scale Long	[Description]	No. of Sheets	By whom Published	[Year]	£	S	D
3,4=1° long	Bay of Biscay by M Magin	2	Laurie & Whittle	1794	0	5	0
3,35=1°	Bay of Biscay by M Magin [with insets of] Mouth of Loire 0,7=1' [and] Basque Road no scale [and] Bordeaux 0,6=1'	2	Steel	1800	0	7	6
4,0=1°	Bay of Biscay [with insets of] Loire by M. Magin 0,75=1' [and] Rochelle, Rochfort &c 0,25=1' [and] Bordeaux by Teulerc 0,45=1' [and] Bilboa 0,25=1' [and] Avides 0,2=1'	2	Heather	1802	0	6	6
2,5=1°	Bay of Biscay and Views by J Knight [with insets of] Brest 0,25=1' [and] Loire 0,4=1' [and] Basque 0,2=1' [and] Bourdeaux 0,4=1'	1	Steel	1804	0	6	0
0,7=1'	Ushant to the Saints & Bay of Brest & Views with Directions Jno Knight 1800 [and] 1st Sheet Ushant to Christian Isle & View 2,8=1' [and] 2d Christian Isle to Parquette & Views 2,8=1' [and] 3d Saints to Bec du Kaz & Views 2,8=1' [and] Glenan Islands & Views 2,5=1' [and] Howat Island & Views 2,5=1'	6	Faden	1802	1	16	0
30,0=1°	Quiberon Bay by W. Brice Master of HM Ship Theseus 1795 & Views & marks	1	Laurie & Whittle	1795	0	4	0
10,3=1°	Northern Coast of Spain - From Tofino with Views in 3 parts	1	Steel	1805	0	7	6
4,1=1°	Coast of Portugal [with insets of] Ferrol 1,15=1' [and] Vigo 0,2=1' [and] Oporto 0,2=1' [and] R. Tagus & Lisbon 0,15=1' [and] San Lucar 0,65=1' [and] Cadiz 0,45=1' [and] Gibraltar 0,75=1' [and] Palos 0,65=1'	2	Heather	1800	0	6	6
4,2=1° long	Coasts of Spain & Portugal with Views [and insets of] R. Miranda 0,1=1' [and] R. Vivero no scale [and] Ferrol 1,0=1' [and] Corunna 0,25=1' [and] Vigo 0,15=1' [and] Oporto 0,3=1' [and] Lisbon & St. Ubes 0,2=1' [and] San Lucar or Seville 0,2=1' [and] Cadiz 0,35=1' [and] Gibraltar 0,65=2' [and] Palos 0,1=1'	2	Steel	1800	0	7	6
2,9=1°	Coasts of Spain & Portugal with Views	1	Steel	1804	0	5	0
4,0=1°	Coasts of Spain & Portugal & Views [with insets of] Ferrol 0,9=1' [and] Lisbon & St. Ubes 0,2=1'	3	Laurie & Whittle	1794	0	6	0
1,6=1'	Inlets of Ferrol, Betanzas & Corunna from Tofino	1 & a slip	Faden	1801	0	5	0
4,0=1'	Harbour of Ferrol, from Tofino	1	Faden	1789	0	7	6
1,4=1'	Harbour of Vigo from Tofino & Plan of Sir George Rookes Attack [with inset of] Camarinas 2,2=1'	1	Faden	1802	0	7	6
1,15=1'	Entrance of the River Tagus by William Chapman Master in RN	1	Faden	1807	0	6	0
2,15=1'	Bay of Cadiz from Tofino	1	Faden	1789	0	10	6
0,8=1'	Bay of Cadiz small with Earl St. Vincent's Blockade	1	Faden	1797	0	2	0
0,6=1'	Bay & Harbour of Cadiz by J Roque [with inset of] Town of Cadiz 4,2=1'	1	Laurie & Whittle	1794	0	2	0
				[total]	6	18	0

Class 9 Mediterranean

Scale Long	[Description]	No. of Sheets	By whom Published	[Year]	£	S	D
1,35=1°	West Part Mediterranean Sea De la Rochette	1	Faden	1780	0	4	0
1,2=1°	Mediterranean Sea [with insets of] Strait of Gibraltar & Views by Mr Baurenfeind 1761 0,075=1' [and] Marseilles - Michelot 0,35=1' [and] Genoa 1,7=1' [and] Malta 0,15=1' [and] Gulf of Salonica, & Gulf of Cassandra, Maximin Faure, 1772 0,2=1' [and] Gulf of Smyrna, French Pilot Choseul Gouffier 1776 0,25=1' [and] Scanderon 0,12=1'	3	Laurie & Whittle	1794	0	5	0
1,0=1°	Mediterranean Sea by J Knight	2	Faden	1795	0	6	0
1,5=1°	Mediterranean Sea & Views [with insets of] Tetuan by J. Foot 0,35=1' [and] Zaffarina Isles by A. Keith 1,65=1' [and] Marseilles, Michelot 0,35=1' [and] Genoa, Capt Dupré 4,1=1' [and] Leghorn 0,8=1' [and] Smyrna, Henry Michelot 0,25=1'	3	Heather	1802	0	10	6
1,45=1°	Mediterranean Sea by J Knight RN. [with insets of] Algesiras J Knight 4,5=1' [and] Marseilles 0,45=1' [and] Genoa 5,2=1' [and] Leghorn, John Jackson, Master RN	3	Steel	1804	0	9	0

	0,55=1' [and] Smyrna 0,25=1'						
0,8=1°	Mediterranean Sea & View J.F. Dessiou	1	Faden	1805	0	5	0
1,7=1°	Mediterranean Sea & View J.F. Dessiou [with insets of] Strait of Gibraltar from Tofino 0,25=1' [and] Faro of Messina by Ant. Rizzi Zannoni 0,4=1' [and] Dardanelles 0,25=1'	3½	Faden	1806	0	14	0
2,0=1°	Mediterranean Sea	3	Arrowsmith	1807	1	1	0
1,5=1°	Mediterranean Sea by J.F. Dessiou [with insets of] Cadiz 0,45=1' [and] Straits of Gibraltar 0,2=1' Appearance of land in Gut of Gibraltar [and] Toulon no scale [and] Straits of Bonifacio &c 0,25=1' [and] Gulf of Palma 0,4=1' [and] Esqerques 0,5=1' [and] Malta 0,3=1' [and] Smyrna 0,25=1' [and] Scanderon 0,1=1'	3	Laurie & Whittle	1807	0	10	6
4,8=1°	Coasts of Portugal & Spain from Lisbon to Cape St. Martin and Coast of Barbary by J Knight 1793 & 1794	2	Faden	1795	0	6	0
4,8=1°	Continuation of ditto from Cape St. Martin to the Gulph of Venice by J Knight with Directions 1793 & 1794	6	Faden	1795	0	15	0
4,2=1°	South Coast of Spain & North Coast of Africa & View J Knight RN [with inset of] Cadiz from Tofino 0,4=1'	1	Steel	1804	0	5	0
17,2=1°	Strait of Gibraltar & Views J.F. Dessiou from Tofino	1	Faden	1806	0	5	0
2,6=1'	Bay of Gibraltar, by an Officer who was at Gibraltar from 1769 to 1775	1	Faden	1783	0	3	0
2,45=1'	Bay of Gibraltar by an Officer in the R.N.	1	Laurie & Whittle	1794	0	2	6
0,6=1'	Ceuta & Tetuan Bays & View J Knight RN [with inset of] Zaffarine Islands by W. Wolesey RN	1	Steel	1800	0	5	0
4,4=1°	Eastern Coast of Spain from Tofino	1	Steel	1803	0	5	0
0,45=1'	Island of Minorca, by John Armstrong & 2 Views [with inset of] Port Mahon 0,45=1000 feet	1	Laurie & Whittle	1794	0	2	6
12,6=1°	Coast of France from the Mouths of the Rhone to Villa Franca [with inset of] Toulon 1,5=1'	1 & a slip	Laurie & Whittle	1804	0	5	0
no scale	Harbour of Toulon	1	Faden	1795	0	5	0
0,6=1'	North Part of Corsica by J Knight RN 1793 & 1794	1	Faden	1795	0	5	0
2,2=1'	Gulph of Ajaccio & View, J Knight RN 1795	1	Faden	1795	0	4	0
2,4=1'	Bastia J. Knight RN 1793	1	Faden	1795	0	2	6
2,5=1'	Gulph of St. Fiorenzo, by J Knight RN 1793 & 1794	1	Faden	1795	0	4	0
1,1=1'	Road & Environs of Leghorn & Views J Knight RN 1795 [with inset of] Plan of Leghorn 0,35=100 yards	2	Faden	1797	0	7	6
2,0=1'	Road of Leghorn by John Jackson Master RN	1	Steel	1800	0	3	0
0,95=1'	Road & Harbour of Leghorn by Thomas Young, Lieut in Tuscan Navy	1	Laurie & Whittle	1794	0	2	0
33,6=1°	Bay of Naples, GA Rizzi Zanoni 1785	1	Faden	1803	0	7	6
33,9=1°	Strait of Messina RA Rizzi Zanoni	1	Faden	1806	0	5	0
0,8=1 mile	Faro or Straits of Messina	1	Laurie & Whittle	1794	0	2	0
2,25=1° lat	Gulph of Venice by Giovanni Grubas Pilot of the Venitian Marine & Views [with insets of] Brindisi 0,55=1' [and] Ancona 3,6=1' [and] Trieste 4,0=1' [and] Cattaro, by G Grubas 1802 0,45=1'	1	Steel	1803	0	5	0
3,4=1° long	Gulph of Venice J.F. Dessiou [with insets of] Coast of Istria from Parenza to Bay of Medolin 0,39=1' [and] Channel of Curzola Port Ledro to Old Ragusa 0,25=1'	2	Faden	1806	0	7	6
2,2=1°	Gulph of Venice by Joseph Dessiou	1	Laurie & Whittle	1806	0	4	0
3,0=1'	Harbour of Alexandria by Major Brice	1	Faden	1804	0	5	0
0,9=1 mile	Bay of Aboukir, Thos. Atkinson Master RN	1	Laurie & Whittle	1803	0	2	0
0,5=1'	Paros Antiparos & Naxia	1	Arrowsmith	1799	0	2	6
5,9=1° long	Archipelago	1	Steel	1804	0	5	0
8,6=1°	Archipelago	2	Arrowsmith	1799	0	10	6
3,25=1° lat	Archipelago to Constantinople	1	Laurie & Whittle	1794	0	2	0
9,3=1° long	The Propontis or Sea of Marmora [with inset of] Bosphorus by F. Kauffer 1776 0,8=1'	1	Laurie & Whittle	1788	0	3	6
10,3=1°	Sea of Marmora	1	Arrowsmith	1807	0	5	0

2,55=1'	Channel of Constantinople	2	Arrowsmith	1807	0	5	0
2,0=1°	The Black Sea & the Seas of Azof & Marmara	1	Laurie & Whittle	1794	0	3	6
2,45=1°	Black Sea Imperial Depôt of Charts St. Petersburg	2	Faden	1806	0	6	0
3,2=1° lat	Black Sea [with insets of] Chanel of Constantinople 0,85=1' [and] Mouth of Danube 0,2=100 yards [and] Sebastopolis 1,15=1' [and] Balaklava 0,25=100 yards [and] Strait of Inikale 0,55=1'	1	Arrowsmith	1801	0	5	0
0,75=1'	No. 1 Gibraltar Bay } Spain		[Heather]				
0,4=1'	2 Malaga, by Michelot } Spain		[Heather]				
0,25=1'	3 Almeria, by Michelot } Spain		[Heather]				
3,6=1 St M	4 Cartagena, by Michelot } Spain		[Heather]				
1,35=1'	5 Alicant } Spain		[Heather]				
0,2=1'	6 Port of Yvica & Isle of Fromenterra } Spain		[Heather]				
1,15=1'	7 Bay of Majorca, by Michelot } Spain		[Heather]				
0,55=1'	8 Bay of Poyance & Bay of Alcudia } Spain		[Heather]				
1,3=1'	9 Port Mahon, by J.F. Dessiou } Spain		[Heather]				
3,50=1'	10 Le Sofa Bay } Spain		[Heather]				
2,4=1'	11 Road of Salo, by Ayrouard } Spain		[Heather]				
2,5=1' St M	12 Barcelona, by Michelot } Spain		[Heather]				
5,3=1 St M	13 Bay of Philiou, by Michelot } Spain		[Heather]				
8,0=1 St M	14 Port of Palamos } Spain		[Heather]				
0,35=1'	15 Bay of Roses, by Michelot } Spain		[Heather]				
5,8=1 St M	16 Cadaquie, by Ayrouard } France		[Heather]				
7,4=1 St M	17 Port Vendre by Ayrouard } France		[Heather]				
12,8=1 St m	18 Port of Colioure, by Michelot } France		[Heather]				
1,7=1'	19 Port of Agde & Fort Brescon } France		[Heather]				
3,4=1 St M	20 Port of Cette, by Ayrouard } France		[Heather]				
10,8=1 St M	21 Port of Bouc, by Ayrouard } France		[Heather]				
0,4=1'	22 Marseilles, by Michelot } France		[Heather]				
6,8=1 St M	23 Port of Pormeon } France		[Heather]				
9,2=1 St M	24 Port Cassis } France		[Heather]				
3,6=1 St M	25 Port of Ciota, by Ayrouard } France		[Heather]				
1,7=1'	26 Bay of Bandol, by Ayrouard } France		[Heather]				
0,95=1'	27 Road of Brusac, by Ayrouard } France		[Heather]				
1,15=1'	28 Bay of Toulon, by Michelot } France		[Heather]				
0,55=1'	29 Road of Engien } France		[Heather]				
0,15=1'	30 Road of Hieres } France		[Heather]				
12,8=1 St M	31 Port of Crose, by Ayrouard } France		[Heather]				
0,55=1'	32 Gulf of St. Tropez, by Ayrouard } France		[Heather]				
1,5=1'	33 Bay of Negaye, by Ayrouard } France		[Heather]				
0,95=1'	34 Road of Gourjan by Ayrouard } France		[Heather]				
No scale	35 Island of St. Margaret & Honoria Island } France		[Heather]				
10,8=1 St M	36 Port of Antibes } France		[Heather]				
2,55=1'	37 Ville Franche Bay & Road of St. Souspir } Italy		[Heather]				
5,1=1 St M	38 Bay of Monaco, by Ayrouard } Italy		[Heather]				
8,2=1' St M	39 Port of Savona, by Ayrouard } Italy		[Heather]				

3,9=1 St M	40 Harbour of Genoa, by Michelot } Italy		[Heather]					
8,0=1 St M	41 Porto Fino, by Ayrouard } Italy		[Heather]					
4,7=1 St M	42 Road of Sestri, by Ayrouard } Italy		[Heather]					
0,8=1'	43 Port of Venere } Italy		[Heather]					
0,55=1'	44 Gulf of Spezia, by Ayrouard } Italy		[Heather]					
0,5=1'	45 Road of Leghorn by Capt Young } Italy		[Heather]					
0,7=1'	46 Road of St. Fiorenzo, by Ayrouard } Corsica		[Heather]					
1,15=1'	47 Bay of Calvi } Corsica		[Heather]					
0,45=1'	48 Gulf of Ajacio, By J. Wilson } Corsica		[Heather]					
0,55=1'	49 Gulf of Valinco, and Campo Moro } Corsica		[Heather]					
0,55=1'	50 South Part of Corsica } Corsica		[Heather]					
4,5=1 St M	51 Port of Bonifacio } Corsica		[Heather]					
0,55=1'	52 Port Vechio } Corsica		[Heather]					
16,0=1 St M	53 Port of Bastia } Corsica		[Heather]					
2,35=1'	54 Figaroni Isles and Road St. Mary } Corsica		[Heather]					
11,6=1 St M	55 Port of Longo Sardo } Sardinia		[Heather]					
3,4=1'	56 Channels between Azinara and Sardinia } Sardinia		[Heather]					
0,9=1'	57 Porto Conte } Sardinia		[Heather]					
0,175=1'	58 Oristano } Sardinia		[Heather]					
0,175=1'	59 Gulf of Palma } Sardinia		[Heather]					
0,3=1'	60 Gulf of Cagliari } Sardinia		[Heather]					
0,45=1'	61 Carbonaire Bay } Sardinia		[Heather]					
0,65=1'	62 Road of Olaster } Sardinia		[Heather]					
0,6=1'	63 Magdalen Isles } Sardinia		[Heather]					
2,7=1'	64 Porto Ferraro } Isle Elba		[Heather]					
4,0=1 St M	65 St. Pierre de Campo } Isle Elba		[Heather]					
3,7=1 St M	66 Port of Longon } Isle Elba		[Heather]					
1,15=1'	67 Isle Planera or Planosa		[Heather]					
3,2=1'	68 Port of Hercules } Italy		[Heather]					
10,8=1'	69 Civita Vechio } Italy		[Heather]					
8,0=1'	70 Port of Dancio } Italy		[Heather]					
0,65=1'	71 Road NW of Mount Circello } Italy		[Heather]					
2,15=1'	72 Road SE of Mount Circello } Italy		[Heather]					
1,35=1'	73 Bay of Gayeta } Italy		[Heather]					
1,45=1'	74 Port of Pozea } Italy		[Heather]					
0,15=1'	75 Gulf of Naples } Italy		[Heather]					
3,6=1 St M	76 Port of Ponsolle } Italy		[Heather]					
18,4=1 St M	77 Mole of Naples		[Heather]					
0,2=1'	78 Gulf of Salerno } Italy		[Heather]					
0,15=1'	79 Gulf of Policastro } Italy		[Heather]					
0,2=1'	80 Gulf of St. Euphemia } Italy		[Heather]					
0,25=1'	81 Strait of Messina } Sicily		[Heather]					
3,4=1 St M	82 Port of Messina } Sicily		[Heather]					
1,55=1'	83 Road of Lipari } Sicily		[Heather]					
1,7=1'	84 Melazzo } Sicily		[Heather]					
0,65=1'	85 Gulf of Palermo } Sicily		[Heather]					
0,4=1'	86 Port of Trapano } Sicily		[Heather]					
0,35=1'	87 Gulf of Gargente } Sicily		[Heather]					

0,9=1'	88 Port of Saragosa } Sicily		[Heather]				
0,95=1'	89 Port of Augusta } Sicily		[Heather]				
0,25=1'	90 Gulf of Catania } Sicily		[Heather]				
0,25=1'	91 Malta & Goza } Malta		[Heather]				
2,7=1'	92 Harbour of Valette } Malta		[Heather]				
2,7=1 St M	93 Harbour of St. Paul } Malta		[Heather]				
2,0=1'	94 Harbour of Marsascirocco } Malta		[Heather]				
0,8=1'	95 Bay of Tarento } Italy		[Heather]				
1,05=1'	96 Port of Cesario } Italy		[Heather]				
1,8=1'	97 Port of Galipoli } Italy		[Heather]				
0,55=1'	98 Port of Otrante } Italy		[Heather]				
2,1=1'	99 Port of Brindisi } Gulf of Venice		[Heather]				
0,15=1'	100 Gulf of Manfredonia } Gulf of Venice		[Heather]				
1,2=1'	101 Isles of Tremiti } Gulf of Venice		[Heather]				
0,35=1'	102 Port of Ortona } Gulf of Venice		[Heather]				
3,3=1 St M	103 Ancona } Gulf of Venice		[Heather]				
0,35=1'	104 Goro } Gulf of Venice		[Heather]				
0,35=1'	105 Chiozza } Gulf of Venice		[Heather]				
0,35=1'	106 Venice } Gulf of Venice		[Heather]				
0,8=1'	107 Trieste } Gulf of Venice		[Heather]				
0,35=1'	108 Rovigno } Gulf of Venice		[Heather]				
1,0=1'	109 Gulf of Medolin } Gulf of Venice		[Heather]				
0,35=1'	110 Fiume } Gulf of Venice		[Heather]				
0,65=1'	111 Cherson } Gulf of Venice		[Heather]				
0,3=1'	112 Sebenico } Gulf of Venice		[Heather]				
0,5=1'	113 Trau } Gulf of Venice		[Heather]				
0,4=1'	114 Spalato } Gulf of Venice		[Heather]				
0,35=1'	115 Narento } Gulf of Venice		[Heather]				
0,5=1'	116 Lessina } Gulf of Venice		[Heather]				
0,85=1'	117 Port St. George, Island of Lissa } Gulf of Venice		[Heather]				
0,55=1'	118 Curzola Straits } Gulf of Venice		[Heather]				
0,75=1'	119 Ragusa } Gulf of Venice		[Heather]				
0,25=1'	120 Cattaro } Gulf of Venice		[Heather]				
0,2=1'	121 Lodrino } Gulf of Venice		[Heather]				
0,3=1'	122 Durazzo } Gulf of Venice		[Heather]				
0,35=1'	123 Gulf of Valona } Gulf of Venice		[Heather]				
0,15=1'	124 Corfu Island		[Heather]				
0,75=1'	125 Corfu Harbour		[Heather]				
0,35=1'	126 Prevesa		[Heather]				
0,25=1'	127 St. Maura		[Heather]				
0,15=1'	128 Cefalonia Island		[Heather]				
0,4=1'	129 Cefalonia Harbour		[Heather]				
0,35=1'	130 Zante Island		[Heather]				
2,1=1'	131 Zante Port		[Heather]				
0,15=1'	132 Petrasso & Lepanto		[Heather]				
1,4=1'	133 Navarin } Morea		[Heather]				
0,45=1'	134 Modon } Morea		[Heather]				
1,75=1'	135 Servy		[Heather]				
0,75=1'	136 Serigo		[Heather]				
2,6=1 St M	137 Port St. Nicholas in Serigo		[Heather]				
3,0=1' St	138 Napoli de Romania } Morea		[Heather]				

M								
0,55=1'	139 Bizalti } Morea		[Heather]					
4,4=1 St M	140 Port Lion or Old Port of Athens		[Heather]					
0,85=1'	141 Mandry		[Heather]					
5,2=1 St M	142 Zea		[Heather]					
1,8=1'	143 Ports in Island Thermo		[Heather]					
1,5=1'	144 Port Zira		[Heather]					
1,8=1'	145 St. Nicholas in Island Tino by J Wilson		[Heather]					
1,1=1'	146 Miconi		[Heather]					
0,15=1'	147 Paros Island &c		[Heather]					
6,0=1' St M	148 Part, Paros I.		[Heather]					
1,3=1'	149 Port Ausa in Paros I.		[Heather]					
1,05=1'	150 Trico in Paros I.		[Heather]					
5,6=1 St M	151 Nio Port		[Heather]					
0,5=1'	152 Milo & Argentiere		[Heather]					
0,45=1'	153 Island Stampalia		[Heather]					
4,6=1 St M	154 Port Lero Negropont		[Heather]					
1,3=1'	155 Port St. George, in Schiro		[Heather]					
0,15=1'	156 Volo		[Heather]					
2,6=1 St M	157 Port Siata		[Heather]					
0,15=1'	158 Gulf of Salonique		[Heather]					
0,2=1'	159 Gulf of Cassandria		[Heather]					
0,25=1'	160 Gulf of Mt. Santo, Michelot		[Heather]					
0,3=1'	161 Contessa		[Heather]					
0,35=1'	162 Porto Cavallo in Tasso Island		[Heather]					
0,65=1'	163 Port Lagos		[Heather]					
0,15=1'	164 Gulf of Saros & Dardenelles		[Heather]					
0,2=1'	165 Marmara		[Heather]					
0,05=1'	166 Sea of Marmora, Bellin		[Heather]					
0,5=1'	167 Port St. Anthony, on Lemnos I.		[Heather]					
1,1=1'	169 Myteline, by J. Wilson		[Heather]					
1,45=1'	169 Oliver, by J. Wilson		[Heather]					
3,2=1 St M	170 Sigi		[Heather]					
0,3=1'	171 St. Drily		[Heather]					
1,5=1'	172 Harbours of Fogos & Rephia		[Heather]					
0,2=1'	173 Smyrna, J Wilson		[Heather]					
0,2=1'	174 Strait Scio, J Wilson		[Heather]					
1,05=1'	175 Port Scio		[Heather]					
1,95=1 St M	176 Port Fin		[Heather]					
0,15=1'	177 Ipsera Island, J Wilson		[Heather]					
2,3=1 St M	178 Spalmadore, J Wilson		[Heather]					
1,9=1'	179 Chesme, J Wilson		[Heather]					
5,6=1 St M	180 Siagi } Natolia		[Heather]					
0,6=1'	181 Escala Nova } Natolia		[Heather]					
0,45=1'	182 Strait of Samos, Michelot } Natolia		[Heather]					
0,35=1'	183 Melissa } Natolia		[Heather]					
0,25=1'	184 Gulf of Mandaya } Natolia		[Heather]					
1,15=1'	185 Caragol & Carabagela } Natolia		[Heather]					

0,2=1'	186 Gulf of Stancho } Natolia		[Heather]				
0,65=1'	187 Port of Crio } Natolia		[Heather]				
0,25=1'	188 Gulf of Simia } Natolia		[Heather]				
1,7=1'	189 Piscopia		[Heather]				
0,25=1'	190 Scarpanton		[Heather]				
0,2=1'	191 Candia } Candia		[Heather]				
0,2=1'	192 Spinalongo } Candia		[Heather]				
0,65=1'	193 Zuda } Candia		[Heather]				
1,25=1'	194 Carabusa } Candia		[Heather]				
6,2=1 St M	195 Rhodes, by Michelot		[Heather]				
0,8=1'	196 Marmora, Michelot } Caramania		[Heather]				
0,25=1'	197 Macri } Caramania		[Heather]				
0,45=1'	198 Cacamo } Caramania		[Heather]				
0,3=1'	199 Chateau Rouge } Caramania		[Heather]				
0,2=1'	200 Salefi &c } Caramania		[Heather]				
0,2=1'	201 Lemasol } Cyprus		[Heather]				
0,2=1'	202 Ernica } Cyprus		[Heather]				
0,15=1'	203 Alexandrella } Syria		[Heather]				
1,0=1'	204 Tripoli } Syria		[Heather]				
0,5=1'	205 Beirout } Syria		[Heather]				
0,3=1'	206 Saide } Syria		[Heather]				
2,0=1'	207 Sour } Syria		[Heather]				
0,2=1'	208 Caiffe or Acre } Syria		[Heather]				
0,5=1'	209 Mouths of the Nile } Egypt		[Heather]				
0,45=1'	210 Aboukir } Egypt		[Heather]				
0,45=1'	211 Alexandria } Egypt		[Heather]				
0,1=1'	212 Bomba & Derne } Barbary		[Heather]				
1,0=1'	213 Bengazi } Barbary		[Heather]				
0,9=1'	214 Tripoli } Barbary		[Heather]				
0,1=1'	215 Face } Barbary		[Heather]				
0,4=1'	216 Sousa } Barbary		[Heather]				
0,1=1'	217 Tunis } Barbary		[Heather]				
1,6=1'	218 Galita Island } Barbary		[Heather]				
0,9=1'	219 Bona } Barbary		[Heather]				
0,45=1'	220 Algiers } Barbary		[Heather]				
0,95=1'	221 Arzeni } Barbary		[Heather]				
0,65=1'	222 Oran } Barbary		[Heather]				
0,55=1'	223 Ceuta } Barbary		[Heather]				
0,75=1'	224 Tangier } Barbary		[Heather]				
	The above from Heathers Collection					2	2 0
				[total]		15	0 0

Class 10 Coast of Africa to Cape of Good Hope

Scale Long	[Description]	No. of Sheets	By whom Published	[Year]	£	S	D
1,65=1°	Western Islands &c & part of Portugal & Africa between the Burlings & Cape Bajador & Views [with insets of] Corvo & Flores 4,6=1° [and] Azores Faal to Terceira 4,6=1° [and] St. Michaels & St. Marys & View Formigas 4,6=1° [and] Madeira & Porto Santo 0,1=1' [and] Funchal Road 1,65=1' [and] Porto Cavallo on Lanzarotte, Geo. Glass 1,25=1' [and] Channel between Gratirosa & Lanzarotte Geo. Glass 0,5=1' [and] Sa. Cruz Tenerif No scale [and] Port Gomera from De Borda No Scale	2	Laurie & Whittle	1807	0	8	0

2,0=1°	Coast of Africa, from Gibraltar to Cape Blaco & Views [with inset of] Mogador & View by W. Sidney Smith	2	Laurie & Whittle	1794	0	6	0
3,1=1°	Coast of Africa from Cape Blanco to Cape Verd &c [with insets of] Portandrie 0,9=1' [and] Goree 0,16=1'	1	Laurie & Whittle	1794	0	2	0
4,0=1°	Coast of Africa from Cape Verd to Cape St. Ann & Views [with insets of] Bar of Senegal No scale [and] Bissao by J. Sorel 1758 1,0=1' [and] Islas de Los & View by William Woodville 1777 0,6=1' [and] Bananas 1,1=1' [and] Plantain 1,45=1' [both] by William Woodville 1777	2	Laurie & Whittle	1791	0	6	0
2,6=1°	Coast of Africa from Cape Verga to Cape Formosa & Views by Robert Norris [with insets of] Sierra Leon 1790 0,2=1' [and] Bassaw Cove 0,25=1' [and] Lagos & its Channels by Capt Horsely 0,7=1' [and] Benin by Capt. Archibald Dalzell 1785 0,25=1'	3	Laurie & Whittle	1802	0	10	6
0,55=1'	Entrance of Sierra Leon River by Capt thompson Directions by George Young [with insets of] Bonny River by Thomas Clarke 178 [sic] 0,25=1' [and] Entrance Old Calabar Capt Fairweather 1790 0,075=1' [and] Bimbia Roger Latham 0,75=1' [and] Camaroons River Roger Latham 1790 0,3=1' [and] Anna de Chaves or St. Thomas 1784 2,9=1' [and] Mayumba or Alvaro Martins - Mackey Reed 0,6=1' [and] St. Paul de Leonda 1790 & Views 0,1=1' [and] Benguela 0,4=1' [and] Fish Bay 1786 0,2=1'	1	Laurie & Whittle	1801	0	2	0
0,55=1'	River Sherbro, with Yawry Bay & View - Ralph Fisher 1773	1	Laurie & Whittle	1794	0	2	0
2,55=1°	Coast of Africa from Cape Formosa to Cape Negro & Views	3	Laurie & Whittle	1794	0	10	6
0,45=1'	Actual Survey of the River Congo, Geo: Maxwell	2	Laurie & Whittle	1795	0	7	6
2,85=1°	Western Islands & Views with Observations on the Formigas by Nathaniel Simpson 1783 [with insets of] Roads of Punta del Gada & Villafranca 0,35=1' [and] Azores from Fleurieu 1,05=1° [and] So. Coast of Tercera & View 0,25=1' [and] Fayal Road & Porto Pin 0,55=1'	1	Laurie & Whittle	1797	0	2	0
4,7=1°	Western Islands & Views	1	Steel	1802	0	3	6
3,35=1°	Western Islands [with insets of] Delgada & Villa Franca 0,35=1' [and] Angra Bay 0,25=1' [and] Channel between Fayal & Pico 0,5=1' [and] Road of Fayal 1,55=1'	1	Heather	1803	0	3	6
2,0=1°	Island Porto Santo & View Lieut Col. Roberts Capt Woolley of HM Ship Arethusa [with inset of] Plan of Rocks to the Northward 0,5=1'	1	Faden	1802	0	5	0
23,4=1°	Island Madeira, Johnson with additions & View [with insets of] Road of Funchal & View 0,55=1' [and] Town of Funchal 0,25=100 yards	2	Faden	1791	0	12	0
2,5=1°	Madeiras & Canary Islands & Views [with insets of] Channel between Lanzerote & Gratiiosa by George Glass 0,6=1' [and] Port de Novi & Porto Cavello George Glass 1,25=1'	1	Laurie & Whittle	1794	0	2	0
0,15=1°	Madeira & Canary Islands [with inset of] Funchal Road 3,1=1'	1	Heather	1801	0	3	6
3,3=1°	Madeira & Views [with insets of] Funchal Road 1,35=1' [and] Gomera No scale [and] St. Cruz Tenerif No scale [and] Porto Naos No Scale	1	Steel	1803	0	4	0
3,45=1° lat	Cape Verd Islands & Views [with inset of] Porto Praya 1,4=1'	1	Laurie & Whittle	1794	0	2	0
4,5=1° long	Cape Verd Islands & Views [with inset of] Porto Praya 2,9=1'	1	Heather	1805	0	1	9
4,0=1°	English Road Island of Ascension; G Maxwell	1	Laurie & Whittle	1795	0	2	0
				[total]	4	15	9

Class 11 Coasts of North America

Scale Long	[Description]	No. of Sheets	By whom Published	[Year]	£	S	D
1,1=1°	W. Coast of Greenland from Statenhock to Womans Island	1	Steel	1800	0	6	0
2,0=1°	Davis's Strait [with inset of] Coast of South Bay 0,45=1'	1	Steel	1800	0	6	0
4,1=1°	Coast of Labradore from 54°N Lat to Cape Charles with Directions / Lane [with inset of] Port Charlotte & Mecklenburgh Harbour	2	Faden	1792	0	5	0
20,0=1° lat	Eastern Coast of Labradore from Cape Bluff to the Straits of Belle Isle By Joseph Gilbert 1767 [with insets of] Charlotte, Sophia & Mechlenburgh Harbours 1,35=1' [and] Pitts Harbour 1,3=1' } No. American Pilot		Sayer & Bennet	1770			

10,6=1° lat	The Straits of Belle Isle By James Cook 1766 & Michael Lane 1769 North American Pilot [with insets of] York or Chateau Bay [and] Red Bay [and] Bradore Bay [and] Ferolle [and] Quirpon & Griguet [all at] 1,0=1'		Sayer & Bennet	[1770?]			
0,35=1'	South Coast of Labradore from Shecatica to Grand Pt. By Michael Lane 1768 No. American Pilot [with insets of] Cumberland Harbour [and] St. Augusting [both at] 2,0=1' [and] Mecatina 4,0=1'		Sayer & Bennet	[1770?]			
2,35=1°	Island Newfoundland By James Cook & Michael Lane & others in No. American Pilot		Sayer & Bennet	1775			
3,0=1°	Island Newfoundland Michl. Lane 1790	1	Faden	1791	0	5	0
4,25=1°	Island of Newfoundland [with insets of] Bradore } Labradore 0,95=1' [and] Red Bay Harbour 1,0=1' } Labradore [and] Quirpon North part no scale [and] Hawkes Harbour West Coast 0,95=1' [and] Port aux Basques near Cape Ray no scale [and] Great Jervis Harbour 1,95=1' [and] Breton or Britain Harbour 1,3=1' [and] St. Laurence near Chapeau Rouge 1,3=1' [and] Burin Harbour } Bay of Placentia 1,0=1' [and] Placentia Harbour } Bay of Placentia 1,15=1' [and] St. Mary 1,0=1' [and] Trepassy 1,0=1' [and] Cape Broyle & c 0,75=1' [and] Witless Bay & Bay of Bulls 0,75=1' [and] St. Johns Harbour 3,3=1'	2 & a slip	Steel	1800	0	7	6
1,0=1'	Island Fogo by Michael Lane 1785	1	Faden	1787	0	5	0
19,6=1° lat	Coast of Newfoundland from Bonavists to Cape Spear with Directions	1	Faden	1778	0	5	0
3,85=1'	Trinity Harbour	1	Laurie & Whittle	1801	0	2	0
2,0=1'	Tinity Harbour Vide American Pilot No. IV		Sayer & Bennet	1770			
2,5=1'	Grace Harbour & Carboniere Vide American Pilot No. IV		Sayer & Bennet	1770			
[blank]	View of the East Coast of Newfoundland from Cape Spear to Cape St. Francis by Joseph Sidney Yorke RN.	1	Faden	1797	0	1	0
6,35=1°	South East part of Newfoundland from Conception Bay to Chapeau Rouge & Views Vide American Pilot No. III		Sayer & Bennet	1770			
19,6=1° lat	Coast of Newfoundland from Cape Spear to Point Lance with Directions [with insets of] Bay of Bulls & Witless Bay [and] Cape Broyle & c [and] Trepassey [and] St. Marys Harbour [all at] 1,0=1'	1	Faden	1774	0	5	0
0,45=100 yards	St. Johns Harbour & Views by Francis Owen Master RN 1798	1	Laurie & Whittle	1799	0	3	0
3,35=1'	St. Johns Harbour Vide American Atlas No. IV		Sayer & Bennet	1770			
0,95=1'	Cape Broyle, Ferry Land, Aquafort, & Fermouse Harbours Vide American Pilot No. IV		Sayer & Bennet	1770			
1,6=1°	Banks of Newfoundland with adjacent Coast & c No. American Pilot No. II		Sayer & Bennet	1775			
4,25=1°	Banks of Newfoundland with adjacent Coast	2	Steel	no date	0	7	6
0,95=1'	Trepassey [with inset of] St. Mary's 1,01=1' } Vide American Pilot No. V		Sayer & Bennet	1770			
19,6=1° lat	Bay of Placentia by Michael Lane 1772 with Directions [with insets of] Burin Harbours 1,0=1' [and] Harbour of Placentia by James Cook 1,15=1'	1	Faden	1773	0	5	0
5,75=1 St M	Harbour of Great Placentia & Views by Francis Owen Master RN 1800	1	Laurie & Whittle	1801	0	3	0
1,15=1'	Placentia by James Cook Vide American Pilot No. V		Sayer & Bennet	1770			
19,5=1° lat	South Coast of Newfoundland from Sauker Head to Cape Anguill by [sic] Cape Ray & Views by James Cook Vide American Pilot N VI [with insets of] St. Laurence 1,3=1' [and] Harbour Briton 1,3=1' [and] Great Jervis Harbour 3,95=1' [and] Port aux Basque 3,0=1' [and] St. Peters Island, by Engineer Fortin 1763 0,75=1'		Sayer & Bennet	1774			
19,6=1°	Coast of Newfoundland from C. Anguille to Cape Ferolle & Views by James Cooke Vide American Pilot No. XV [with insets of] Hawkes Harbour & c 1,0=1' [and] York & Lask Harbours 1,0=1'		Sayer & Bennet	1770			
2,45=1°	Coast from Belle Isle to Cape Cod [with inset of] Quebec & Island Orleans with part of the River St. Laurence	4	Steel	1807	0	12	0
0,2=1'	Magdalen Islands 1765 Vide No. American Pilot No. XII		Sayer & Bennet	1775			
2,0=1'	Gulf of St. Laurence Vide No. American Pilot No. XI	1	Sayer & Bennet	1775			
5,6=1°	Gulf of St. Laurence & Views Thos. Wright 1790 [with inset of] Mingan & Esquimaux Islands 0,3=1'	4	Faden	1790	0	10	6
5,35=1°	Gulf of St. Laurence	2	Steel	1800	0	7	6
2,25=1°	Gulf & River of St. Laurence	2	Heather	1800	0	7	6

3,9=1°	Gulf & River St. Laurence, by Thomas Wright [with insets of] Quirhon 0,75=1' [and] York or Chateaux Bay 0,75=1' [and] Mingan & Esquimaux Islands 0,3=1' [and] Old Ferrolle 0,95=1' [and] River St. Laurence from Isle Bec to Quebec 0,45=1'	6	Wright	1807	2	2	0
0,16=1°	River St. Laurence & Views wide No. American Pilot No. XX, XXI & XXII [with insets of] Mingan Island 1,0=1' [and] Mingan Harbour 1,0=1' [and] Gaspee Bay & Views 1,0=1' [and] 0,45=1' Bay of Swen Islands 0,45=1' [and] Havre St. Nicholas, by Desjardins Pilot of Quebec 0,6=1' [and] 0,3=1' Point Alhouettes or Larks Point, by Desjardins 0,3=1' [and] Quebec 1,8=1'		Sayer & Bennet	1775			
0,1=1°	River of St. Laurence & Views by T. Jefferys [with insets of] The Seven Islands 0,55=1' [and] St. Nicholas or English Harbour 0,55=1' [and] Road of Tadousac 0,4=1' [and] The Travers or Passage from Cape Torment into the So. Channel of Orleans Island 0,4=1' [and] Continuation of the River from Quebec to Lake Ontario from D'Anville 1755	2	Laurie & Whittle	1794	0	4	0
0,15=1°	Chaleur Bay HM Ship Norwich 1760, No. American Pilot No. XIV		Sayer & Bennet	1775			
1,3=1°	Restigouche Harbour, Ship Norwich 1760, No. American Pilot No. XV		Sayer & Bennet	1775			
0,25=1°	Island St. John No. American Pilot No. XIII [with inset of] Gulf of St. Laurence 0,7=1°		Sayer & Bennet	1775			
0,55=1 St M	Port Dauphin No. American Pilot No. X [with inset of] Margain or Cow Bay 0,15=1' [and] Gut of Canso 0,2=1'	1	Sayer & Bennet	1775			
6,1=1°	Nova Scotia with Part of Cape Breton & Bay of Fundy & Views [with insets of] Port Roseway 0,65=1' [and] Entrance of River St. John 0,45=1' [and] River St. John 3,8=1° lat	3	Laurie & Whittle	1798	0	6	0
5,4=1° long	Nova Scotia Cape Breton & Bay of Fundy [with insets of] Harbour of Halifax 0,6=1' [and] Port Campbell or Roseway 0,55=1'	2	Steel	1800	0	7	6
1,05=1°	Harbour of Halifax by Charles Morris Vide No. American Pilot No. IX		Sayer & Bennet	1775			
0,3=1°	Sable Island Vide No. American Pilot No. VIII		Sayer & Bennet	1770			
1,95=1°	Coast from Cape Canso to Cape Hatteras	2	Arrowsmith	1800	0	10	6
5,4=1°	Hollands Surveys from Halifax to Philadelphia & Views [with insets of] Halifax Harbour 0,45=1' [and] Boston Harbour 0,7=1' [and] New York Harbour 0,4=1'	3 & a slip	Laurie & Whittle	1798	0	10	6
5,35=1°	New England & New York from Cape Sable to New York Harbour [with insets of] River Kennebeck & Shupscut by Joseph Huddart 0,7=1' [and] Hell Gate & View by W.A. Williams 1777	4	Laurie & Whittle	1794	0	7	6
5,2=1°	Coast from Goldsborough Bay to New York & Views by Holland [with insets of] Piscataqua Harbour 0,65=1' [and] Boston 0,65=1' [and] Rhode Island 0,25=1' [and] Hell Gate 1,35=1' [and] New York Harbour 0,35=1 St M	2	Steel	1800	0	7	6
2,6=1°	Boston Harbour	1 & a slip	Laurie & Whittle	No date	0	2	0
4,6=1°	Coast from Cape Cod to the Havana [with insets of] Delawar R & Bay 0,1=1' [and] Charlestown 0,5=1' [and] Port Royal 0,15=1' [and] St. Marys 0,6=1' [and] Nassau 0,7=1' [and] St. Augustin 2,3=1	5	Laurie & Whittle	1800	0	14	0
4,4=1°	United States of America 3 Charts [with insets of] Boston 0,8=1' [and] New York 0,35=1' [and] Delawar 0,2=1' [and] Cape Fear 0,45=1' [and] Cape Fear 0,45=1' [and] Charlestown 0,5=1' [and] Port Royal 0,25=1' [and] Savanna 0,45=1'	6	Heather	1799	0	18	0
6,4=1°	Coast from Boston to Cape Hatteras	3	Mason	1807	0	10	6
No scale	Bar of Sandy Hook Lieut Hills 1782	1	Faden	1784	0	4	0
0,9=1°	Hudsons River from Sandy Hook to New York	1	Laurie & Whittle	1794	0	2	0
5,3=1°	Coast from New York to Cape Fear [with insets of] New York Harbour 0,4=1 St M [and] Mouth of Delawar 0,2=1' [and] Delawar River from Bombay Hook Island to Chester 0,4=1' [and] Delawar River Chester to Philadelphia 1,0=1'	2	Steel	1800	0	7	6
4,9=1°	New Jersey, Maryland, Virgini from Norfolk to Cape Hatteras	2	Laurie & Whittle	1794	0	6	0
0,25=1 St M	Delawar Bay & River to Philadelphia	1	Laurie & Whittle	1794	0	2	0
17,0=1°	The Bay of Chesapeake [with inset of] Herring Bay 2,2=1'	4	Laurie & Whittle	1794	0	6	0
0,8=1°	Cape Fear River from the Bar & c to Brunswick	1	Laurie & Whittle	1794	0	2	0

5,4=1°	Coast from Cape Fear to Hillsboro [with insets of] Charleston & View 0,6=1' [and] Port Royal 0,5=1' St M [and] St. Augustine 3,25=1' St M	2	Steel	1800	0	7	6
5=0=1° [sic]	North & South Carolina from Cape Hatteras to Port Royal	2	Laurie & Whittle	1794	0	6	0
2,0=1'	Charleston Bar & Harbour	1	Laurie & Whittle	1794	0	2	0
1,0=1'	Port Royal South Carolina	1	Laurie & Whittle	1794	0	2	0
1,0=1'	D'Awsoskee South Carolina	1	Laurie & Whittle	1794	0	2	0
8,4=1°	Coast of Georgia from Port Royal to Matanza Inlet [with insets of] St. Marys 0,6=1' [and] Nassau 0,7=1' [and] St. Augustin 2,3=1'	1	Laurie & Whittle	1794	0	3	0
				[total]	14	15	6

Class 12 West Indies

Scale Long	[Description]	No. of Sheets	By whom Published	[Year]	£	S	D
1,25=1'	The Bermudas or Summer Islands by C. Lempriere	1	Laurie & Whittle	1794	0	2	0
26,4=1°	The Bermudas	½	Heather	1804	0	1	9
3,9=1°	East & West Florida [with insets of] Spirito Santo 0,15=1' [and] St. Joseph & St. Andrew 0,55=1' [and] Pensacola 0,55=1' [and] Mississippi 6,9=1°	2	Steel	1800	0	7	6
1,65=1'	Amelia Bar & Harbour in East Florida by Jacob Blamey 1775	1	Laurie & Whittle	1794	0	2	0
31,6=1°	Totugas & Florida Keys by George Gauld, & Views with Directions	3	Faden	1790	0	18	0
11,1=1°	Coast of Wt. Florida & Louisiana by George Gauld 1764. 65. 66. 67. 68. 69. 70 & 1771	4	Faden	1803	1	1	0
0,5=1'	Entrance of Tampa, Spo. Santo on W. Coast of East Florida	½	Laurie & Whittle		0	0	6
0,3=1'	Pensacola by B. Romans 1771 [with inset of] Mobile, by B. Romans 1771 0,7=1'	1	Laurie & Whittle		0	1	6
0,35=1'	Mobile [with inset of] Entrance of Mississippi 2,75=1'	1	Laurie & Whittle		0	1	6
5,0=1° lat	River Mississippi [with inset of] Mouths of the Mississippi 0,9=1'	2	Laurie & Whittle	1800	0	4	0
0,55=1°	Index Map to Charts of the West Indies by T. Jefferys	1	Sayer & Bennet	1775			
2,8=1°	NW Part Bay of Mexico	1	Sayer & Bennet	1775			
2,8=1°	NW Part Bay of Mexico with differences	1	Laurie & Whittle	1794	0	3	6
2,8=1°	Louisiana & West Florida	1	Sayer & Bennet	1775			
2,8=1°	Louisiana & West Florida with differences	1	Laurie & Whittle	1794	0	3	6
2,8=1°	Et. Florida, Gulf & Bahama Islands	1	Sayer & Bennet	1775			
2,8=1°	Et. Florida, Gulf & Bahama Islands with Differences	1	Laurie & Whittle	1794	0	3	6
2,8=1°	W & So. Part Gulf of Mexico	1	Sayer & Bennet	1775			
2,8=1°	W & So. Part Gulf of Mexico with differences [with inset of] Plan of Vera Cruz 1,25=1'	1	Laurie & Whittle	1794	0	3	6
2,8=1°	Yucatan & W. End of Cuba	1	Sayer & Bennet	1775			
2,8=1°	Yucatan & W. End of Cuba with Differences	1	Laurie & Whittle	1794	0	3	6
2,8=1°	Middle of Cuba	1	Sayer & Bennet	1775			
2,8=1°	Middle of Cuba with differences	1	Laurie & Whittle	1794	0	3	6
2,8=1°	East End of Cuba & No. Side of St. Domingo	1	Sayer & Bennet	1775			
2,8=1°	East End of Cuba & No. Side of St. Domingo with differences	1	Laurie & Whittle	1794	0	3	6
2,8=1°	So. Pt. St. Domingo	1	Sayer & Bennet	1775			
2,8=1°	Porto Rico & Caribee Islands	1	Sayer & Bennet	1775			
2,8=1°	Porto Rico & Caribee Islands with differences	1	Laurie & Whittle	1794	0	3	6
2,8=1°	New Spain to Trieste Island	1	Sayer & Bennet	1775			
2,8=1°	New Spain to Trieste Island with differences	1	Laurie & Whittle	1794	0	3	6
2,8=1°	Bay of Honduras	1	Sayer & Bennet	1775			
2,8=1°	Bay of Honduras with differences	1	Laurie & Whittle	1794	0	3	6
2,8=1°	Jamaica & Mosquito Shoar	1	Sayer & Bennet	1775			
2,8=1°	So. Part Nicaragua	1	Sayer & Bennet	1775			
2,8=1°	Isthmus Panama to Cartagena	1	Sayer & Bennet	1775			

2,8=1°	Isthmus Panama to Cartagena with differences	1	Laurie & Whittle	1794	0	3	6
2,8=1°	Terra Firma from Cartagena to Gulf Trieste	1	Sayer & Bennet	1775			
2,8=1°	Caracas, &c to Trinidad	1	Sayer & Bennet	1775			
2,8=1°	Caracas, &c to Trinidad with differences	1	Laurie & Whittle	1794	0	3	6
1,0=1°	West India Islands by de la Rochette	1	Faden	1796	0	5	0
2,4=1°	West Indies & Views	3	Heather	1797	0	8	6
2,8=1°	West Indies [with insets of] Port Royal Martinico 1,0=1 [and] English Harbour Antigua 5,6=1 St M [and] Savanna le Mer 0,75=1 [and] Bluefields } Jamaica 1,05=1 [and] Port Royal & Kingston } Jamaica 1,0=1'	2	Steel	1800	0	8	0
1,1=1°	West Indies	2	Heather	1801	0	6	0
1,0=1°	West Indies	2	Laurie & Whittle	1802	0	6	0
1,0=1°	West Indies	4	Arrowsmith	1803	1	11	6
1,5=1°	West Indies & Views J Knight RN	4	Steel	1804	0	12	0
2,95=1°	Gulf of Florida & Bahama Islands & Views with Directions Charles Roberts [with inset of] Islands & Keys from Hog Island to Booby Rocks, New Providence 0,1=1'	1	Faden	1794	0	7	6
4,75=1°	Gulf Passage & Views Robert Bishop [with inset of] Cominas Islands 6,15=1°	2	Laurie & Whittle	1794	0	5	0
2,3=1°	Gulf of Florida, Bahamas, Windward Passage & Views 0.7.6 with Directions 0.3.0 [with inset of] British Yucatan in Bay of Honduras 7,1=1°	4	Steel	1800	0	10	6
5,35=1°	Capt Roman's Survey of the Gulf of Florida & Channels of Bahama & Views [with inset os] Cayman Island 0,1=1'		Laurie & Whittle	1802	0	15	0
3,95=1°	Gulf Passage or New Bahama Channel & Views by James Manderson with a Book an Examination into the causes of the Gulf Stream	2	Steel	1804	0	7	6
3,9=1°	Old Straits of Bahama & Views, Robert Bishop	2	Laurie & Whittle	1794	0	5	0
5,4=1° lat	Bahama Banks	2	Steel	1800	0	7	6
3,8=1° long	Windward Passage &c Views by D Woodriff [with inset of] Endymions Shoal & Rocks by D Woodriff 0,6=1'	2	Laurie & Whittle	1794	0	7	6
4,6=1°	Windward Passage Robert Bishop & Views [with inset of] Island Jamaica 6,1=1°	2	Laurie & Whittle	1794	0	5	0
2,65=1°	Windward Passage by Charles Roberts Master, Royal Navy with Directions & Views [with inset of] Morant Keys 0,55=1'	1	Faden	1795	0	7	6
0,75=1'	Turks Islands & Banks, Vide No. XV West India Atlas	1	Laurie & Whittle	1794	0	2	0
1,1=1'	Barracoa	½	Laurie & Whittle	[blank]	0	1	0
0,4=1'	Great Bay of Nipi, by the chief Pilot of the Armada [with inset of] Nuevitas Harbour 0,45=1'	1	Laurie & Whittle	[blank]	0	1	6
0,2=1'	Bay of Matanzas [with inset of] City & Harbour of Havanna 1,15=1'	1	Laurie & Whittle	[blank]	0	1	6
5,0=1'	Harbour & City of the Havanna, by Don Joseph del Rio, 1798	1	Faden	1805	0	7	6
2,1=1'	Port Mariel [with inset of] Port Cavanis 2,4=1'	1	Laurie & Whittle	[blank]	0	1	6
0,55=1'	Bahia Honda	½	Laurie & Whittle	[blank]	0	0	6
0,55=1'	West End of the Island of Cuba & part of the Colorados by Geo: Gauld 1773 [with inset of] Grand Cayman by Geo: Gauld, 1773 0,55=1'	1	Faden	1790	0	3	0
0,35=1'	Bahia Xagua	½	Laurie & Whittle	[blank]	0	0	6
1,0=1'	Harbour of St. Yago [with inset of] Guantanamo or Waltenham Bay & Cumberland Harbour by Durell 1740	1	Laurie & Whittle	[blank]	0	1	6
	St. Domingo						
0,45=1'	[St. Domingo] Monte Christe Bay with the Seven Brothers [with inset of] Bayaha or Port Dauphin 0,075=100 yards	1	Laurie & Whittle	[blank]	0	1	6
0,15=100 yards	[St. Domingo] Town & Harbour of Cape François [with inset of] Port Paix 0,25=100 yards	1	Laurie & Whittle	[blank]	0	1	6
0,1=100 yards	[St. Domingo] Cape Nicola Mole [with inset of] Leogane and Port au Prince 0,25=1'	1	Laurie & Whittle	[blank]	0	1	6
0,2=100 yards	[St. Domingo] Petit Guave [with inset of] Fort St. Louis 0,175=100 yards	1	Laurie & Whittle	[blank]	0	1	6
	Charts by John Leard &c & Directions taken together or in single sheets as underneath						
3,7=1° long	General Chart of St. Domingoe, Jamaica & Part of Cuba & Views 1789.90.91 & 1792	2	[John Leard]	1792	0	5	0
11,8=1°	Island of Jamaica between the years 1789 & 1793	1	[John Leard]	1793	0	4	0

1,7=1 St M	Old Harbour Longs Wharf &c 1791	1	[John Leard]	1793	0	2	6
1,3=1 St M	Port Toyal & Kingston Harbours & Coast to Cow Bay & Salt Pond Bay 1791 & 1792	1	[John Leard]	1793	0	3	0
2,1=1 St M	Port Royal Geo Vancouvre [sic] & Joseph Whidbey 1788	1	[John Leard]	1792	0	3	6
4,3=1 St M	Anchorage at Morant Bay & the Coast from Belvedere Point to Fishermans Bay 1792	1	[John Leard]	1793	0	2	0
0,35=100 yards	Port Morant 1792	1	[John Leard]	1793	0	2	0
0,5=100 yards	Port Antonio 1790	1	[John Leard]	1792	0	2	0
8,5=1'	St. Anns Bay 1790	1	[John Leard]	1792	0	2	0
8,6=1'	Martha Brae	1	[John Leard]	1793	0	2	0
0,5=100 yards	Montego Bay 1791	1	[John Leard]	1793	0	2	0
0,5=100 yards	Lucea Bay 1790	1	[John Leard]	1793	0	2	0
2,15=1'	Savanna la Mer 1791	1	[John Leard]	1792	0	2	0
4,3=1'	Blewfields 1791	1	[John Leard]	1793	0	2	0
9,6=1° lat	Island Jamaica by Thomas Jefferys vide West India Atlas No.1 [with insets of] Harbour of Kingston & Port Royal 0,04=100 yards [and] Bluefields 0,7=1'	1	Robert Sayer	1775			
2,0=1 St M	Harbours of Kingston & Port Royal, & Wreck Reef by Geo Gauld with Directions 1772 [with insets of] Port Roayl 11,5=1' [and] Fort Augusta & the Narrow Channel 5,8=1'	1	Faden	1798	0	7	6
0,25=100 yards	Port Antonio 1790	½	Laurie & Whittle	[blank]	0	1	0
2,05=1'	Lucia Harbour [with inset of] Mantega Bay 2,15=1'	½	Laurie & Whittle	[blank]	0	1	0
	Porto Rico						
5,35=1'	Harbour of Porto Rico by Don Cosme de Churruca 1794	1	Faden	1805	0	5	0
0,1=100 yards	Forts & Harbour of San Juan de Portorico [with inset of] West Road of Portorico or Aguada Nueva 1740 0,35=1'	1	Laurie & Whittle	[blank]	0	1	6
8,3=1° lon.	Virgin Islands & Views by Thomas Jefferys vide No. III W India Atlas	1	Sayer	1775			
8,3=1°	Virgin islnads with differences [with insets of] Tortola 1,65=1' [and] St. Peters Islands 1,25=1'	1	Laurie & Whittle	1794	0	3	6
0,5=1'	Virgin Islands & Views by Thomas Jefferys vide No. III W India Atlas	1	Steel	1802	0	4	0
16,1=1'	Virgin Islands & Views by Thomas Jefferys vide No. III W India Atlas	1	Arrowsmith	1803	0	5	0
0,65=1'	Virgin Islands	1	Laurie & Whittle	1804	0	3	6
1,6=1°	Caribbee Islands & Views by de la Rochette 1784 [with inset of] Positions from Porto Rico to Trinidad & Orchilla 0,55=1°	1	Faden	1784	0	3	0
3,0=1°	Caribbee Islands	1 & a slip	Laurie & Whittle	1794	0	5	0
3,5=1°	Caribbee Islands	1	Heather	1795	0	4	0
2,75=1°	Caribbee Islands Lieut. Columbine 1787 to 1790	1	Faden	1796	0	4	0
1,6=1'	St. Kitts & View by Anthony Ravell Vide No. IV West India Atlas [with inset of] Plan of Nevis 0,9=1'	1	Sayer	1775			
1,4=1'	Antigua & View by Robert Baker Vide No. V West India Atlas [with inset of] English Harbour 5,6=1'	1	Sayer	1775			
3,35=1° Lon.	Harbour of St. Johns & Views by Capt Columbine 1789,1790 [with inset of] S & Part of W. Coast of Antigua by EH Columbine 0,45=1'	1 & a Slip	Faden	1793	0	10	6
0,3=1'	Guadaloupe Vide No. VI West India Atlas	1	Sayer	1775			
7,0=1'	Saints	1	Arrowsmith	1798	0	5	0
0,8=1'	Dominica 1773 Vide No. VII West India Atlas	1	Sayer	1775			
0,5=1'	Martinico Vide No VIII West India Atlas [with inset of] Plan de Cul de Sac Royal 1,0=1'	1	Sayer	1775			
0,5=1'	Martinico with differences [with inset of] Cul de sac Robert no scale	1	Laurie & Whittle	1798	0	3	6
3,2=1 St M	Fort Royal Martinique by Wm Booth	2	Faden	1795			
0,65=1'	St. Lucia Vide No. IX West India Atlas [with inset of] Plan of Carenage 0,25=100 yards		Sayer	1775			
1,25=1'	Barbadoes by Wm. Mayo & Views Vide No. X West India Atlas	1	Sayer	1775			

1,25=1'	St. Vincent 1773 Vide No. XI West India Atlas	1	Sayer	1775			
2,7=1'	Becquia or Becouya 1763 Vide No. XII West India Atlas	1	Sayer	1775			
1,05=1'	Grenada &c Surveyed by order of Govr. Scott, Vide No. XIII W. India atlas	1	Sayer	1775			
1,05=1'	Grenada with differences	1	Laurie & Whittle	1801	0	3	6
0,95=1'	Tobago Vide No. XIV Wt. Indian Atlas [with insets of] Man of War Bay 2,25=1' [and] Great & Little Courland Bays by David Ross	1	Sayer	1775			
0,3=1'	Trinidad [with inset of] Harbour of Chaquaramus	2	Faden	1798	0	4	0
21,5=1° lon	Trinidad 1797	1	Laurie & Whittle	1800	0	3	6
0,35=1'	Trinidad	1	Heather	1802	0	4	0
1,15=1°	Coast from Terra Firma from the Spanish 1805 [with insets of] Cumana 1793 1,3=1' [and] Truxillo 0,85=1'	1	Faden	1806	0	7	6
1,5=1'	Barcelona [with insets of] La Guayra 4,8=1' [and] Porto Cabello 4,25=1' } Don Francisco Fidalgo 1804	1	Faden	1807	0	5	0
10,6=1'	Road & Town of La Guayra [with inset of] Puerto Cabello Lieut Jones 1741 5,1=1' } 2 Plates	1	Laurie & Whittle	1794	0	1	6
0,45=1'	Curaçao & Views from Gerard Van Keulen Vide No. XVI West India Atlas [with inset of] Plan of Fort Amsterdam no scale	1	Sayer	1775			
0,45=100 yards	Harbour of Curaçao [with inset of] Part of the adjacent Coast & Gulf of Maracaybo 1,5=1° Lon	1	Arrowsmith	1807	0	2	6
2,7=1'	Bay & Town of St. Martha [with inset of] Harbour of Carthagen 1,05=1' } 2 Plates	1	Laurie & Whittle	[blank]	0	1	6
0,5=1'	Lispata Bay [with inset of] Porto Velo 3,50=1' } 2 Plates	1	Laurie & Whittle	[blank]	0	1	6
3,1=1'	Road & Harbour of Chagre [with inset of] Bahais del Almerantes } 2 Plates	1	Laurie & Whittle	[blank]	0	1	6
0,2=1'	Blewfields Lagoon [with inset of] Truxillo Bay 0,5=1' } 2 Plates	1	Laurie & Whittle	[blank]	0	1	6
0,5=1'	Ruatan or Rattan Island Vide No. II West India Atlas [with insets of] New Port Royal Harbour, Barnsley, 1742 3,1=1' [and] Old Providence & Sta. Catalina 0,65=1'	1	Sayer	1775			
3,8=1'	San Fernando de Omoa, taken in the Viper & Nautillus 1759 & 1767	½	Laurie & Whittle	[blank]	0	1	0
0,15=1'	Port of Yacatan [with inset of] Map of the Musquito Shoar &c 0,8=1°	1	Faden	1787	0	5	0
0,6=1'	Road & Port of Vera Cruz 1740	½	Laurie & Whittle	[blank]	0	0	6
1,25=1'	Vera Cruz & View from the Spanish of Don Bernardo de Orta 1798	1	Faden	1805	0	5	0
				[total]	21	5	3

Class 13a South America to the Southward of Trinidad

Scale Long	[Description]	No. of Sheets	By whom Published	[Year]	£	S	D
1,45=1°	Guayana & Views from the Observations of Ed. Thompson by Rochette [with insets of] Rivers of Essequibo & Demerari, Thompson 0,1=1' [and] River Berbice ET 0,35=1' [and] Surinam River from the Dutch 0,15=1' [and] Cayenne from the French 0,45=1'	1	Faden	1783	0	5	0
8,0=1°	Guayana	1	Laurie & Whittle	1795	0	3	0
3,0=1°	Guayana & Surinam & Views [with insets of] Cayenne 0,25=1 St M [and] Fort & Town 1,0=100 fathoms	1	Laurie & Whittle	1796	0	3	0
1,85=1°	Guayana & Views [with insets of] Chaguaramas 0,6=1' [and] Esquebo 0,15=1' [and] Berbice by Capt Walker 0,25=1' [and] Surinam J. Von Trump 0,31=1' [and] Cayenne 0,4=1'	1	Heather	1797	0	4	0
23=1° lat	Coast of Guayana Thomas Walker Asst. Quarter Master General 1798 [with inset of] Plan of the Mouths of the Demerary River & Town of Stabrock 0,45=100 Rhyndland Rood	4	Wilkinson	1799	1	1	0
0,4=1'	Chart of the Colony of Surinam	4	Wilkinson	1800	1	1	0
2,05=1'	River Surinam & its Defences	1	Wilkinson	1800	0	5	0
0,5=1'	Surinam River & Views	1	Laurie & Whittle	1801	0	3	0
0,3=1'	Guayana Major Von Bouchenroeder 1798, 1802 [with inset of] Plan of Stabrock & Vicinity 1804	2 & slip	Faden	1804	0	15	0

2,3=1'	Island of Fernando Neronha & Views	1	Laurie & Whittle	1794	0	2	0		
1,65=1°	Coast of Brazil from the Banks of St. Roque to the Id. St. Sebastian & Views [with insets of] Bay of All Saints & View 0,1=1' [and] Soast from St. Anns to Isle Grande & Views 0,075=1' [and] Ascensaõ No scale	1	Laurie & Whittle	1794	0	5	0		
8,85=1°	Coast from Brazil from Barra de Santos to Guaratuba [with insets of] Barra de Santos 0,5=1' [and] Barra de Marpequena & Iguape 0,5=1' [and] Cannea 0,5=1' [and] Paranagua 0,35=1' [and] Garatuba 5,0=1'	1	Faden	1807	0	7	6		
0,65=1'	Bay & Harbour of Rio Janerio & Views	1	Laurie & Whittle	1794	0	2	0		
5,8=1°	River Plater & View	1	Laurie & Whittle	1803	0	4	0		
6,2=1°	River Plate & Views [with insets of] Maldonado 1,5=1' [and] Mte. Video 2,4=1'	1	Heather	1806	0	6	0		
6,35=1°	River Plate 2d. Editn. & Views [with insets of] Maldonado 1,95=1' [and] Mte. Video 2,4=1'	1	Faden	1807	0	10	6		
14,2=1° Lat	Falkland Islands Thomas Edgar 1786 & 1787 [with inset of] Falkland Islands 1,55=1° Lat	1	Arrowsmith	1797	0	5	0		
2,95=1° Long	Strait of Magellan Vide No. 29 American Atlas [with inset of] So. Point America & Falkland Islands 0,7=1°	1	Laurie & Whittle	1794	0	2	0		
1,15=1°	Chart of the Southern Promontory of America	1	Arrowsmith	1802	0	7	6		
1,15=1°	Coast from Rio de la Plata to Valparaiso round Cape Horn [with insets of] Maldonado 0,9=1' [and] Sta. Eleno 1,05=1' [and] No. Coast of St. George's Bay 9,2=1° [and] Sea Bear Bay to Sound of Port Desire 0,8=1' [and] Port St. Julian 0,6=1' [and] Berkley Sound on Falkland Islands 0,65=1' [and] New Year's Harbour, Staten Island 0,45=1' [and] Bay Good Success 1,35=1' [and] Bay St. Francis 0,1=1' [and] Labyrinth of Cordova 0,55=1' [and] Juan Fernandez Island 0,4=1' [and] Cumberland Bay on Juan Fernandes 0,85=1' [and] Mas-a fuera Road 1,2=1'	2	Faden	1802	0	12	0		
1,75=1°	Coast of Chile & Views	1	Faden	1805	0	7	6		
2,0=1°	Coast of Peru & Views	1	Faden	1805	0	7	6		
2,05=1°	West Coast of America from 7°S to 9°N & Views	1	Faden	1805	0	7	6		
2,5=1'	Harbour of Valdivia & View [with inset of] Sn. Juan Baptista, or Cumberland Bay or Juan Fernandez 2,8=1'	1	Faden	1807	0	5	0		
26,5=1°	Islands St. Felix & St. Ambrose [with inset of] Cocos 4,6=1° by James Colnett 1793	1	Arrowsmith	1798	0	5	0		
7,3=1°	Marquesas [with inset of] Resolution Bay 2,1=1' by James Colnett	½	Arrowsmith	1798	0	1	6		
6,7=1°	Gallapagos by James Colnett	1	Arrowsmith	1798	0	5	0		
[blank]	[Galapagos] Views & Whale by James Colnett	1	Arrowsmith	1798	0	5	0		
18,0=1°	Bay of Panama	1	Arrowsmith	1800	0	5	0		
13,0=1°	Socoro &c by James Colnett	½	Arrowsmith	1798	0	2	6		
2,05=100 yards	Roca partida by James Colnett	½	Arrowsmith	1798	0	2	6		
0,5=1'	River Oregan	½	Arrowsmith	1798	0	1	0		
						[total]	2	15	0

Class 14 East Indies in detail

NB Those without price are in the H.O. & are not to be purchased singly							
Scale	[Description]	No. of Sheets	By whom Published	[Year]	£	S	D
0,8=1° Lon.	Cape of Good Hope & Mosambique Channel [with insets of] Plans of Saldanha Bay, Table Bay, False Bay, Delagoa Bay, NW Harbour Mauritius, View of Table Land	2	Heather	1796	0	7	6
5,4=1° Lat.	Cape of Good Hope, Coast & inland	4	Arrowsmith	1806	1	1	0
1,55=1° Long	South Coast of Africa from the Cape of Good Hope to Delagoa Bay in East India Pilot Vol 1st		[blank]	[blank]			
1,4=1'	Table Bay with the Cape of Good Hope from G Van Keulen in East India Pilot Vol 1st		[blank]	[blank]			
0,5=1'	Cape Bona Esperance with False Bay by Joseph Huddart in East India Pilot Vol 1st		[blank]	[blank]			
1,5=1'	Seamons Bay by Joseph Huddart in East India Pilot Vol 1st		[blank]	[blank]			
0,8=1'							
0,45=1'	Algoa Bay, Mossel Bay & Flesh Bay from Van Keulen in East India Pilot Vol 1st		[blank]	[blank]			
0,3=1'							

1,3=1° Lon.	Mosambique or Inner Passage Plan of Comora Islands, Bay Johanna Felil Pt. Madagascar	1	Laurie & Whittle	1797	0	6	0
1,1=1°	Bays of St. Augustine & Tullear 1755 & 1768 in East India Pilot Vol 1st		[blank]	[blank]			
2,4=1° Lat	West Coast of Madagascar from St. Augustines Bay to Cape St. Andrew in East India Pilot Vol 1st		[blank]	[blank]			
2,6=1°	West Coast of Madagascar from Manafia to the No. Point of Bay St. Lucia in East India Pilot Vol 1st	1	Laurie & Whittle	1801	0	6	0
0,5=1°	North Pt. of Bay St. Lucia to the Pt. Itapare & View [with inset of] Harbour of Locar 1,7=1°	1	Laurie & Whittle	1801	0	6	0
[blank]	Querimbo &c, Patta &c. in East India Pilot Vol 1st		[blank]	[blank]			
[blank]	Mahe & Amirantes Islands in East India Pilot Vol 1st		[blank]	[blank]			
[blank]	Particular Plans of Islands, Rocks & Shoals in the Indian Sea in East India Pilot Vol 1st		[blank]	[blank]			
[blank]	Track of the Calcutta East Indiaman over the Bassas de Chagos in East India Pilot Vol 1st		[blank]	[blank]			
[blank]	Isle Rodrigues, & Northern Part of Madagascar in East India Pilot Vol 1st		[blank]	[blank]			
[blank]	Matheurin Bay in East India Pilot Vol 1st		[blank]	[blank]			
[blank]	Northern Part of the Indian Ocean in East India Pilot Vol 1st		[blank]	[blank]			
1,3=1° Lon.	Entrance of the Red Sea 1 Plate Socotra Road, Cape Babelmandel to Mocha, Mocha Road, Kisseen Babelmandel Strait Aden & View 1 Plate	1	Laurie & Whittle	1802	0	6	0
2,3=1° Lon	Red Sea by De La Rochette & various Plans	4	Faden	1781	0	10	6
2,9=1°	Red Sea by Sir Home Popham & various Plans	2	Faden	1804	0	16	0
[blank]	Red Sea with Plans of Suez, Tor &c in East India Pilot Vol 1st		[blank]	[blank]			
3,0=1° Lon	Red Sea in East India Companys Cruizers Panther & Assaye & several Plans	2	Arrowsmith	1807	1	1	0
8,4=1° Lon	Sea of Suez by De la Rochette & Plans	1	Faden	1785	0	7	6
[blank]	Road of Jeddah in East India Pilot Vol 1st		[blank]	[blank]			
14,8=1°	Straits of Jubal by W Friend 1802 [with inset of] Tor Harbour by W Friend 2,2=1°	1	Laurie & Whittle	[blank]	0	6	0
2,5=1° Lon	Gulph of Persia & several Plans stolen from AD	1	Heather	1805	0	7	6
[blank]	Gulph of Persia in East India Pilot Vol 1st		[blank]	[blank]			
[blank]	Coast of India from Giants Point to Cape Rama in East India Pilot Vol 1st		[blank]	[blank]			
1,0=1°	Bombay Harbour & adjacent Coast to Choul in East India Pilot Vol 1st	1	Heather	1803	0	7	6
2,0=1°	Bombay Harbour & View Capt Horsburgh	1	Blacks & Parry	1806	0	10	6
[blank]	Bombay Harbour in East India Pilot Vol 1st		[blank]	[blank]			
2,5=1° Lon	Navigation from Bombay to Madrass & Jagernaut	2	Heather	1806	0	15	0
[blank]	Coast of India from Goa to Cape Comorin in East India Pilot Vol 1st		[blank]	[blank]			
3,2=1° Lon	Coast of India from Mount Dilly to Pondicherry [with inset of] Plan from Tillicherry to Calicut by Lt. Lewis - of Nezombo by M Forten Master of HMS Heroine	1	Laurie & Whittle	1798	0	6	0
1,0=1°	Gulph of Bengal &c [with inset of] Plan of Syrian, Negrais & St. Mathew &c	1	Laurie & Whittle	1797	0	6	0
[blank]	Calpentyn &c in East India Pilot Vol 1st		[blank]	[blank]			
[blank]	Columbo in East India Pilot Vol 1st		[blank]	[blank]			
[blank]	Pt. de Gale & Nilewelle in East India Pilot Vol 1st		[blank]	[blank]			
[blank]	Trincomalay & Venloos Bay in East India Pilot Vol 1st		[blank]	[blank]			
[blank]	Trincomalay in East India Pilot Vol 1st		[blank]	[blank]			
[blank]	Bay of Bengal in East India Pilot Vol 1st		[blank]	[blank]			
3,0=1°	Coast of India from Calymere Islands to Gardeware Point	1	Laurie & Whittle	1794	0	6	0
[blank]	Palleacate & Road of Tengepatnam in East India Pilot Vol 2d.		[blank]	[blank]			
3,0=1°	Coast of India from Pt. Gardeware to the Ganges	1	Laurie & Whittle	1794	0	6	0
4,2=1° Lon	Northern Circars [with inset of] Plan of Vizagapatam, Bimplipatam Fort	1	Laurie & Whittle	1794	0	6	0
4,1=1°	Bay of Bengal [with inset of] Plan of arrackan River	1	Heather	1803	0	7	6

Lon							
12,0=1°	Coast of Bengal from Pt. Palmiras to Mascall Island by John Ritchie	2	Arrowsmith	[blank]	0	10	6
4,5=1° Lon	Northern Part of the Bay of Bengal [with inset of] Plan of Chittagon River	1	Laurie & Whittle	1794	0	7	6
13,1=1° Lon	Hoogly River [with inset of] Plan from Tannah to Burnegur by B. Lacum 1,8=1 St M	2	Laurie & Whittle	1803	0	7	6
[blank]	Eastern Coast of the Bay of Bengal in East India Pilot Vol 2d.		[blank]	[blank]			
3,9=1°	Coast of Ava Pegue &c	1	Laurie & Whittle	1798	0	6	0
2,9=1°	Andaman & Nicobar Islands & Plans	1	Laurie & Whittle	1799	0	6	0
[blank]	Nicobar Islands in East India Pilot Vol 2d.		[blank]	[blank]			
2,6=1° Lon	Coast of Ava &c from Cheduba to Po. Ladda with Andaman & Nicobar Islands	1	Heather	1803	0	7	6
4,2=1° 4,8=1°	Isles of Merguy & Junkseylon &c	1	Laurie & Whittle	1798	0	6	0
0,85=1°	Prince of Wales Island	1	Arrowsmith	[blank]	0	5	0
[blank]	Prince of Wales Island by Lieut. Evans	1	Laurie & Whittle	1807	0	6	0
[blank]	East India Islands from Calminera to Pt. Amoye in East India Pilot Vol 2d.		[blank]	[blank]			
1,5=1° Lon	East India Islands & Coast from Bengal to China & New Guinea part stolen from an unpublished Chart by AD	4	Arrowsmith	1800	1	5	0
0,9=1°	China Seas & Oriental Islands	2	Heather	1803	0	10	6
2,3=1°	Strait of Malacca by Thos. Jefferys Plans	1	Laurie & Whittle	1794	0	6	0
9,8=1°	Strait of Malacca by James Horsburgh [and] Soundings to the Southward of Po. Aor by James Horsburgh 19,1=1°	2 + 1	Blacks & Parry	1806	1	1	0
12,0=1°	Strait of Malacca [with inset of] North Part of Strait of Malacca from M D'Aprés	1	Lindsay	0	8	0	
3,6=1°	Strait of Malacca [with insets of] Strait of Sincapore 9,6=1° [and] Plans of Bass Harbour & Prince of Wales Island	1	Heather	1803	0	7	6
4,0=1°	Northern Part of the Straits of Malacca [with inset of] Prince of Wales Island	1	Laurie & Whittle	1798	0	6	0
10,2=1°	South Part of Straits of Malacca by Lindsay	1	Laurie & Whittle	1798	0	6	0
4,8=1°	Strat of Malacca Alexander Black &c [with inset of] Plans Po. Jara to Cape Richardo & Strait of Sincapore	2	Laurie & Whittle	1802	0	10	6
0,35=1°	Salangor and Straits of Callong	1	Laurie & Whittle	1796	0	6	0
[blank]	Strait of Sincapore &c Thomas Jefferys East India Pilot, Vol. 2d		[blank]	[blank]			
0,5=1°	Strait of Sincapore by Lieut. Evans	1	Laurie & Whittle	[blank]	0	6	0
[blank]	Port of Rhio in East India Pilot Vol. 2d		[blank]	[blank]			
[blank]	Soundings to the Southward of Po. Aor - vide Strait of Malacca above		[blank]	[blank]			
[blank]	West Coast of Sumatra from Touroumanie River to Pt. Indrapore in East India Pilot Vol. 2d		[blank]	[blank]			
[blank]	West Coast of Sumatra from the Equinoxial Line to the Strait of Sunda in East India Pilot Vol. 2d		[blank]	[blank]			
8,4=1°	West Coast of Sumatra from Bencoolen to Keyzers Bay & Plans	1	Laurie & Whittle	1794	0	6	0
1,2=1°	West Coast of Sumatra from Old Bencoolen to Buffaloe Point by Joseph Huddart [with inset of] Plans Poolo Bay and Rat Island	1	Laurie & Whittle	1797	0	6	0
[blank]	Straits of Sunda & Banka in East India Pilot Vol. 2d		[blank]	[blank]			
16,4=1°	Straits of Sunda - Plan of Zalphen Islands	1	Laurie & Whittle	1794	0	6	0
[blank]	Chart from the Strait of Sunda to the Strait of Banka in East India Pilot Vol. 2d		[blank]	[blank]			
2,3=1°	Jave Sea &c - Plan Lubeck	1	Laurie & Whittle	1794	0	6	0
24,0=1°	North Coast of Java / Roads of Bantam & Batavia	1	Laurie & Whittle	1794	0	6	0
[blank]	Road & City of Batavia in East India Pilot Vol. 2d		[blank]	[blank]			
[blank]	Strait of Bali in East India Pilot Vol. 2d		[blank]	[blank]			
2,4=1°	Eastern Straits in the Passage to China [with inset of] Plan Strait Sapy & several Views	1	Laurie & Whittle	1798	0	6	0
2,5=1°	Straits to the Eastward of Java, Pitts Strait &c	1	Heather	1800	0	7	6
4,0=1°	Straits of Sunda, Banka, Gaspar & Billiton	1	Heather	1803	0	7	6
2,1=1°	S.W. Part of the China Sea & Views	1	Laurie & Whittle	1794	0	6	0
6,4=1°	Strait of Banka	1	Laurie & Whittle	1796	0	6	0
3,3=1°	Strait of Macassar - Plan of 2 Shoals & several views	1	Laurie & Whittle	1799	0	6	0

3,3=1°	Strait of Macasar & several Plans & Views	1	Heather	1805	0	7	6
2,3=1°	Banda Sea - Plan of Amboina Bay & banda [with inset of] Banda Islands - no Scale	1	Laurie & Whittle	1799	0	6	0
14,4=1°	Strait of Bocton by Capt Hogan & Views	1	Laurie & Whittle	1803	0	6	0
2,0=1° Lon	China Sea James Horsburgh	1	Blacks & Parry	1806	1	1	0
1,2=1°	China Sea	1	Laurie & Whittle	1802	0	7	6
[blank]	NW Coast of Borneo from Balambangan to Borneo Proper in East India Pilot Vol. 2d		[blank]	[blank]			
[blank]	Chart from Po. Timon to Po. Cambir in East India Pilot Vol. 2d		[blank]	[blank]			
[blank]	Bay on the South W side of Po. Aor in East India Pilot Vol. 2d		[blank]	[blank]			
[blank]	Bay on the SW side of Po. Timon in East India Pilot Vol. 2d		[blank]	[blank]			
[blank]	Coast of India & China from Pt. Comboja to Canton in East India Pilot Vol. 2d		[blank]	[blank]			
9,2=1°	Dampiers Straits, Pitts Strait &c	1	Laurie & Whittle	1798	0	6	0
2,4=1°	N E end of Borneo, Mindanao &c	1	Laurie & Whittle	1794	0	6	0
[blank]	Philippine Islands in East India Pilot Vol. 2d		[blank]	[blank]			
9,0=1°	Bay of Manilla	1	Laurie & Whittle	1798	0	6	0
[blank]	Port of Subec in East India Pilot Vol. 2d		[blank]	[blank]			
[blank]	Solsogon Harbour & Bongo Bay in East India Pilot Vol. 2d		[blank]	[blank]			
[blank]	Cochin China from Cham Collao Island to Kings River & Plan of Po. Condor in East India Pilot Vol. 2d		[blank]	[blank]			
[blank]	South Coast of Hay-nam from Tinhosa to Guichon in East India Pilot Vol. 2d		[blank]	[blank]			
[blank]	Gallon Bay on the Island Hay-nam in East India Pilot Vol. 2d		[blank]	[blank]			
11,6=1°	Coast of China from Pedro Blanco to St. Johns Island [with inset of] Plan of Canton River	1	Heather	1803	0	7	6
[blank]	Coast of China from Pedro Blanco to St. Johns Island [with inset of] Plan of Canton River in East India Pilot Vol. 2d		[blank]	[blank]			
40,8=1° Lon	River of Canton by Joseph Huddart	1	Laurie & Whittle	1794	0	6	0
[blank]	Northern Part of the China Sea in East India Pilot Vol. 2d		[blank]	[blank]			
[blank]	Entrance of Nangasacqui in East India Pilot Vol. 2d		[blank]	[blank]			
2,9=1°	Torres Strait between New Holland & New Guinea	1	Arrowsmith	1798	0	5	0
5,8=1°	Track of the Pitt Capt Edwd. Manning 1792 thro' the Islands to the Eastward of New Guinea	1	Faden	[blank]	0	5	0
0,9=1° Lon	Track of the Walpole to the Eastward of New Holland &c	3	Laurie & Whittle	1800	0	10	6
0,95=1° Lon	Eastern Coast of New Holland &c from South Cape to Cape York [with insets of] Plan of Van Diemens Land - Adventure Bay - Botany Bay - Port Jackson - Sidney Cove - & Endeavour River	2	Laurie & Whittle	1798	0	5	0
23,4=1°	New South Wales - Port Jackson &c	1	Arrowsmith	1799	0	5	0
3,0=1° Lon	Coast of New South Wales from Ram Head to Northumber Isles	1	Arrowsmith	1801 See below			
3,0=1° Lon	Van Diemens Land & Bass's Strait Math Flinders 1798.9	1	Arrowsmith	1800	1	1	0
1,25=1°	Port Dalrymple [with insets of] Western Port 0,5=1° [and] Southern most Fourneaux's Island 0,85=1° [and] Two fold Bay on Coast of New South Wales 1,25=1°	1	Arrowsmith	1801 See above			
2,0=1° Lon	Bass's Strait	1	Faden	1806	0	5	0
20,0=1°	Harbours on the SE Part of Van Diemens Land	1	Arrowsmith	1798	0	5	0
15,8=1°	SE part of Van Diemens Land by John Hayes 1798	1	Laurie & Whittle	1798	0	4	0
	Charts by George Robertson						
4,9=1°	Carimate Passage	1	Geo. Murray	[blank]			
5,9=1°	Strait of Banca &c	1	Geo. Murray	[blank]			
0,2=1°	Straits to Eastward of Banca	1	Geo. Murray	[blank]			
0,33=1°	Strait of Allas [with inset of] Strait Sapy & Salair 3,0=1°	1	Geo. Murray	[blank]			
[blank]	Plate of Views of the Billiton Islands, & of the Entrance of the Straits of Lombock Allas & Sapy	1	Geo. Murray	[blank]			
10,5=1°	Dampier and Pitts Strait	1	Geo. Murray	[blank]			
1,0=1°	Chart from New Holland to China	2	Geo. Murray	[blank]			

Lon							
						[total]	29 0 0

Source: TNA, ADM1/3522

Appendix 8

Manning figures for surveying vessels, 1825-8

	Ship	B	A	C	E	H	K	I	M	P	S
	Tons	235	314	237	295	375	203	126	184	185	180
	Year ¹⁶⁴⁴	1825	1825	1827	1827	1827	1827	1828	1825	1826	1825
Rank											
Captain	1										1
Commander	6	1	1	1	1	1			1		
Lieutenant	9	1	2	2		2			1		1
Lieutenant (Assistant Surveyor, supy.)	3	1	1								1
Master	9	1	1	1		1	1	1	1	1	1
2 nd Master	6		1			1	1	1	1		1
Surgeon	4	1	1	1		1					
Purser	6	1	1	1		1			1		1
Purser's Steward	3					1			1		1
Assistant Surgeon	9	1	1	1		1	1	1	1	1	1
Carpenter	4	1	1	1		1					
Mates or Midshipmen	14	2	2	3	1		2			2	2
Midshipmen	9		1			6		2			
Master's Assistant	7	2	1				1		1	1	1
Master's Mates	2								2		
Clerk	11	1	1	1	1	1	1	1	1	2	1
Coxswain	3		1	1		1					
Captain's Coxswain	1	1									
Gunner	2		1			1					
Quarter Master	12	2	2	2		3	1		1		1
Gunner's Mate	9	1	1	1		1	1	1	1	1	1
Boatswain	2		1			1					
Boatswain's Mate	11	2	1	2		1	1	1	1	1	1
Carpenter's Mate	10	1	1	1	1	1	1	1	1	1	1
Captain Forecastle	3	1	1	1							
Cook	8	1	1	1		1	1		1	1	1
Cook's Mate	1							1			
Sailmaker	5	1	1	1		1					1
Caulker	3	1	1	1							
Armourer	4	1	1	1	1						

¹⁶⁴⁴

This is the year this complement was used on this vessel.

Armourer's Mate	2					1					1
Captain Maintop	3	1	1	1							
Captain Foretop	4	1	1	1		1					
Volunteer 1 st Class	14	1	1	3		4	1	1	1	1	1
Volunteer 2 nd Class	7	1	1				1	1	1	1	1
Gunner's Crew	3		2								1
Carpenter's Crew	2		1								1
Able Seamen	160	14	25	18	8		26		24	20	25
Seamen	23		4					19			
Able Seamen, Ordinary and Landsmen	29					29					
Boys 1 st Class	9	2	2				2		1	1	1
Boys 2 nd Class	9	3					2		1	1	2
Boys (Supy.)	10	4	6								
Boys (unspecified)	12					8		4			
[Widow's Man]	8	1	1	1		1	1		1	1	1
Marines – Serjeant	4	1	1	1		1					
Marines – Corporal	6	1	1	1		1			1		1
Marines – Privates	48	8	8	6		10			6		10
Ship's Corporal	1		1								
Cooper	1			1							
Cooper's Crew	1		1								
Collector of Natural History	1		1								
Engineers	2				2						
Captain's steward	2				1	1					
Stokers	3				3						
Apprentices	2				2						
Admiralty Mate	1					1					
Steward	2						1			1	
Gunroom Steward	1										1
Total	546	63	86	57	21	86	46	35	52	37	63

Key to Ship names: A=Adventure, B=Beagle, C=Chanticleer, E=Echo, H=Hecla, K=Kangaroo, I=Investigator, M=Mastiff, P=Protector, S=Shamrock

Source: UKHO, SL101/1

Appendix 9

Surveying officers promoted to commander and captain, 1777-1824

Name	Promoted Lieutenant	Span of years	Promoted Commander	Span of years	Promoted Captain	Total span of years
George Frazer	1824	17	1841	10	1851	27
William G. Skyring	1823	7	1830			
John S. Roe d.1878	1823	40	1863			
Henry M. Denham	1822	13	1835	11	1846	24
Alexander B.B. Becher d.1876	1822	19	1841	15	1856	34
Richard Owen	1821	5	1826	11	1837	16
Edward Belcher	1818	11	1829	12	1841	23
Frederick W. Beechey	1815	7	1822	5	1827	12
Henry W. Bayfield	1815	11	1826	8	1834	19
John Franklin	1815	6	1821	1	1822	7
Americ T.E. Vidal d.1863	1815	8	1823	2	1825	10
Pringle Stokes d.1828	1815	10	1825			
Henry Foster d.1831	1815	12	1827			
William Mudge d.1837	1815	10	1825			
William Hewett	1814	12	1826	11	1837	24
Philip P. King d.1856	1814	7	1821	9	1830	16
William Henry Smyth	1813	2	1815	9	1824	11
Frederick Bullock	1812	17	1829	9	1838	26
Richard Copeland	1811	4	1815	23	1838	27
William E. Parry	1810	10	1820	1	1821	11
Basil Hall	1808	6	1814	3	1817	9
David Buchan d.1839	1806	10	1816	7	1823	17
William Cutfield d.1823	1806	2	1808			
John Ross d.1856	1805	7	1812	6	1818	13
David E. Bartholomew d.1821	1805	7	1812	3	1815	10
Martin White	1800	6	1806	12	1818	18
James Grant d.1833	1800	5	1805			
Matthew Flinders d.1814	1798	3	1801	9	1810	12
Francis Beaufort	1796	4	1800	10	1810	14
Murray Maxwell	1796	6	1802	1	1803	7

Peter Heywood d.1831	1795	5	1800	3	1803	8
William F.W. Owen	1794	15	1809	2	1811	17
William R. Broughton d.1821	1792	1	1793	4	1797	5
Thomas Hayward d.1797	1790	6	1796			
Home R. Popham	1783	11	1794	1	1795	12
Edward H. Columbine	1782	4	1796	6	1802	10
William Bligh	1781	6	1787	3	1790	9
George Vancouver d.1798	1780	10	1790	4	1794	14
Thomas Hurd d.1823	1777	18	1795	7	1802	25
Average		9.23		7.03		15.67

Appendix 10

Sample of non-surveyor officers promoted to commander and captain, 1778-1826

Name	Promoted Lieutenant	Span of years	Promoted Commander	Span of years	Promoted Captain	Total span of years
G. Mundy	1826	2	1828	9	1837	11
T. Maitland	1823	4	1827	10	1837	14
H.T. Austin	1822	9	1831	7	1838	16
J. Nais	1820	7	1827	8	1835	15
W. Martin	1820	3	1823	1	1824	4
H. Dundas	1819	4	1823	2	1825	6
C. Hope	1817	5	1822	4	1826	9
W. Kelly	1815	16	1831	13	1844	29
J. Kingcome	1815	13	1828	10	1838	23
J. Adams	1815	22	1837	6	1843	28
C. Keele	1814	12	1826	17	1843	29
H.O. Love	1814	12	1826	11	1837	23
D. Marsh	1813	9	1822	20	1842	29
M. Quin	1812	12	1824	13	1837	25
C.C. Parker	1811	4	1815	7	1822	11
J. Montagu	1810	4	1814	10	1824	14
J. Leigh	1808	2	1820	9	1829	11
W. Hamley	1807	7	1814	20	1834	27
V.F. Hatton	1806	2	1808	4	1812	6
J. Lyons	1805	9	1814	16	1830	25
W.J. Mingaye	1805	12	1817	5	1822	17
W. Symonds	1801	24	1825	2	1827	26
R.C. Mangin	1800	4	1804	3	1807	7
F.J. Snell	1799	3	1802	4	1806	7
T.B. Sullivan	1797	10	1807	7	1807	17
J. Noble	1796	1	1797	5	1802	6
E. Mounsher	1796	9	1805	8	1813	17
J.F. Maples	1795	15	1810	3	1813	18
J.W. Loring	1794	5	1799	3	1802	8
C. Laroche	1793	5	1798	2	1800	7
R. Jackson	1790	11	1801	1	1802	12
P. Malcolm	1783	9	1794	0	1794	9
G. M'Kinley	1782	16	1798	3	1801	19
W. Mitchell	1781	1	1782	8	1790	9
J.N. Morris	1780	10	1790	3	1793	13
N. Ingram	1778	5	1783	7	1790	12
Average		8.33		7.25		15.58

Appendix 11

Geographical arrangement of Hydrographic data in reports, 1802-1826

1802	1807	c.1816	1819	1826 ¹⁶⁴⁵	1826 ¹⁶⁴⁶
Great Britain and Ireland	Great Britain	The English Channel	Thames entrance	South America	Europe
Holland, North Sea and Baltic	North Sea	North Sea	East coast of England	Pacific	Mediterranean
France	Baltic	West Coast of England and Scotland	English and Irish Channels	Bristol Channel	Asia
Spain	France, Spain and Portugal	North and West Coasts of Ireland	Bahamas	Greek Archipelago	Australasia
Mediterranean	Mediterranean	Atlantic	Newfoundland	North Sea	Africa
Africa	West coast of Africa	East Coast of Africa, Arabian and Persian Gulph	Atlantic	Newfoundland	North America
West Indies	East coast of North America	Northern and Western part of New Holland, and Northern and Eastern New Guinea	Mediterranean	Mediterranean	South America
North America	West Indies			Shetland Islands	North and South America
East Indies	South America and West coast of North America			West Indies	
South America	East Indies			Africa	Polynesia
New South Wales and adjacencies	Polar charts			Mediterranean	
General maps and charts				Lakes of Canada	
Maps					

Source: UKHO, MLP183/1,3; TNA, ADM1/3522; UKHO, MLP70; UKHO, LB1, f.262

¹⁶⁴⁵ This report is divided into surveys afloat and already received, therefore the geographical order starts again after Africa.

¹⁶⁴⁶ This is the report on World hydrographic information and charting (UKHO, MLP 183/3).

Appendix 12

Scientific instruments taken on Parry's 1821-1823 voyage in search of a north-west passage

Instrument	Number taken
Astronomical clock	1
Chronometer	17
Portable observatory	1
Transit instrument	1
Spirit levels for compasses	8
Repeating circle	1
Circular transit	1
Dipping needle	3
Variation transit	1
Variation needle	1
Instrument for determining the magnetic force	1
Azimuth compass	8
Photometer	4
Hydrometer	4
Hydrostatic balance	2
Water bottle	4
Electrometers with copper chains	2
Two feet telescopes	4
Air pump	1
Thermometer	40
Pyrometer	1
Magnets	4
40 inch triple-object glass, achromatic telescope	1
Dip sector	4
Macrometer	1
Altitude instrument	4
Quadrant with level	2
Artificial horizon with mercury	6
Anglometer	4
Circular protractor	2
Station pointer	1
Beam compass	2
Theodolite	3
Self registering thermometer with iron case	8
Hygrometer	2
Total	150

Appendix 13

Chart sizes and dimensions

Abbreviation	Description	Size (inches)	Metric (cm)
Ant	Antiquarian	53x31	135x79
Dmp	Double Imperial	44x30	112x79
Imp	Imperial	30x22	76x56
A	Atlas	34x27	87x69
DE	Double Elephant	40x27	102x69
DE/2	Half DE	20x27	51x69
DE/3	Third DE	27x13.12	69x34
DE/4	Quarter DE	20x13.5	51x35
DE/8	Eighth DE	10x13.5	26x35

Appendix 14

Lithographed charts published by the Hydrographic Office, 1808-1829

No.	Description	Date of publication	Size	Reference
1	[Discoveries in the Arctic]	16.11.1820	DE/4	BL, Maps 982(36)
2	[Bermuda]	[<16.2.1827]	Small	UKHO, MB1 f.100
3	Leman and Ower Shoals by Hewett	<24.8.1826	DE/4	UKHO, OCB 106 A1
4	Table Bay by Owen	1.2.1827	DE/2	UKHO, OCB 634 A1
5	Island of Fernando Po, with the adjacent Coast	1827		BL, Maps SEC.11, (602*.)
6	The Six Shilling Channel, leading to the New Anchorage—New Providence by Allen, 1828 ¹⁶⁴⁷	<10.12.1828	DE/2	BL, Maps SEC.8. (405.); UKHO, LB2 fol. 224; <i>ibid</i> , OCB 405 A1.
7	Plan of Man of War Bay by Brown	<18.9.1828	DE/8	UKHO, OCB 213 A1
8	Chart of the Rabbit Islands by Farley and James, 1820	<31.10.1828	DE/4	UKHO, OCB 222 A1
9	Enlarged plan of Great Rabbit Island by Farley and James	<31.10.1828	DE/4	UKHO, OCB 223 A1
10	Exmouth Harbour by Loney	15.4.1829	DE/4	UKHO, OCB 24 A1

¹⁶⁴⁷ The survey from which this was derived is reference E528 Ag5 and dated 1827 from which a reduced copy was drawn (UKHO, E812 Ag6) at the same scale and extent as the lithographic edition (UKHO, OCB 405 A1).

Appendix 15

Sailing Directions published, bought in, or issued by the Hydrographic Office, 1808-29¹⁶⁴⁸

1. Dated sailing directions				
No.	Title	Author	Date ¹⁶⁴⁹	Location and notes
1.1	<i># Observations on the Florida Kays, Reef and Gulf; with directions for sailing along the Kays, from Jamaica to the Grand Cayman and the West end of Cuba: also a description, with sailing instructions, of the coast of West Florida</i> ... Published by W. Faden, 1796. ¹⁶⁵⁰	George Gauld	1796	BL, 10496.dd.3.
1.2	<i># Sailing directions for the Road of Leghorn by Capt. John Knight, 1796</i> Published by W. Faden, 1797	Capt. John Knight	1797	AL, P512. ¹⁶⁵¹
1.3	<i>\$ Nautical Memoirs</i>	Alexander Dalrymple	1806	AL, Sa129a. Still being issued in three volumes in 1827.
1.4	<i>\$ Collection of papers concerning the navigation, winds and weather at the French Islands Mauritius and Bourbon</i>	Alexander Dalrymple	1809	AL,
1.5	<i>\$ A description of the island called St Paulo</i>	J.H. Cox	1809	AL,
1.6	<i>* Harbour of Port St Vincent</i>	Capt. Kent	1809	Cook, 'Alexander Dalrymple' vol.2, p.647.
1.7	<i>* Remarks, &c. made in the Great Belt, &c. Printed by W. Winchester & Son, Strand.</i>	Capt. Lawford	1809	AL, UB9II.
1.8	<i>* Directions for the Malmo Channel. Printed by W. Winchester & Son, Strand.</i>	John Bates, Master in the Royal Navy	1809	AL, UB9II.
1.9	<i>* Directions for the Glenan Islands; written to accompany a chart of the coast of France, from Pointe de Conq to Pointe de Trevignan, dated 30 November 1808 [Issued in Remarks for the Western Station]</i>	William Chapman, Master, H.M.S. Spencer	> 30 Nov 1808	AL, Ub8.

¹⁶⁴⁸ This list does not include Graeme Spence's tide tables that were issued throughout the period, which contained similar information to that contained in some of the volumes of sailing directions (UKHO, LB2 fos 171, 173, 175).

¹⁶⁴⁹ This is the date of publication, or of the earliest date of issue recorded in Hydrographic Office papers.

¹⁶⁵⁰ Offered for sale in the 1832 catalogue of publications offered for sale by the Admiralty for one shilling (Hydrographic Office, *Catalogue of charts, plans, views, and sailing directions, constructed under the orders of the Lords Commissioners of the Admiralty, for the use of His Majesty's Navy, with the prices to which Their Lordships permit them to be sold, unmounted, by R.B. Bate, Poultry, London* (London, 1832), 66).

¹⁶⁵¹ Still issued in 1827 (UKHO, MLP 5/5Aii).

1.10	* <i>Remarks on the SW and NW coasts of Ireland, by Thomas George Shortland, Lieutenant in His Majesty's Ship Melpomone, communicated by Sir Thomas Troubridge, Bart</i> [Issued in <i>Remarks for the Western Station</i>]	Lieutenant Thomas George Shortland	20 April 1809	AL, Ub8.
1.11	* <i>A nautical description of the Bay of Brest: with instructions for its navigation; also for a new channel into the Four as surveyed by Captain Hurd, R.N. in the years 1804 and 1806.</i> Printed for the Hydrographical Office by Ballintine and Law, Duke-street, Adelphi [Issued in <i>Remarks for the Western Station</i>]	Captain T.H. Hurd	1809	AL, Ub8.
1.12	# <i>Directions for sailing to and from the East Indies, China, New Holland, Cape of Good Hope, and the interjacent ports, compiled chiefly from original journals and observations made during 21 years' experience in navigating those seas</i>	James Horsburgh	1809, 1811	BL.
1.13	# <i>Remarks on, and instructions for navigating the River la Plata</i> Printed by W. Winchester & Son	Captain P[eter] Heywood, R.N.	1813	AL, P514.
1.14	* <i>Description of the coasts of Portugal, and nautical instructions to accompany the general chart and particular plans of the said coasts . . .</i>	Marino Miguel Franzini, translated by Capt. W.F.W. Owen	1814	UKHO.
1.15	# <i>India Directory, or directions for sailing to and from the East Indies, China, New Holland, Cape of Good Hope, Brazil, and the interjacent ports, 2nd edition.</i> Printed by Plummer and Brewis, Love-Lane, Eastcheap	James Horsburgh	1817	BL.
1.16	# <i>A brief description of Nova Scotia, with plates of the principal harbors; including a particular account of the Island of Grand Manan</i> ¹⁶⁵²	Anthony Lockwood, Professor of Hydrography, Assistant Surveyor-General of the provinces of Nova Scotia and Cape Breton	1818	AL, UB4.
1.17	# <i>Supplement to the India Sailing Directory . . .</i> Printed by Cox and Baylis, Great Queen-Street, Lincoln's-Inn-Fields	James Horsburgh	1818	BL.
1.18	# <i>Sailing directions fo Guernsey, Jersey, and all the British Islands in the Gulf of Avranches, with a full description of the tides, rocks and appearances of the land from sea, principally intended to guide strangers.</i> Dedicated by permission to Admiral Sir James Saumarez, Baronet. Printed and published by Chevalier & Mauger, 328 Fountain Street, Guernsey	Alexander Deschamps, Mariner	1818	LB1 fos 181-2 ¹⁶⁵³ ; AL, P174 and Ua26-II
1.19	* <i>Memoir of a survey of the coast of</i>	Capt. Francis	1820	AL, Uc5. ¹⁶⁵⁴

¹⁶⁵² 250 copies were purchased in 1826 by Parry (UKHO, MB1 f.40 Minutes on the copper plates of the harbours of Nova Scotia, 21 and 27 April 1826).

¹⁶⁵³ Four dozen copies were ordered.

	<i>Karamania; made, in pursuance of the orders of the Lords Commissioners of the Admiralty. Printed by G. Hayden, Little College Street, Westminster.</i>	Beaufort		
1.20	* <i>Sailing directions. Bonavista Bay</i> ¹⁶⁵⁵	Lieut. F.W. Bullock	1820	UKHO, MP38 fos.47-54
1.21	* [Sailing directions for the English Channel] ¹⁶⁵⁶	Capt. Martin White	1822	AL, UaI.
1.22	* <i>Memoir on the navigation of South America, to accompany a chart of that station.</i> Printed by H. Teape, Tower-Hill for the HO	Capt. Basil Hall	1825	BL, Maps 44.b.43; UKHO.
1.23	# <i>The French coasting pilot; being a Description of Every Harbour, Roadsted, Channel, Cove, and River on the French Coast in the English Channel, and in the Bay of Biscay.</i> Printed by J. Williams, Plymouth ¹⁶⁵⁷	A. la Barre	1825	Bodleian Library
1.24	* <i>Remarks to accompany a new chart of the Leman and Ower Shoals, situated in the North Sea; surveyed by order of the Right Honourable The Lords Commissioners of the Admiralty</i>	Lieut. William Hewett	1826	AL, P159 part 4. UKHO, MB1 f.52. ¹⁶⁵⁸
1.25	* <i>General directions for the navigation of the Archipelago: with remarks on several ports and anchorages in that Sea: together with a few correct latitudes, longitudes, and magnetic bearings, of various places therein</i>	Capt. John Stewart	1826	NYPL; AL, P174.
1.26	* <i>Tables of latitudes, and longitudes by chronometer, of places in the Atlantic and Indian Oceans; principally on the west and east coast of Africa, the coasts of Arabia, Madagascar, &c resulting from the observations of H.M.S. Leven and Barracouta, in the years 1820 to 1826 inclusive, under the direction of W.F.W. Owen, Captain R.N.</i> Printed by Duckworth and Ireland.	Capt. W.F.W. Owen	1827	UKHO, LB2 fos 221, 225-6. ¹⁶⁵⁹
1.27	* <i>Memoir on the Navigation of the western coast of Africa, from Cape Bojador to Mount Souzos. From the observations of Baron Roussin, in the years 1817 & 18. Printed by Duckworth and Ireland, 76 Fleet Street.</i>	Baron Roussin, translated by Lieut. William Badgley R.N.	1827	AL, Ub1.
1.28	# <i>Appendix to the India Directory</i>	J. Horsburgh	1828	UKHO, LB2 fos 170, 172, 175 ¹⁶⁶⁰

¹⁶⁵⁴ Hurd claimed £15 9s for memoir printing by 'Haden' in 1820 (TNA, ADM17/28, Hydrographic Office accounts, 1818-23).

¹⁶⁵⁵ Parry asked for an estimate in 1828 for 500 copies to be printed (UKHO, LB2 f.185, Parry to Duckworth, 27 August 1828).

¹⁶⁵⁶ 750 copies were printed in the initial print run (TNA, ADM17/28, Hydrographic Office accounts, 1818-23).

¹⁶⁵⁷ The copyright was offered to the Admiralty of this work in 1828 and Parry agreed a copy should be put in the chart boxes covering the French coast.

¹⁶⁵⁸ 1000 copies ordered.

¹⁶⁵⁹ 40 copies supplied.

¹⁶⁶⁰ 21 copies ordered.

1.29	# <i>Directions for St. Georges Channel</i>	[Norie]	1828	UKHO, LB2 fos 139, 192, 258. ¹⁶⁶¹
1.30	# <i>North Atlantic Memoir</i>	[Laurie]	1828	UKHO, LB2 f.139. ¹⁶⁶²
1.31	# <i>New British Channel Pilot</i>	[Norie]	1828	UKHO, LB2 fos.139, 192, 258. ¹⁶⁶³
1.32	* <i>Errata to Owen's Tables</i>	W.F.W. Owen	1828	UKHO, LB2 fos 220-1 ¹⁶⁶⁴
1.33	# <i>New and Complete Piloting directions for the West Coast of Scotland from the Mull of Cantire to Cape Wrath etc.</i>	[Norie]	1829	UKHO, LB2 f.258 ¹⁶⁶⁵
1.34	* <i>The West India Directory; volume I. Containing directions for navigating the Carribean Sea and Gulf of Mexico; with a description of the coast of Colombia, Yucatan, Mexico, and Florida, and the adjacent islands and shoals. Compiled from the documents in the Hydrographical Office. Printed by G. Duckworth, 76 Fleet Street.</i>	[Capt. Columbine, Brigadier D. Joaquin Francisco Fidalgo and 'British officers employed on that coast']	1829	UKHO.
2. Unidentified volumes published before 1828				
2.1	Marks for a sunken rock in Bellaches Cove, Gut of Canso			UKHO, MLP 5/5Aii.
2.2	Marks for a shoal off Smith's Island, Virginia			UKHO, MLP 5/5Aii.
2.3	Instructions for making the Bermuda Islands	Capt. Hurd		UKHO, MLP 5/5Aii.
2.4	Directions for Arakina Sound and Port Litche	Russell		UKHO, MLP 5/5Aii.
2.5	Directions for the Boston Deeps and coast from Orford to Hasbro			UKHO, MLP 5/5Aii.
3. Undated volumes supplied by the Hydrographic Office				
3.1	* <i>Instructions for sailing in and out of Falmouth Harbour</i> [Issued in <i>Remarks for the Western Station</i>]	J. Bowen		AL, Ub8.

* Published by the Hydrographic Office

Bought in from the chart trade

\$ Reprinted by the Hydrographic Office

¹⁶⁶¹ 68 copies were purchased from Mr Norie.

¹⁶⁶² 25 copies were purchased from Mr Laurie.

¹⁶⁶³ 90 copies were purchased from Mr Norie.

¹⁶⁶⁴ 23 copies supplied.

¹⁶⁶⁵ 50 copies ordered.

Appendix 16

Multiple copies of charts (*i.e.* more than five) held in the Hydrographic Office, *c.*1802

No.	Title	Author	No. of copies	Date published	Current UKHO reference ¹⁶⁶⁶
1	Coast of Wales from Milford Haven to Conway	Lewis Morris	26	1748	C36
2	Plymouth Sound	Richard Cowl	274	1780	
3	Copenhagen Road	Francis Gibson	137	1791	
4	Cronstadt and Wyburg	Francis Gibson	143	1791	
5	Swedro Island and Torks Road	Francis Gibson	145		
6	Views from Robsnout in the Sleeve to Windaw, in Cairland	Francis Gibson	145	1791	
7	False & Simons Bay, Cape of Good Hope	W. Nicholson	14	1764	
8	Fort Royal Martinico	William Booth	12	1793	e2; 418
9	Journal of a siege of Fort Royal	-	12	-	
10	Jamaica and Windward Passage	John Leard	12	1792	w6; q99
11	Port Antonio, Jamaica	John Leard and Stephen Seymour	12	1792	239
12	St Ann's Bay, Jamaica	John Leard and Stephen Seymour	12	1792	240
13	Savanna La Mer, Jamaica	John Leard and Stephen Seymour	12	1792	235
14	Port Royal	George Vancouver and Joseph Whidbey	12	1792	r4
15	St Christophers	Samuel Baker	9	-	
16	Windward Passage, Jamaica	Robert Bishop	6	1761	A109
17	Martha Brae, Jamaica	John Leard	12	1792	237
18	Lucea Bay	John Leard and H. Seymour	12	1792	238
19	Blewfield	John Leard and W. Buller	12	1792	241
20	Montego Bay	John Leard and H. Seymour	12	1793	242
21	Port Morant	John Leard	12	1792	336
22	Old Harbour	John Leard and W. Buller	12	1792	379
23	Anchorage at Morant Bay	John Leard	12	1792	236
24	Port Royal and Kingston	John Leard	12	1792	q94
25	Boston Harbour	Des Barres	7	1775	
26	Bay of Point Simoan	William Nicholson	14	1763	u31/1-2
27	Bay of Point Ara	William Nicholson	14	1763	
28	St Augustine's Bay, Madagascar	William Nicholson	13	1758	u76
Total			1127	44575	
Avg			40.25	1783	

¹⁶⁶⁶ The reference is taken from the inventory of charts and surveys compiled by Becher from 1823-6 known as Book A.

Source: UKHO, MLP183; *ibid*, 'Book A' inventory and accession ledger, 1823-6

Appendix 17

Number of charts published, 1821-9

Section		Number of charts published on the 1 st January					
No.	Name	1821	1825	1826	1827	1828	1829
1	Channel & Western	51	62	62	63	63	63
2	North Sea	8	15	16	17	18	21
3	Baltic	14	14	14	14	14	14
4	Mediterranean	41	75	81	88	97	101
5	Newfoundland	5	14	15	17	17	34
6	North America	1	7	8	13	18	46
7	West Indies	37	69	77	95	97	114
8	South America	24	39	39	39	45	46
9	Coast of Africa	37	50	50	}419	}464	}482
10	Indian Ocean	28	30	30			
11	Mozambique	47	48	48			
12	Red Sea, Persian Gulf	52	52	52			
13	Malabar Coasts	31	39	37			
14	Chittagong &c	50	50	50			
15	Straits of Sunda	39	51	51			
16	Japan China	33	37	37			
17	Eastern China Pa.	56	63	63			
18	Australia	21	48	41	52	55	55
	[total]	575	723	771	817	888	986
	Increase		148	48	46	71	98

Source: UKHO, MLP 5/5B.

Appendix 18

The designations of chart boxes in circulation, 1808-28

1808	1808 total	1814 (station names only)	1828	1828 total	1829 (station names only)
North Sea & Baltic ¹⁶⁶⁷	33	Baltic & North Sea	North Sea & Baltic	25	North Sea & Baltic
Channel only	15	Channel	Channel & North Sea	42	Channel & North Sea
Channel or Western Station	6	Western Station	Channel & Western	125	Channel & Western
Irish Station	2	Irish	Irish	21	[combined into Channel & Western]
Atlantic	3	Atlantic	-	-	-
Lisbon	2	-	-	-	-
Mediterranean	9	Mediterranean	Mediterranean	79	Mediterranean
Brazil	1	-	-	-	-
Cape	5	Cape & Brazil	Cape & South America	24	Cape & South America
East Indies	4	East Indies	East Indies	12	East Indies
Leeward Islands	15	West Indies	West Indies	46	West Indies
Jamaica	3	-	-	-	-
America	15	American	North American	26	North American
-	-	Newfoundland	-	-	-
-	-	-	Hudson's Bay	3	Hudson's Bay
-	-	-	-	-	-
-	-	Northern Seas	-	-	-
-	-	-	Leith	13	[combined into Channel and North sea]
-	-	-	Sheerness	4	[combined into Channel and North sea]
-	-	African	African	26	African
-	-	Downs	-	-	-
			Portsmouth & Plymouth	18	[combined into Channel & Western]
Total	113			464	

Source: TNA, ADM1/3523 Hurd to Pole, 17 January 1809; *ibid*, ADM2/1084; UKHO, MLP 5/5B; *ibid*, MB1 fos 221-2, Minutes on rearranging chart box coverage, 22-23 January 1829.

¹⁶⁶⁷ This originally covered the North Sea, Baltic, Leith, Yarmouth, Sheerness and the Downs Stations but were soon amalgamated into one, i.e. North Sea and Baltic (TNA, ADM1/3458 Hurd to Croker, 13 November 1811).

Appendix 19

Sheringham's comparative costs of preparing chart boxes, c.1828

Comparative expense of preparing a box of South American charts by the 3 following methods											
Plan formerly adopted	£	s	d	Plan lately ordered	£	s	d	Proposed plan	£	s	d
One atlas binding and putting in charts	2	0	0	One large portfolio	2	2	-	One waterproof canvas cover fitted as pattern	-	12	-
3 vols of plan books at 15/	2	5	-	One small portfolio	1	1	-	Mounting the whole of the charts and plans upon the material of the Office	2	15	8
Mounting the remainder of the charts on Brown Holland – about	2	6	8	To mounting the whole of the charts and plans on coloured calico (about)	5	7	9				
Total expense	6	11	8	Total expense	8	10	9	Total expense	3	7	8
Proposed plan	3	7	8	Proposed plan	3	7	8				
Saving	3	4	-	Saving	5	3	1				
The same calculated for a Channel and Western box											
2 atlases for binding and putting in the charts	4	-	-	One portfolio to contain the whole of the charts	2	2	-	On waterproof canvas cover as above	-	12	-
Mounting the extra charts on Brown Holland	1	10	-	To mounting the above upon coloured calico	4	1	8	Mounting upon the material of the office	2	5	10
Total expense	5	10	-	Total expense	6	8	18	Total expense	2	17	10
Proposed plan	2	17	10	Proposed plan	2	17	10				
Saving	2	12	2	Saving	4	-	10				

Source: UKHO, MLP 5/5B

Appendix 20

Instruments supplied to hydrographic surveyors, 1716-1821

These lists do not include instruments that were personally owned by the surveyor and therefore do not appear in the inventories.

No.	Gaudy - 1716	Mackenzie – 1754	Hurd – 1788	Parry - 1821
1	A theodilett	A brass astronomical quadrant 10 inch radius	Astronomical Quadrant, 12 or 14 Inches Radius	Astronomical clock
2	Plaine table ball socket staff and box and needle	A reflecting speculum fitted quadrant, and a quill of silver wire.	A Brass Sextant of Hadley's, 9 Inches Radius	Chronometer
3	Brass ruler and sights	A repaired theodolite and a new staff (for above)	A Theodolite	Portable observatory
4	Quadrant for altitudes	An azimuth compass with two cards and a pair of sights	A Plane Table	Transit instrument
5	Gunters chain with a large pair of compasses	A new case for the theodolite	A Brass Protractor of 6 or 8 inches diameter	Spirit levels for compasses
6	Sector scale and a protractor with 2 pair of compasses in a case	A case of drawing instruments	Two Measuring Chains and Pins	Repeating circle
7	Large sexton with a telescope	A three foot brass scale	An amplitude and two good Boat Compasses	Circular transit
8	A rack and three leg staff	A brass arched Hadley's quadrant	A Telescope for observing Jupiter's Satellites	Dipping needle
9	A case for the theodilett and a large box for the sexton	Two circular protractors 12 inch diameter	A Two foot Glass	Variation transit
10	2 large rulers and a box to hole the paper with 2 plating scales	Four fifty foot chains	A case of Pocket Instruments and a copying Glass	Variation needle
11	Azimuth compass	Two small compasses	A Brass parallel Ruler of about 18 Inches	Instrument for determining the magnetic force
12		Two drawing compasses	A Brass Scale Two feet in length with various lines of equal parts	Azimuth compass
13		A wainscot stand for the astronomical quadrant	Two Deep-Sea Loads and Lines: 12 hand Leads and 24 Lines	Dip sector
14		24 oak poles spiked with iron	Bunting for Signal and Station Colours	Macrometer
15		4 iron reels and four stakes		Altitude instrument
16		A drawing board squared and a four foot rule		Quadrant with level

17		Lead lines and 20 yards of scarlet bunting for flags		Artificial horizon with mercury
18		Linen for flags		Anglometer
19				Circular protractor
20				Station pointer
21				Beam compass
22				Theodolite
23				Self registering thermometer with iron case
24				Hygrometer
25				Photometer
26				Hydrometer
27				Hydrostatic balance
28				Water bottle
29				Electrometers with copper chains
30				Two feet telescopes
31				Air pump
32				Thermometer
33				Pyrometer
34				Magnets
35				40 inch triple-object glass, achromatic telescope

Source: Gaudy - NMM, ADM/A/2057b, List of materials bought of John Bellinger by Mr. Gaudy June the 8th 1716. McKenzie - NMM, G.P.R. Naish collection, Mackenzie file. Hurd - TNA, ADM2/264, 20 February 1789. Parry - Parry, *Journal . . . 1821-3*, x-xi.

Appendix 21

Instruments supplied by the Hydrographic Office to survey vessels, 1818-29

Instrument	Lieut. King, <i>Mermaid</i> , 1818	Cmdr Boteler, <i>Hecla</i> , 1828	Capt. Beechey, <i>Blossom</i> , 1829
Astronomical telescope			1
8 inch theodolite		1	1
6 inch theodolite		2	2
Transit			1
Repeating circle			1
Pocket sextants		2	2
Chains			2
Tapes		2	2
Marine barometer	1		1
Oil barometer			1
Self registering thermometer			1
Thermometer			6
Small pocket thermometer	1		
Small pocket thermometer graduated to 140°	1		
Star quadrant			1
Kater's compass	1	1	2
Horizons			3
Levelling staves			1
Daniel's hygrometer			1
Sector drawing instrument			1
Circular protractor			2
Hour protractor [?4 hour protractor?]			4
Parallel ruler			2
Beam compass			1
Brass scale	1	2	1
Brass triangle			1
Case of 6 scales			1
Station pointer		2	1
Lantern			unspecified
Azimuth compass	2	4	-
28 second glass	1		-
14 second glass	1		-
Sextant and stand	1		-
3 foot spy glass / telescope	1	1	
Small pocket case of instruments	1		
Pricking off rough	6		

compasses			
Artificial/false horizon	1	3	
Hanging compass		2	
Magnet		2	
Four inch brass protractor		2	
Five inch brass protractor		1	
Four inch horn protractor		2	
Three inch horn protractor		2	
Massey's patent log		6	
Birt's Buoy and Nipper		6	
Gunter chain		2	
One foot box scale		6	
Beading off small lamp		2	
Chronometers		4	
Condemned chronometers		2	
Massey's patent watch		2	
Total items	19	61	44

Source: King - UKHO, LB1 f.179. Boteler - UKHO, MB1 fos134-5. Beechey - UKHO, SL101/1.

Appendix 22

List of instruments examined by Captain Parry on return from Thomas Jones, 1828

[fol.192] June 10 1828

[To] Sir Edward Owen

In pursuance of the plan proposed on the 23rd February last for the better security of the surveying and other instruments belonging to the Admiralty and directed by the Council to be adopted, the whole of the instruments in store, and which have hitherto been kept in charge of Mr Jones the optician have now been received from him, and deposited in the room near the Hydrographical Office appropriated to that purpose.

Having carefully inspected the whole of these, I now submit the annexed report of their state and condition, in which I have classed them under the five following heads, namely

Class 1st Serviceable

N.B. Estimates of expence made by the optician.

[Class] 2nd Requiring a moderate expence to render them serviceable

[Class] 3 Requiring a greater expence

[Class] 4 Requiring a very considerable expence

[Class] 5 Those which appear to me not worth repairing.

I request the directions of the Council as to the further disposal of these instruments

Signed W.E. Parry

1st Class Serviceable

- 3 Celestial compasses (Graydons)
- 2 Pair of Gimbals for Katers compasses
- 2 4 inch lenses
- 3 Clarence sextants
- 1 Quadrant [fol.193]
- 1 Experimental artificial horizon (for sea)
- 3 Iron troughs for artificial horizons
- 1 Hydrophorus for bringing up sea water
- 2 Brass-triangles
- 1 Portable instrument for magnetic force
- 1 Tracing glass
- 9 Thermometers and 2 by metallic expansion
- 7 Massey's patent sounding machines
- 2 Brass sextants with counterpoise

2nd Class

	£	s	d
17 Compasses	8	5	0
6 Telescopes	4	1	6
3 Theodolites	27	16	0
one of these costs £24 11s and is <u>already</u> repaired; therefore <u>inserted in Class 2</u>			
6 Sextants	15	15	0

one nearly repaired costs £9 18s			
4 Altitude instruments	2	10	
1 Circle		10	
1 Transit instrument	8	8	
already nearly repaired			
5 Anglometers	1	18	
2 Marcets water bottles	1	17	
2 Daniels hygrometer	1	15	
1 Electrometer		13	
5 Artificial horizons	1	16	
2 Beam compasses	1	8	6
3 Quadrants	1	17	
2 instruments for magnetical force	1	15	
1 Dipping needle		17	
3 measuring tapes	1	3	
3 Levelling staves	2	5	
1 Box of measuring rods		3	6
1 Levelling instrument		12	
3 Circular protractors	2	14	
already partly repaired			
1 Pentagraph 2 nd sent		8	
1 Tracing glass 2 nd sent		7	
1 Camera Lucida 2 nd sent		2	6
3 Barometers 3 rd sent	2	15	
[fol.194] 14 Thermometers	5	12	0
several partly repaired			
Total 2 class	96	0	6
amount to about	44	0	0

of which the repairs already done

3rd Class

7 Compasses	6	16
2 Telescopes	3	1
1 Theodolite	3	0
1 Sextant	5	0
1 Circle	1	15
1 Transit instrument	3	5
1 Artificial horizon	1	10
2 Dip micrometers	2	10
1 Eidograph	2	0
3 Barometers	4	6
6 Thermometers	7	9
Total 3 rd Class	40	12

4th Class

4 Compasses	17	5
2 Telescopes	7	0
1 Theodolite	9	0
4 Sextants	13	15
2 Repeating circles	18	0
1 Transit instrument	13	0

1 Artificial horizon	2 3
2 Astronomical quadrants	14 0
1 Standard measuring chain	3 15
1 Eidograph	2 10
1 Case of instruments	2 5
4 Barometers	11 13
Total 4 th Class	114 6

[fol.195]

5th Class

3 Barlows plates	destroyed by rust
3 Steering dipping needles	useless
2 Hanging dipping needles	old and useless
1 Common dipping needle	rudely constructed and old
3 Hygrometers	on a principle which can never again be admitted
2 Measuring chains	destroyed by rust
2 Solid pendulums	useless
1 Celestial globe	almost destroyed very old
2 Cosmographic columns	ditto
2 Sounding thermometers	rude construction – useless
1 Box of pyrometic bars	query worth retaining ?

Several sounding lines for Massey's machines. Query send them to Deptford Dockyard?

Signed W E Parry

Proceed with the repairs of the second class only reporting to weekly the number issued for repair and the number brought home completed. The sounding lines to be sent to Deptford acquainting Navy Board to be issued on captain Parry's approval. G E Owen.

Source: UKHO, MB1 fos 192-5

Appendix 23

Stationery supplied to survey vessels, 1824-9

Stationery	White and Fitzmaurice, <i>Shamrock</i> , 1824	Barnett, <i>Linnet</i> , 1828	Owen, <i>Blossom</i> , 1829
Paper, antiquarian	-	-	12 sheets
Paper, double elephant	6 sheets	5 sheets	100 sheets ¹⁶⁶⁸
Indian ink	-	-	12
Camel hair pencils	-	-	36
Crow	½ hundred	½ hundred	1200
Pencil, F	-	-	18 dozen
Pencil, H	-	-	18 dozen
Pencil, HH	-	-	30 dozen
Pencil, HHH	-	-	6 dozen
Indian rubber	1 piece	-	6
Wax	-	-	5 lbs
Pen knives	-	-	12
Ink powder	-	-	72 R24
Pens	-	-	300
Port folios	-	-	2
Paper [unspecified]	-	-	2 ½ reams
Oiled tracing paper	-	-	--
Paper, cartridge	6	4 quires	1 ream
Paper, cap	-	-	2 reams
Paper, blotting	2	-	¼ ream
Paper mounted on linen	6 rolls	-	-
Paper, foolscap	6 quires	-	-
Paper, quarto	6	-	-
Paper, note	6	-	-
Pencils, unspecified	1 dozen	1 dozen	-
Paper, atlas	6	-	-
Paper, China	3 sheets	5 sheets	-

Source: *Shamrock*, UKHO, LB2 f.28 Parry to White, 14 February 1824; *Linnet*, *ibid*, LP1857 B987 Barnett to Parry, 4 December 1828; *Blossom*, *ibid*, SL101/1.

¹⁶⁶⁸ Supplied in three tin cans.

Appendix 24

Notices to Mariners published in the *London Gazette*, 1808-29

No.	Description	Authority	Date of publication
1	Floating light, Kish Bank, Dublin Bay	Ballast Office, Dublin	1 October 1811
2	Lighthouse, Point of Toward	Act of parliament	8 September 1812
3	Lighthouse on Inishterhol Island	Ballast Office, Dublin	9 February 1813
4	Floating light, entrance to Liverpool	Act of Parliament	13 November 1813
5	Light on Hill of Howth, Dublin Bay	Ballast Office, Dublin	29 January 1814
6	Tusker Rock lighthouse	Ballast Office, Dublin	9 May 1815
7	Lighthouse, Island of May	Commissioners of Northern Lighthouses	20 January 1816
8	Inchkeith lighthouse	Commissioners of Northern Lighthouses	20 January 1816
9	Swape or Low Light, Spurn Point	Trinity House	29 October 1816
10	Corsewall Point lighthouse	Commissioners of Northern Lighthouses	29 October 1816
11	Lighthouses at Fannett Bay and Pier of Ardglass	Ballast Office, Dublin	8 February 1817
12	Lighthouse, Roche's Point	Ballast Office, Dublin	10 May 1817
13	Lighthouse, Mutton Island, Galway Bay	Ballast Office, Dublin	30 September 1817
14	Lighthouse, Cape Lativanem	Russian Government	30 September 1817
15	Lighthouses, Cape Clear Island and Arran Island	Ballast Office, Dublin	10 January 1818
16	Lighthouse, East Pier Head Entrance, Howth	Ballast Office, Dublin	20 June 1818
17	Lighthouses on the Isle of Man	Northern Lighthouses	9 January 1819
18	Lighthouse on Sumburghead, Shetland	Commissioners of Northern Lighthouses	12 December 1820
19	Beacon towers, Tramore Bay	Ballast Office, Dublin	3 July 1821
20	Carr Rock beacon	Commissioners of Northern Lighthouses	13 July 1822
21	Shoals to the north of the Galloper	Admiralty	3 August 1824
22	Buoyage, The Shambles, Portland Road	Trinity House	31 July 1824

23	Coningbeg floating light ship; Kilkadraan lighthouse; Carlingford lighthouse; Cranfield Point light	Ballast Office, Dublin	31 July 1824
24	Rock off Liesle, Island of Disko	Danish Navy	7 August 1824
25	Floating light, Arklow Bank	Ballast Office, Dublin	18 Jan 1825
26	Light, Nieuport, Western Flanders	Inspector of Pilotage, Ostend	17 May 1825
27	Galloper light	Trinity House	27 August and 25 October 1825
28	Rhins of Islay lighthouse	Commissioners of Northern Lighthouses	25 October 1825
29	Buoyage, King's Channel, Long Sand Head	Trinity House	4 February 1826
30	Buoyage, Race's Shoal and Inner Dowsing	Trinity House	14 January 1826
31	Dungeness lighthouse	Trinity House	19 May 1826
32	Dudgeon floating light	Trinity House	20 May 1826
33	Buoyage, Docking and Haisbro Sands	Trinity House	27 May 1826
34	Dudgeon floating light	Trinity House	11 July 1826
35	Buoys off Harwich	Trinity House	14 November 1826
36	Buoy, Outer Gabbard Shoal	Trinity House	3 April 1827
37	Buchanness lighthouse	Commissioners of Northern Lighthouses	20 April 1827
38	Lights at Kinnaird Head, Aberdeenshire; Island Glass, Harris Isles; Mull of Kintyre, Argyllshire; Island Pladda, Frith of Clyde	Commissioners of Northern Lighthouses	14 September 1827
39	Lynn Well light	Trinity House	4 March 1828
40	Lighthouse near Beachy Head	Trinity House	8 August 1828
41	Lighthouses on the Maiden or Hulin Rocks	Ballast Office, Dublin	19 September 1828
42	Cape Wrath lighthouse	Commissioners of Northern Lighthouses	18 November 1828
43	Caldey Island light	Trinity House	30 January 1829

Appendix 25

Table of notices to mariners issued by the Admiralty or Hydrographic Office, 1808-1829

Date	Description	Reference
12 Oct 1810	Shoal in the Gatway, Yarmouth	TNA, ADM2/1083
1 Dec 1810	Report on St Nicholas Gatway	TNA, ADM2/1083
26 Mar 1811	Buoyage in the Gatway, Yarmouth	TNA, ADM2/1083
31 May 1811	Buoyage in Thornton's Ridge	TNA, ADM2/1083
30 Sep 1811	Floating light, Kish Bank, south-east of Dublin Bay	TNA, ADM2/1083
23 Nov 1811	Passage through the Needles	TNA, ADM2/1083
27 Mar 1813	Pilotage in the Stanford Channel	TNA, ADM2/1084
14 Apr 1813	Light in Sarifa Tower	TNA, ADM2/1084
12 July 1813	Light vessel, Plymouth Breakwater	TNA, ADM2/1084
6 Dec 1813	Remarks on the Stone Banks and Roompot	TNA, ADM2/1084
17 Dec 1813	Stone Banks buoyage	TNA, ADM2/1084
23 Feb 1814	Port of Passages	TNA, ADM2/1084
24 Mar 1814	Directions to be observed by Transports and Merchant Vessels bound to the Port of Passages	TNA, ADM2/1084
25 Mar 1814	Kykduin light	TNA, ADM2/1084
20 Mar 1816	Light vessel, Galloper Sand	TNA, ADM3/187
Apr 1822	Dangers on the coast of Ireland	UKHO, LB1 fos 481-2
3 Aug 1824	Shoals to the north of the Galloper	<i>London Gazette</i> , 3 August 1824
>5 Feb 1827	Rifleman's shoal, Prince Edward's Island	UKHO, MB1 f.98
December 1828	Rock observed by Captain Dixon	UKHO, LB2 f.229
26 Dec 1828	A notice of the position of the Nab light vessel	UKHO, LB2 f.232
31 Dec 1828	Shoal in the Ports of Poros	UKHO, LB2 f.236
31 Dec 1828	Rock on the coast of South America in latitude 40° 1'W	UKHO, LB2 f.236

Appendix 26

R.B. Bate's suggested circular advertising his sole agency, 1829

Suggested circular by Mr Bate

Poultry

The Lords Commissioners of the Admiralty have been pleased to appoint me sole agent for the sale of the charts constructed at the Hydrographical Office.¹⁶⁶⁹

Their Lordships anxiously wish to extend the benefit of the many accurate marine surveys, that have been made for the use of His Majesty's Navy¹⁶⁷⁰ more generally than at present among the mercantile shipping of Great Britain. It therefore becomes my duty to announce my appointment to the public, and to solicit all captains, owners, and underwriters to inspect the collections of charts and plans at any of the depots which I have established as below stated.

Besides the moderate price at which they are offered to the public, the seaman's attention is invited to the following very important circumstance – all charts that pass through my hands will not only have received the latest corrections from the¹⁶⁷¹ naval surveys now in progress, but the Hydrographer authorises me to add that the communications which he is continually receiving from officers and others in all parts of the world, as well as the discoveries of foreigners, shall be immediately signified to me, so that the charts issued from my office will always contain the most authentic and the most recent information.

R Bate

Source: UKHO, MLP 62/1/vii Bate to Parry, 31 January 1829

¹⁶⁶⁹ Followed by *for the use of His Majesty's navy* crossed through.

¹⁶⁷⁰ *for . . . Navy* written over *under the orders* crossed through.

¹⁶⁷¹ Followed by *numerous* crossed through.

Appendix 27

Memorandum on the sale of Admiralty charts by John Wilson Croker Esquire,
Admiralty Office, 30 June 1821

Naval Charts

30 Copies

Admiralty Office 30th June 1821

The Lords Commissioners of the Admiralty having caused various charts to be engraved in this Office, for the use of His Majesty's ships, and being desirous of extending the benefit thereof to navigation in general. This is to give notice that the said charts may be had both wholesale and retail at moderate prices at Mr Fadens, Charing Cross, and at Mr Arrowsmith's, Soho Square, from whom may also be had Catalogues of the said charts, showing the retail prices of each article.

As more charts were, during the course of the late War, mounted on canvas for the use of the Navy, than His Majesty's service at present requires, a large assortment of such mounted charts, marked with their respective prices, will be found at the shops of the beforementioned Agents.

J.W. Croker

Source: TNA, ADM3/197

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Contains numerous examples of manuscript and printed charts from the Hydrographic Department archives

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- MSS 96 Catalogue of the maritime collection of George III, 1828
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- MSS 330 Report on the length of the pendulum at the Equator, 1821
- MSS 342 Translation into English from Danish sailing directions for the Faroe Islands, published from the Royal Sea Chart Office by P. De Löwenörn, 1805. Translated 1820.
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ADM/B/213 1804

- | | |
|--|--|
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| /229 | 1808 |
| /233 | 1808 |
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| ADM/BP/29A | 1809 |
| /29b | 1809 |
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0-999, a1-z99, A1-999, B1-999,

Charts – printed

Old Copy Bundle series

This arrangement of record copies of charts only contains those charts which were numbered in 1839, therefore any chart issued and withdrawn before this date cannot be found in this series.

Cancelled copper pulls

When a chart was withdrawn from circulation before the plates were destroyed a record copy was kept. This series contains 23 charts published by Hurd and 2 by Parry.

Printed charts can also be found in the ‘Original Document series’.

In-letters

Letters prior to 1857 series

Originals letters and enclosures received by the Hydrographer, arranged by surname. A001-A100 are missing but abstracts of a few survive in Historical Index volumes 2 and 3. There is no complete catalogue of the contents.

LP1857A- 44 boxes, 1794-1860
LP1857Z

Surveyors' letters series

Correspondence and reports from surveyors to the Hydrographer. Note how material prior to 1823 is mostly absent from this series.

SL 1a, b, c From Capt. M. White, 1823-9
SL 2 From Cdr. W. Mudge, 1828
SL 3a From Lieut. H.M. Denham, 1829
SL 4 From Cdr. T. Boteler, 1828-9
SL 5 From Capt. W.H. Smyth, 1816-29
SL 7 From Lieut. E.J. Johnson, 1828-29
SL 8 From Capt. J. Moss, 1829
SL 9 From Capt. R. Copeland, 1829
SL 12a From Cdr. G. Thomas, 1825-9
SL 13a From Capt. A.T.E. Vidal, 1828-9
SL 19b Lieut. G.W. Skyring, journal 1829
SL 20a, b From Capt. B. Hall, 1827-9
SL 104 From Cdr. H.W. Bayfield, 1828-9
SL 106a From Cdr. H.W. Bayfield, 1826
SL 101/1 Abstract of correspondence, 1825-33
SL 113 From Capt. F.W. Beechey, 1829

See also the 'Minute book series', 'Miscellaneous letters and papers series' and 'Miscellaneous Papers series' for some abstracts and full letters.

Finding Aids

From the 1960s a series of indexes and abstracts of the older material held within the department were compiled. These are referred to as the 'Historical Indexes' and run to 15 volumes. These should be used with caution as they are in some cases very selective in their arrangement of letters abstracted and subject indexed. The volumes contain references to material no longer found.

- 1 Letters prior to 1857, giving initial letter by surname of writer and identifying number only
- 2 Letters prior to 1857, giving a short abstract

Geographical positions

This series formed the basis of the Hydrographic Department geodetic archive; other positional data can be found amongst the 'Miscellaneous letters and papers series'.

G108 Sir Home Popham, Madeira, watermarked 1817
S25 Commander Pringle Stokes, South America, 1826-8
V6 Lieut. Bullock, Newfoundland, 1820

Memoranda

Miscellaneous letters and papers series

Reports, correspondence and memoranda, including papers from Capt. Parry added posthumously to this series, originally being the forerunner of the jacketing system.

- MLP 2 Dismissal of civilians; receipts; list of instruments, 1823-6
- MLP 3 Survey progress; list of instruments; work received; chart correction, engraving estimates; prices of charts, 1826-8
- MLP 4 Correspondence (Capt. Hurd), 1804-8
- MLP 5 Minutes, regulations and instructions, 1819-23
- MLP 6 Correspondence, 1810-20
- MLP 10 Correspondence, 1812
- MLP 11.1 Correspondence, 1812
- MLP 19 Correspondence, 1828-9
- MLP 23.7 Trinity House notice, 1825
- MLP 56 Papers concerning the career of Capt. Hurd, 1788-1808
- MLP 62 Proposals for chart selling, stock list of charts, 1820-9
- MLP 66 Bound volume of printed Notices to Mariners, 1805-40
- MPL 70 Report on charting coverage, *c.* 1814
- MLP 77 Minutes concerning the Walker family, 1827
- MLP 82 Account of chronometers, 1816-26
- MLP 98 Summary of annual chart sales, 1823-8, 1882-1960
- MLP 107 Notes by Becher on the Hydrographic Office after the death of Captain Hurd (d.1823), 1869
- MLP 118 Trinity House notices to mariners, 1811-1865
- MLP 149 Staff Cdr. Richards note book, 1860s
- MLP 180 Captain Martin White, navigation and surveying notes, 1821
- MLP 183/1 Dalrymple's list of privately published charts and maps held in the Hydrographic Office, *c.* 1802
- MLP 183/3 Parry's survey of world charting, 1827

Minutes

Minute book series

Copies of selected minutes, including some abstracts and full letters, mainly concerning the Board of Admiralty, mainly containing instructions, orders and the personal views of the Hydrographer.

- MB 1 1825-1832
- MB 2 1831-1837
- MB 3 1837-1842

Miscellaneous Papers

This is predominantly ships' remark books but there are numerous letters, sailing directions and other nautical memoranda in this series. Part of this series have been transferred to The National Archives.

- MP30 Letter from Bryden to Hurd, 1815
- Letter from Becher to Owen, 1816

- Report of proceedings on surveys and plans of Canada,
c.1818
- MP33 Letter from Miall to Warren, 1810
- MP36 Lieut. F. Bullock, 'Journal of Chronometers', received
1824
- MP38 Letter from Henderson to unnamed recipient, 1825
Letter from Clinton to Parry, 1828
Letter from Holton to Lords Commissioners, 1828
- MP40 Letter from Arabin to H.O., 1823
Letter from Haynes to Croker, 1814
- MP41 Letter from Owen to Croker, 1811
Letter from Payton to Rich, 1823
- MP46 Letter from Granville to Marsden, 1807
- MP48 Letter from Johnes to Pettman, 1827
- MP49 Letter from Brown to Cockburn, 1823
- MP54 Letter from Hardy to Croker, 1819
- MP55 Letter from Braddick to Croker, 1804
Meteorological register, H.M.S. *Blonde*, 1824-5
- MP57 Letter from King to Messrs Brocklebank, 1827
Letter from Dixon to Parry, 1828
- MP58 Letter from Engledene to Heywood, 1811
- MP61 Letter from Chapman to Hurd, 1817
- MP65 Letter from Robinson to Lucas, 1796
Letter from Rogers to Weir, 1801
Letter from Fellows to Barrow, 1823
- MP68 Surveys by Capt. W.F.W. Owen, 1818
- MP69 Letter from Banks to Hartwell, 1805
Letter from Tuckey to Hartwell, 1809
- MP70 Letter from Horsburgh to Parry, 1828
- MP77 Letter from Griffiths to Hurd, 1812
- MP80 Sailing Directions for the Adriatic by Capt. W.
Symonds, 1830
- MP85 Letter from Head to Hurd, 1820
- MP88 Letter from Croker to Hurd, 1819
- MP89 Letter from Bartholomew to Croker, 1819
- MP90 Letter from Boteler to Croker, 1829
Letter from Willshire to Boteler, 1828
- MP92 Letter from Buckle to Otway, 1810
Letter from Weeks to Croker, 1823
- MP98 Letter from Payne to Parry, 1828
Letter from Colby to Hurd, 1820
- MP99 Letter from Tomkinson to Hurd, 1812
Letters from Broughton to Bligh, 1804
Letter from Smith to Hurd, 1818
Letter from Took to Hurd, 1816
- MP100 Letter from Marshall to Hurd, 1815
- MP101 Letter from Gage to Croker, 1826
- MP103 Nautical survey in the Bay of Brest by Capt. Hurd,
1804-06
- MP105 Letter from Rainier to 'My Lord', 1813

MP106	Letter from Bartholomew to Hurd, 1819
MP107	Remark book for H.M.S. <i>Shannon</i> , from 1807
	Remark book for H.M.S. <i>Racoon</i> , from 1818

Out-letters

Letter book series

Copies of letters sent from the Hydrographic Office by the Hydrographer, or his deputy. Contemporary indexes in the volumes are incomplete.

LB 1	1815-1822
LB 2	1823-1830
LB 3	1830-1832
LB 4	1832-1833
LB 5	1833-1834
LB 6	1834-1836
LB 7	1836-1837
LB 8	1837-1839
LB 9	1839-1841

See also the 'Minute book series' and 'Miscellaneous letters and papers series' for some abstracts and full letters.

Sailing Directions 'Original Documents series'

This is mainly original reports from ships which were then used in the production of sailing directions, however there are some earlier materials which were never published.

OD1	Extracts from the remark book of Capt. Boteler on Barbary Coast, 1828. Capt. Kelly H.M.S. <i>Pheasant</i> observations on islands in Bight of Biafra, 1821.
OD18	Discovery of the coast of Alexander I Land translated from Bellinghausen, 1821. Magellen Straits, Commander Stokes, 1827.
OD35	Reports, 1816-1853 of Telemaque and other shoals, south of Cape of Good Hope by various authors.
OD39	South America observations, H.M.S. <i>Chanticleer</i> , Commander Henry Foster, 1828.
OD51	Arctic Regions, remark book of H.M.S. <i>Shannon</i> , Capt. P.V. Broke, 1807. Possible translation of St Amand's Memoir of the North-West Passage (watermark, 1810).
OD76	Australia south and east coasts and Torres Strait to Timor, Capt. Matthew Flinders, H.M.S. <i>Investigator</i> , 1803.
OD103	Despatches and logs from H.M.S. <i>Superb</i> and H.M.S. <i>Centaur</i> , J.W. King, master, R.N., 1808-9.
OD111	Port Cornwallis, Andaman Islands by Hon. Com. Cornwallis, 1790. Bay of Bengal, Tenasserim and Martaban coasts by Capt. Ross, 1825.
OD124	<i>Scilly Isles An Account of The Tides</i> , Mr Graeme Spence, published 1794.
OD128	Dartmouth to Shoreham, Capt. Sheringham, 1829-1861. A treatise on tides by Lieutenant Mackenzie Jnr., 1782.

- OD130 Tide tables adopted to the marine survey of The Downs by Graeme Spence, 1795.
- OD150 Memoir by Lieut. Daniel Ross of the Bombay Marine on surveys of the China seas, 1813.
- OD168 H.M.S. *Lyra*, 1816-7, Capt. Basil Hall, remarks on China and Korea, also longitude of Madeira.
- OD177 Kuril Islands, Commander Broughton, 1796. Journal of H.M.S. *Providence*, 1796-8. Russian Tartary with pencil note by Z. Mudge.
- OD188 Voyage to New Guinea, Netherlands ship *Triton*, 1828. Translation of either Macklat's or Modera's account.
- OD189 Bristol Channel, Murdock Mackenzie jnr, 1772.
- OD190 Remark book for the River Severn, Capt. White, 1823.
- OD232 Irish coast, from Carlingford to Larne by Capt. White, H.M.S. *Shamrock*, 1823.
- OD260 Unidentified, rough sailing directions thought to be from H.M.S. *Mastiff*, 1832 but watermarked, 1807.
- OD264 North Atlantic, Faroe Islands, 1818, by P Lowenorn of Danish Service.
- OD279 Journal of proceedings of HM Sloop *Discovery* from Kamchatka to Cape of Good Hope, Capt. J. King, 1779-80.
- OD293 Auckland, Campbell and Antipodes islands, Mr Bristow, 1810.
- OD318 Grain Island to North Foreland, Kent, Mr George Thomas, 1825. A report on Fowey by Mr Thomas dated, 1811.
- OD378 St Lawrence pilot, Vol 1 and 2 being the original MS directions by Capt. H.W. Bayfield RN, 1828-55.
- OD445 Directions for Barbary and vicinity of The Canary Islands including the River Gambia, Sierra Leone, Anna Bon etc, West Coast of Africa, Capt. Boteler, H.M.S. *Hecla*, 1828-29.
- OD507 Bermuda, remarks by Capt. J B Warren, 1808.
- OD512 Port Royal and Kingston, directions by Mr A. De Mayne, H.M.S. *Kangaroo*, 1820.
- OD513 Becher's journal H.M.S. *Leven*, 1818-1820 commanded by Capt. Bartholomew.
- OD537 Supplement to the general remark book deposited in the Hydrographical Office November by Commander M. White, H.M.S. *Shamrock*, 1815. Work book by Capt. White, 1821. Covering The Channel Islands and the south coast of England.
- OD537A Log of *Shamrock*, operations in 1822.
- OD541 Soundings in the English and Irish Channels from Beachy Head, Bay of Biscay etc, Capt. Martin White, H.M.S. *Shamrock*, 1817. Includes a work book by Midshipman H.M. Denham.

- OD542A Rough remarks for the survey of the Channel Islands and coast of France by Capt. M. White, 1812.
- OD567 Report on communication and harbours between England and Ireland by Mr McKerlie and Mr Telford, 1808.
- OD698 A report describing certain islands, reefs and shoals in the Pacific Ocean by J.N. Reynolds, 1828. Extracted from American State Papers in the London Library.
- OD775 Remarks on New Zealand, Tahiti, Australia, Torres Strait, India by Commander J.M. Laws, H.M.S. *Satellite*, 1829.
- OD776 West Indies, remarks by Mr J. Napier, Master RN, H.M.S. *Pique*, 1816-17 and *Newcastle*, 1819 and the River Plate from *Snake*, *Wellesley* and *Jaseur*, 1826.
- OD779 Memoir of the construction of charts of Australia with remarks on latitude, longitude and variation, Capt. M. Flinders, H.M.S. *Investigator*, 1801-1803.
- OD785 East coast of America, remarks by Murdo Downie, Master of H.M.S. *Resolution*, c1800.
- OD790 Mediterranean, remarks on various parts. Unsigned and undated but in the hand of Capt. W.H. Smyth RN, c.1820 by watermarks, possibly the basis of his unpublished Mediterranean pilot.
- OD791 Louisbrough to Quebec, directions by James Cook, Master of H.M.S. *Northumberland*, c1760-2.
- OD799 Lake Champlain (Vermont, USA) sailing directions by Capt. W. Chambers, 1779-82.
- OD800 Fair copy of Capt. Chambers Sailing Directions for Lake Champlain, 1779-82.
- OD814 Journal of the proceedings of the Hydrographical Office 30th March to 1st November 1827 by Lieut A.B. Becher.

Receipt ledgers

Mainly charts and surveys received in the Hydrographic Office, with details of atlases, maps and sailing directions. The ledgers contain numerous charts of an earlier and later date than their covering dates suggest

- Book A pre 1827
Note: includes material received in the 1830s
- Book 1 20 October 1826 - 6 March 1839
Note: includes material received in 1816
- Book 2 6 March 1839 – 15 December 1846
Note: includes material received in 1836

Ritchie Collection

Mainly printed articles but includes some correspondence and unpublished draughts

- Box CI.5 Correspondence from Rear-Admiral J.A.E. Edgell concerning the origins of Capt. Hurd, 1961

- Box CI.17 Correspondence from A.W.H. Pearsall, National Maritime Museum, Greenwich, 1961
- Box CI.25 Correspondence from Lt-Cdr A.C.F. David concerning Beaufort's *Karamania* and the use of symbols on charts, 1975
- Box CI.31 Correspondence from Sir Edward Owen Cochrane concerning the 'Owen' punchbowl, 1953
- Box CI.46 Fictional account of Capt. Hurd by G.S. Ritchie, unpublished notes
- Box CI.46 Correspondence from Lt-Cdr A.C.F. David concerning Capt. Hurd, 1999
- Box CII.28 Notes on the equipment of marine surveyors before 1800 by G. Naish
- Box D.22 Correspondence from Ann Parry, 1963 including a transcript of a letter from W.E. Parry to his brother, 1823
- Box H2.15 The role of seafarers in early geodesy by I.K. Fischer
- Box I.1.1 Transcript of a letter from Mr Robert Hodson, 1828
- Box J.8 Military drawing conventions: 1650-1900 by D.W. Marshall, c.1980
- Box J.27 Letter from R.C. Malby, 1985
- Box K.9 Vignettes from Hydrography's Past by R.W. Sandilands, Canadian Hydrographic Service
- Box P Well known Russian navigators by I.P. Magidovich
- Box Q Some notes on the organization of hydrographical services in Portugal until the beginning of the 19th century by A.T. da Mota
- Box V.23 Notes on J.F.W. Des Barres
- Box V.27 Correspondence from Lt-Cdr A.C.F. David concerning chart supply, 1800-1870 (1988)
- Unnumbered Notes on Relations between the Admiralty and the Royal Society during the 18th & 19th centuries by E.J. Widdowson esq., 1950
- British Hydrographic surveys and charting by T.B. Webb, BSc, c.1960

Survey Data Books

Astronomical Observation Books which contain mainly observations for geographical positions.

- 31 Printed tables and errata, Africa and Indian Ocean, Capt. Owen, H.M.S. *Leven* and *Barracouta*, 1825-8
- 32/1 Atlantic, Capt. Foster, H.M.S. *Chanticleer*, 1828 including Dr Tiark's report, undated
- 79 Atlantic Ocean, H.M.S. *Chanticleer*, 1828-30
- 80 Straits of Magellan, Capt. Stokes, et al, H.M.S. *Beagle*, 1826-30

Miscellaneous books mainly containing triangulation observations (bearings, meridian distances and geographical positions).

- 17 West coast of Mexico and Central America, Captains Hall and Foster, H.M.S. *Conway*, 1822-31

- 22 Australia, Capt. Flinders, H.M.S. *Investigator*, 1801-3
- 23 India, Lieutenant Colonel Lambton, Trigonometrical Survey volume 4, 1805
- 24 North coast of Australia, Capt. P.P. King, H.M.S. *Mermaid*, 1819
- 25 Lancaster Sound and Barrow Straight, Capt. W.E. Parry, H.M.S. *Hecla*, construction of charts on voyage, 1819-20
- 26 South Atlantic and Pacific, Capt. Byron, H.M.S. *Blonde*, 1824-6
- 27 South Atlantic and Pacific, Capt. F.W. Beechey, H.M.S. *Blossom*, 1825-8
- 28 North America, Captains Hall and Foster, H.M.S. *Firefly*, 1828-30
- 29 Galapagos, Captains Hall and Foster, H.M.S. *Conway*, 1822-31
- 30 South America, P.P. King, H.M.S. *Beagle* and *Adventure*, 1826-31

Tidal observations

In 1975 the following were held by Tidal Branch. They are no longer in existence, despite searches by numerous people over a space of at least ten years.

- Box B (i) Tide table in Kotzebue Sound, H.M.S. *Blossom*, August to October 1826, Captain F W Beechey.
- Box E Table Bay, 1810
- Box H (vi) Register of tides, Government Wharf, Quebec 1828 by Captain Bayfield with remarks

View volumes

- VF 8K Views of parts of the sea coast of Tierra del Fuego H.M.S. *Beagle*, 1829-30

University of Southampton:

Papers of William Mogg

- AO183/1 *Investigator* journal, 1811-12
- AO183/2 Voyages of discovery to the Arctic under Parry, 1821-5
- AO183/3 *Beagle* journal, 1821-33
- AO184 Notes whilst on *Beagle*, 1829
- AO185 Annotated copies of Fitzroy's *Narrative of the surveying voyages . . . Adventure and Beagle . . . 1826 and 1836 . . .* (London, 1839)
- AO186 Annotated copies of Lyon's *The private journal of Captain G.F. Lyon . . . under Captain Parry* (London, 1824)
- AO187 Abstracts of meteorological information from H.M.S. *Hecla* and *Fury*, 1821-5

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- *Baltic Seas. Directions and remarks for the better navigating those seas. As made and collected by various Naval officers, in the course of service, during the years 1808 & 1809* (London, 1811)
 - *Portulano de la America Setentrional. Construido en la Direccion de trabajos hidrograficos. Divido en quatro partes Aumentado y corre-gido en 1818* (Madrid, 1818)
 - *The annual biography and obituary, for the year 1825 vol. ix* (London, 1825)
 - 'The New Channel' in *The Liverpool Courier* 29 May 1833 (Liverpool, 1833)
- Aspinall, A., ed., *The correspondence of George Prince of Wales, 1770-1812* 8 vols (London, 1963-71)
- Babbage, C., *Reflections on the decline of science in England and some of its causes* (London, 1830)
- Bain, W., Master R.N. 'An essay on the variation of the compass, showing how far it is influenced by a change in the direction of the ship's head, &c, &c' in Royal Institution of Great Britain (ed.), *The Journal of Science and the Arts, no.VII vol.IV* (New York, 1818), 104-12
- Barrow, J., review of 'A memoir on the geography of the north-eastern part of Asia, and on the question whether Asia and America are contiguous, or are separated by the sea; by Captain James Burney FRS, from the *Philosophical Transactions* of the Royal Society' *Quarterly Review* 18:36 (May, 1818), 431-58
- *A chronological history of voyages into the Arctic regions, undertaken chiefly for the purpose of discovering a north-east, north-west or polar passage between the Atlantic and the Pacific, from the earliest periods of Scandinavian navigation to the departure of the recent expeditions under the orders of Captains Ross and Buchan* (London, 1818)
- Barrow, Sir J., *Voyages of discovery and research within the Arctic regions, from the year 1818 to the present time, under the command of the several naval officers employed by sea and land in search of a North-West passage from the Atlantic to the Pacific, with two attempts to reach the North Pole. Abridged and arranged from the official narratives, with occasional remarks* (London, 1846)
- *An auto-biographical memoir of Sir John Barrow, Bart., late of the Admiralty, including reflections, observations and reminiscences at home and abroad, from early life to advanced age* (London, 1847)
 - *Sketches of the Royal Society and the Royal Society Club* (London, 1849)

- Bates, J., *Directions for the Malmo Channel* (London, 1809)
- Beaufort, Capt. F., *Karamania, or a brief description of the south coast of Asia Minor and of the remains of antiquity* (London, 1817)
- *Memoir of a survey of the coast of Karamania; made, in the pursuance of the orders of the Lords Commissioners of the Admiralty* (London, 1820)
- Beechey, F.W., *Narrative of a voyage to the Pacific and Beering's Strait. To cooperate with the Polar expeditions: performed in His Majesty's Ship Blossom, under the command of Captain F.W. Beechey, R.N. in the years 1825, 26, 27, 28* 2 vols (repr. London, 1968)
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- Brenton, E.P., *Life and correspondence of John, Earl of St. Vincent, G.C.B., Admiral of the Fleet, &c. &c. &c.* 2 vols. (London, 1838)
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- Byron, Capt. G.A., *Voyage of H.M.S. Blonde to the Sandwich Islands in the Years 1824-1825. Captain the Right Hon. Lord Byron, Commander* (London, 1826)
- Bullock, Lt. F.W., *Sailing directions. Bonavista Bay* (1820)
- Campbell, R.J., 'The journal of H.M.S. *Beagle* in the Strait of Magellan by Pringle Stoker, Commander RN 1827' in *Four travel journals. The Americas, Antarctica and Africa, 1775-1874*, Hakluyt Society 3rd ser., 18 (2007)
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- Christie, S.H., 'Discussion of the Magnetical Observations made by Captain Back RN during his late Arctic Expedition' *Philosophical Transactions of the Royal Society of London* 126 (1836), 377-415
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- *Memoir concerning the hydrographical map of part of Ægypt* (London, 1801)
 - *Case of Alexander Dalrymple, late Hydrographer to the Admiralty* (London, 1808)
 - *Collection of papers concerning the navigation, winds and weather at the French Islands Mauritius and Bourbon* (London, 1809)
- Debrett, J., *A collection of State Papers relative to the war against France now carrying on by Great Britain and the several other European powers . . .* (London, 1797)
- Dennis, J., *Ample instructions for the barometer and thermometer; containing, particular directions for the marine and house barometers, or weather glasses . . .* (London, 1825)
- Des Barres, J.F.W., *A statement submitted by Lieutenant Colonel Desbarres, for consideration. Respecting his services, from the year 1755, . . . The utility of his surveys and publications . . . intituled, The Atlantic Neptune. - and his proceedings and conduct as Lieutenant Governor . . . of Cape Breton* (London, 1795?)
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