International Hydrographic Review, Monaco, LXII (1), January 1985

PRESENT STATE OF HYDROGRAPHIC SURVEYING OF THE NORTH SEA AND ENGLISH CHANNEL

by Rear Admiral D. W. HASLAM, CB, OBE, FRICS(*)
& F. A. PIELOU, OBE, MA(**)

This paper was originally presented at "Oceanology International", March 1984, Brighton, U.K. and is reproduced with the kind permission of the Organizers, Spearhead Exhibitions Ltd, U.K.

BACKGROUND

1. Ever since man first ventured to sea, he has needed to know not only where he was in relation to the land but also what dangers lay hidden below the surface, and what courses to steer in order to avoid these unseen dangers so as to arrive safely and speedily at his destination — making due allowances for the effects of tidal streams and currents.

2. Because his sea-maps were working documents, usually exposed to a hostile environment, fewer such old records have survived than is the case with old land maps. Undoubtedly, whilst many early voyages of exploration emanated from Europe, it should not be forgotten that in the — to European eyes — "unexplored" parts of Asia and the Pacific, similar voyages were being made. However, as trade developed between Europe and the rest of the world, hydrographic surveyors from Europe began to record the information needed along the various trade routes.

3. Predominant amongst such nations were France, Germany, the Netherlands and the United Kingdom, whose surveyors during the 19th century methodically and conscientiously combed the shallower seas, using the best equipment available to them in order to improve the knowledge gained by the earlier explorers and navigators. When sail gave way to steam, the speed of their surveying work increased, but it was not until the 1930s — when the use of the echo-sounder allowed a continuous profile of depths immediately under the track of the survey vessel to be recorded instead of the spot-depths obtained by the traditional hand-lead and line — that hydrographic surveying methods began to change.

(*) Hydrographer of the Navy, Hydrographic Department, Ministry of Defence, Taunton, Somerset TA1 2DN, U.K.
(**) Superintendent of Chart Maintenance, Hydrographic Department, Ministry of Defence, Taunton, Somerset TA1, 2DN, U.K.

4. Immediately after World War II, advantage was taken of the technological improvements developed originally for non-surveying purposes. The use of electronic positioning systems produced for air navigation enabled hydrographers to fix their position accurately when out of sight of land, and the use of sonar enabled them to search ahead and to either side of their track to check whether dangers lay outside the coverage of the echo-sounder transmissions.

5. But the sonar systems used were designed to search for submarines some distance above the seabed and the acoustic lobes were not suited to seabed searches for natural or man-made dangers; nor was there a proper understanding of the effects of temperature gradients which refract sonar signals as glass does light. It was not until 1971 that the use of side-scanning sonars — designed specifically for hydrographic surveying — enabled surveyors to claim, with more certainty than ever before, that they had located almost every variation in depth of the seabed in the area covered by their surveys.

6. The late 1960s, however, had brought three significant changes in the requirements of a hydrographic surveyor. For the superpowers, the introduction of nuclear-powered submarines produced the need to know — with greater accuracy than ever before — the depths in oceanic waters so that they could operate undetected for long periods on patrol. At about the same time, the closure of the Suez Canal in 1956 meant that the large numbers of tankers needed to supply Western Europe and America with oil from the Middle East had to travel the much greater distance round the Cape of Good Hope; very rapidly the size of such tankers increased; typical draughts doubled from about 12 to 24 metres and, for economic reasons, greatly reduced underkeel clearances were accepted.

7. The third development — the technology which allowed the recovery of hydrocarbons from the seabed — not only changed the requirement of the hydrographers but introduced the need for a completely different type of hydrographic surveyor. The traditional hydrographer was concerned almost entirely with the collection of data necessary to ensure the safety of navigation by the deepest-draught vessel expected to pass through the surveyed area in the foresee able future; he measured the depth, the rise and fall of the tide, the strength and direction of the tidal stream and current, and described the adjacent land masses; he disproved or proved all previously reported dangers and, once he had reached what he regarded as sufficiently deep water (or reached the outer limit of the area in which he could accurately calculate his position), he discontinued his search.

8. With the ability to extract oil and gas from the seabed, however, surveyors were required to obtain geophysical and geological data by seismic means, to fix their positions at very great distances offshore whilst undertaking very large-scale engineering-type surveys of the comparatively small areas where production platforms were to be placed, to survey tow-out routes for platforms of over 120 metres draught, to control the placing in position of such vast platforms exactly on the surveyed, pre-planned site, and to lay very long pipes, of large diameters, from these platforms to a shore terminal. To their basic seamanship and traditional hydrographic knowledge had to be added many new facets of scientific knowledge.

9. When considering the state of hydrographic surveying of any area, therefore, one now has to consider not only the accuracy of the traditional bathymetric data and their adequacy for the use to which they are put, but also the

state of knowledge of the potential marine resources — hydrocarbons, fisheries, minerals (such as sand, gravel and, more valuable, manganese nodules). This paper deals primarily with the aspects of hydrographic knowledge which, traditionally, have been freely exchanged between nations so as to ensure the safety of international shipping and reduce the risks of pollution of the world's high seas. Because of the commercial implications of much of the more recent types of marine research surveying, this is not so freely exchanged — although anything which could effect maritime safety ought to be made freely available to all.

THE NORTH SEA AND ENGLISH CHANNEL

10. Although the North Sea and English Channel form only a small part of the world's oceans, their economic significance has been considerable. The concentration of trading routes leading into North West Europe (including the Baltic), gives the English Channel and North Sea one of the highest densities of shipping traffic in the world. About 1 out of every 10 accidents at sea and half of the world's annual collisions at sea take place off N.W. Europe. As a result of these accidents and of numerous wars and the unsettled and often violent weather patterns, there is a large number of wrecks in the two areas; details are held of about 20,000 such wrecks off N.W. Europe out of a known world total of some 100,000; of these some 8,000 lie in the North Sea. Both areas are very productive fishing areas, with an increasing usage by recreational sailors, whilst over 11 million tons of sand and gravel are taken out of the North Sea alone each year for the building industry. The littoral nations are all well-developed hydrographically and cartographically and all have substantial naval forces, active merchant marines and fishing fleets.

11. Measuring only some 600 miles by 360 miles, the North Sea has a wide range of offshore depths, varying from over 600 metres in the Norwegian Trench to numerous drying banks in the southern part. Most of the area south of about 54°N is relatively shallow and this fact — combined with the very changeable nature of the seabed and the unusually large number of wrecks — makes careful and regular hydrographic surveying most important and, in some cases, vital. Indeed, there is a need for several surveying vessels to be employed in perpetuity in the area from south of 54°N to the western entrance to the Straits of Dover; some critical areas must be resurveyed at least every 12 months and the whole area at intervals of from 3 to 10 years.

12. The English Channel is even smaller than the North Sea, being but some 300 miles in length and narrowing from about 100 miles at its western entrance (from Ushant to the Scillies) to less than 20 miles from Cap Gris Nez to Dover. The depths vary from about 2 metres over banks in the Straits of Dover to the narrow hole, Hurd Deep, where there are depths of as much as 170 metres. Depths in the Dover Strait are now so critical to the VLCCs passing through to Europoort and the Baltic that regular surveys of some parts are needed at intervals of from 1 to 6 years.

13. Much of both the North Sea and English Channel lies outside the limits of traditional, national territorial waters. By 1963, only the areas within visibility

of the coast, or shallow enough for a framework of floating beacons to be used for positional control of soundings, had been surveyed systematically; most of such work had been carried out by hand-lead and line in the 19th century. It was considered that frequent passages by shipping of up to 12 metres draught over the centuries across the central and northern regions of the North Sea (except for the Dogger Bank) and the central and western part of the English Channel had indicated that there was no need for systematic surveys of these generally deeper parts. The surveying effort of the various national offices was used to survey more critical areas of interest to their shipping overseas.

In the areas of the North Sea thought to have more than about 20 metres of water, the depths charted, therefore, were from scattered lines of sounding — many of doubtful reliability. Moreover, on the charts, large areas of the northern North Sea were completely devoid of soundings.

International Co-operation

14. The importance of having charts and navigational publications to enable shipping to navigate their coastal waters and to use their ports has long been understood by most developed maritime states. As early as 1835, Rear Admiral Beaufort, the British Hydrographer, got six other European countries and the United States of America to carry out simultaneous readings of high and low waters in order to compile an international tidal chart of the North Atlantic.

15. So long as a friendly power was willing to undertake the time-consuming and expensive tasks of collecting the data and both publishing and maintaining them in various forms, many countries were only too glad to authorize such collection — even inside their territorial waters. When no such country was prepared to undertake the task or to devote the necessary effort to their data collection, new national hydrographic offices were established.

16. In 1921, the International Hydrographic Bureau (IHB) was established to promote co-operation and to encourage the free exchange of ideas and information between national hydrographic offices and to introduce standardization in surveying and charting. Its 22 founder-Member States included all those bordering the North Sea and English Channel. Headquarters in Monte Carlo were provided by H.S.H. Prince Albert of Monaco and, in 1970, the implementation of the International Hydrographic Organization (IHO) Convention gave the IHB enhanced intergovernmental status. Conferences are held at the IHB every 5 years and there are now 51 Member States which freely exchange their charts and publications. Each realizes that, if there is a danger in its coastal waters, it is in the best interests of the country to inform all mariners of its details since failure to do so could result in a ship — perhaps with a dangerous cargo and of any nationality — striking the danger and causing pollution of the country's coastline and coastal waters.

17. In 1971, to avoid duplication of effort, the limits and contents of two series of small-scale charts of the world's oceans — at 1 : 3.5 M and 1 : 10 M scales — were agreed upon in the IHO. Almost all of these two International (INT) series have now been published. Each sheet is produced by a volunteer Member State and reproduction material of all sheets is available to all IHO Member States — each of which can reproduce these charts, incorporating minimal changes to meet their

own particular national requirements and without having to expend considerable compilation effort, but in the knowledge that, in essential details, the charts agree with the other national versions in use. In 1982, a six-volume series of standardized specifications for charts on medium and large scales was adopted by the IHO Member States; further information is given in paragraph 44 below.

North Sea Hydrographic Commission (NSHC)

18. Neighbouring maritime nations can often benefit from even closer and more frequent contact than is offered by the 5-yearly International Hydrographic Conferences in Monaco. As long ago as 1929, the first experiment in regional collaboration was instituted by Denmark, Finland, Iceland, Norway and Sweden which formed the Nordens Hydrografiske Forbund or the Northern Hydrographic Union. This still holds annual meetings with their venue and chairmanship rotating between the 5 IHO Member States.

19. Even before the prospect of oil and gas from the North Sea became a significant factor, the increasing size and draught of merchant ships was giving some cause for concern at the state of hydrographic knowledge and, in October 1962, Captain (later Rear-Admiral) LANGERAAR — the then Netherlands Hydrographer — convened a conference of the Hydrographers of Denmark, Federal Republic of Germany, Norway, Sweden and the United Kingdom in The Hague.

20. He addressed them as follows :

> "We are faced with a rather grim outlook. Huge areas await modern and consistent surveys and, unfortunately, a large amount of the surveying capacity of the countries bordering the southern coasts of the North Sea must be spent on continuous resurveys of the ever-shifting alluvial sea-bed with shoals and banks that block the entrances to their harbours. Only international co-operation can provide the solution."

21. The six Hydrographers agreed unanimously to form the North Sea Hydrographic Commission (NSHC) with defined aims as follows :

> "The NSHC shall be composed of the Hydrographers of the countries bordering the North Sea and Skagerrak who have given notice of their willingness to participate in — or co-operate with — programmes or joint actions, studies and exchange of information pertaining to the field of hydrography. The Commission shall promote and stimulate the furtherance of hydrographic and related knowledge and science, particularly regarding the North Sea and its entrances. The members shall participate in hydrographic programmes which require concerted action and exchange information regarding surveys, research, new development and technical details as well as organization questions relating to hydrography in its widest sense."

22. Since its formation, Belgium and France have joined the Commission; meetings are held about every 18 months, always attended by the national Hydrographer and one of his staff, each member taking it in turn to act as host and to be Chairman. Observers may also be present and a Director from the IHO attends. All decisions reached have to be unanimously agreed and important ones

are published as NSHC Conclusions. A detailed report is made after each Conference and has to be approved by all members. The 14th NSHC Conference took place in The Hague in June 1983 and the 15th is scheduled in Belgium in September 1984.

Achievements of the NSHC — Surveying

23. At the October 1962 meeting, Rear Admiral IRVING, the then British Hydrographer, expressed the view that it would be quite impossible to plan a complete survey of the North Sea which had any reasonable chance of being completed by the end of this century. All agreed that even the surveyed areas needed re-assessment to consider how accurate and detailed was the original survey, whether the area was liable to have changed since the last survey, and whether all wrecks and other obstructions potentially now dangerous to the deeper-draught vessels had been located and "heighted".

24. The Commission agreed that their co-ordinated efforts should be concentrated initially on defining and surveying the recommended tracks likely to be most suitable for use by deep-draught merchant shipping across the North Sea. It was intended that a pattern of routes within which all shoals and wrecks had been recorded would be shown on the standard navigational charts; it was accepted that, whilst the adjacent areas would continue to be based on earlier, more open-spaced soundings (or, indeed would continue to be blank with no available depths from any source), and would thus be unsuitable for passage by deep-draught vessels, they would continue to be reasonably safe for conventional-draught ships.

25. A pre-requisite to this initial work was a study of the existing state of surveys. It immediately proved very difficult to define the "adequacy" of existing or new surveys in an area of such contrasting depths and seabed conditions. Surveys of the deep Norwegian Trench and of the more stable and deeper northern waters of the North Sea and western part of the English Channel can be to a lower specification and less frequent than those of the southern part of the North Sea and Straits of Dover where depths are more critical and the seabed is less stable. In order to make a start, the criterion was adopted of differentiating only between pre-1930 (i.e. hand-lead and line) surveys and post-1930 (i.e. Echo Sounder) surveys and between "detailed" and "exploratory" surveys. The results were published in the first issue (1963) of the "NSHC Survey Progress Charts" — the contents of which are reproduced — on small scale — in Fig. 1.

26. Using this chart, each nation then consulted its national companies to obtain their views as to suitable tracks required, taking into account not only the shipping requirements but the likely depths, the number of wrecks and the existence of minefields with the associated swept routes used for some years after World War II.

27. After the war, in clearing wrecks from the navigable channels, the criterion used as a safe operating depth was 14 metres. Wreckage was dispersed by explosive charges to give this "safe" depth, with the result that the original wreckage was spread over a wider area, but at depths which are critical to the much deeper vessels now wishing to use the area. To locate and height accurately each wreck or piece of dispersed wreckage is a very lengthy business. On average, at

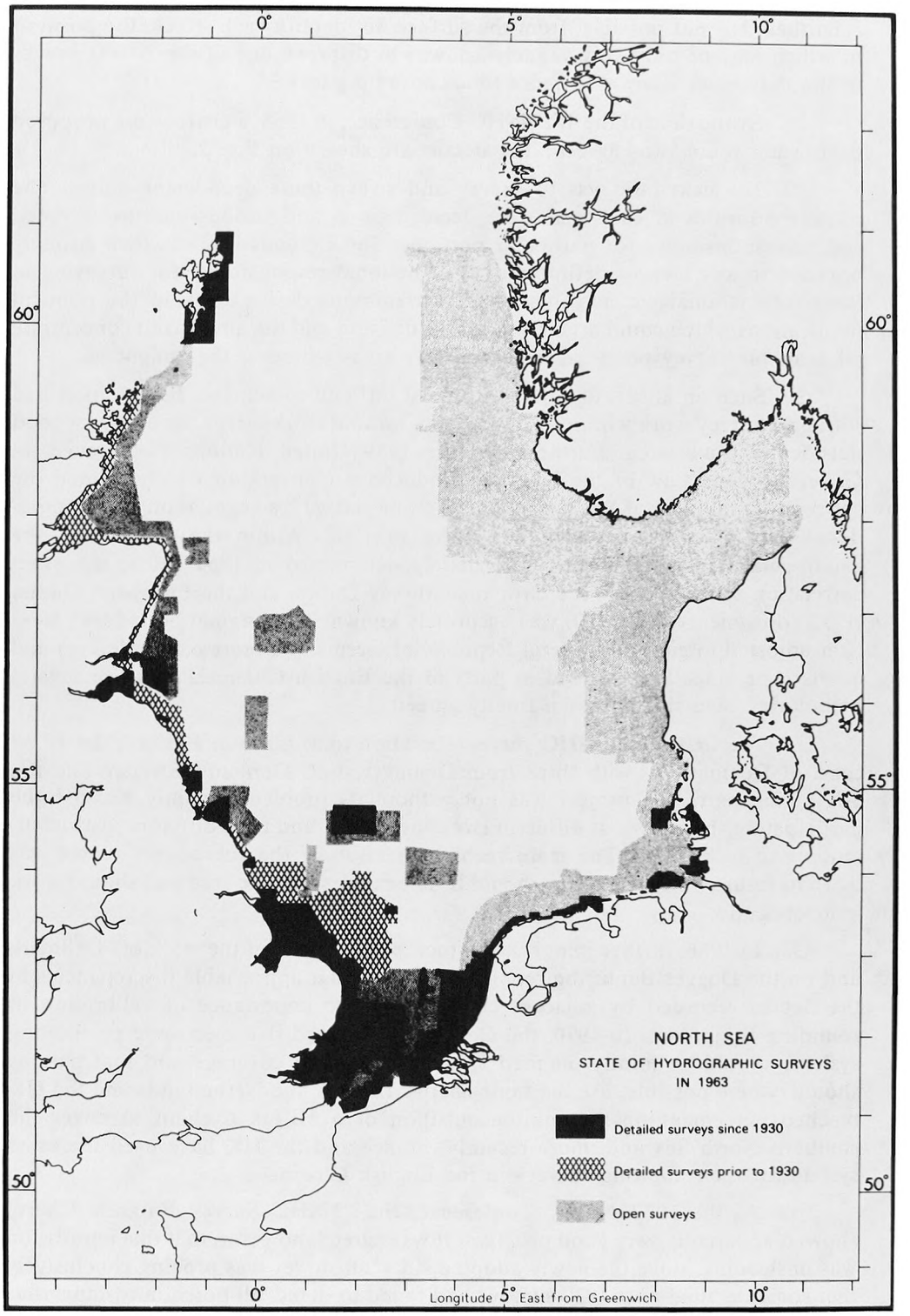
0°
5°
10°
60°
55°
50°
NORTH SEA
STATE OF HYDROGRAPHIC SURVEYS
IN 1963
Detailed surveys since 1930
Detailed surveys prior to 1930
Open surveys
Longitude 5° East from Greenwich

FIG. 1.

least 6 hours (and possibly much longer) is needed to investigate each wreck, and even then it is not possible, from the surface, to identify each wreck, the position of which may be only very vaguely known; to disprove one of the 20 000 wrecks in the data bank is an even more time-consuming task.

28. By the time of the 4th NSHC Conference, in 1966, a chart of the proposed deep-water routes was agreed. The details are shown on Fig. 2.

29. The next task was to survey and sweep these deep-water routes. The relative priorities of each part were decided upon and various nations accepted special responsibility for particular portions. The Commission was then strongly opposed to any idea of defining areas of national responsibility for surveying in these international waters. There was a unanimous desire to avoid the political implications which could arise from such a division and the aim was to concentrate all available survey potential in the priority areas wherever they might be.

30. Such an altruistic objective proved difficult to achieve. Each nation had sufficient survey work within its own waters without working for the common good outside its usual area. Furthermore, the 1959 United Nations Conference, in Geneva, on the Law of the Sea had produced a Convention which defined the concept of Continental Shelf Boundaries to be settled by negotiation and international agreement which came into force in 1962. Within the North Sea, the Continental Shelf Boundaries were mainly determined in 1964 before the exact correlation between the UK's Ordnance Survey Datum and the European Datum (1950 adjustment) (ED 1950) was accurately known. The original boundaries were later adjusted to give the Federal Republic of Germany a more equitable area and others have since been agreed in parts of the English Channel, although several boundaries have still not been finally agreed.

31. The first joint NSHC survey operation took place in 1965 off the N.W. coast of Denmark — with ships from Denmark, F.R. Germany, Sweden and the UK taking part. The project was not without its problems, mainly because the participating ships were of different sizes and speeds and used different instrumentation and techniques. The main recommendation of the subsequent report was that, for future work, each ship should be allocated a specific area and should work independently.

32. In 1966, further joint surveys took place to extend the work off Denmark and on the Dogger Bank; the report highlighted that appreciable discrepancies in the depths recorded by adjacent craft proved the importance of calibration of sounding equipment. In 1970, the Commission agreed that electronic positioning systems should be jointly planned as to location and coverage and that nations should, where possible, use the same chains. In 1976, the Netherlands and the UK reached agreement on the joint acquisition of a Hi-Fix 6 chain to cover the southern North Sea and, more recently, France and the UK have used the same system for their abutting surveys in the English Channel.

33. At the 1977 NSHC Conference, the "NSHC Survey Progress Chart" showed apparently very good progress. It was agreed, however, that this impression was misleading, since the newly adopted sidescan survey was proving conclusively that some detailed post-1930 surveys had failed to detect all potentially dangerous obstructions. As an example, the 200-square-nautical-mile area from Dover to Dungeness, extending from the English coast to the Varne Bank area, when

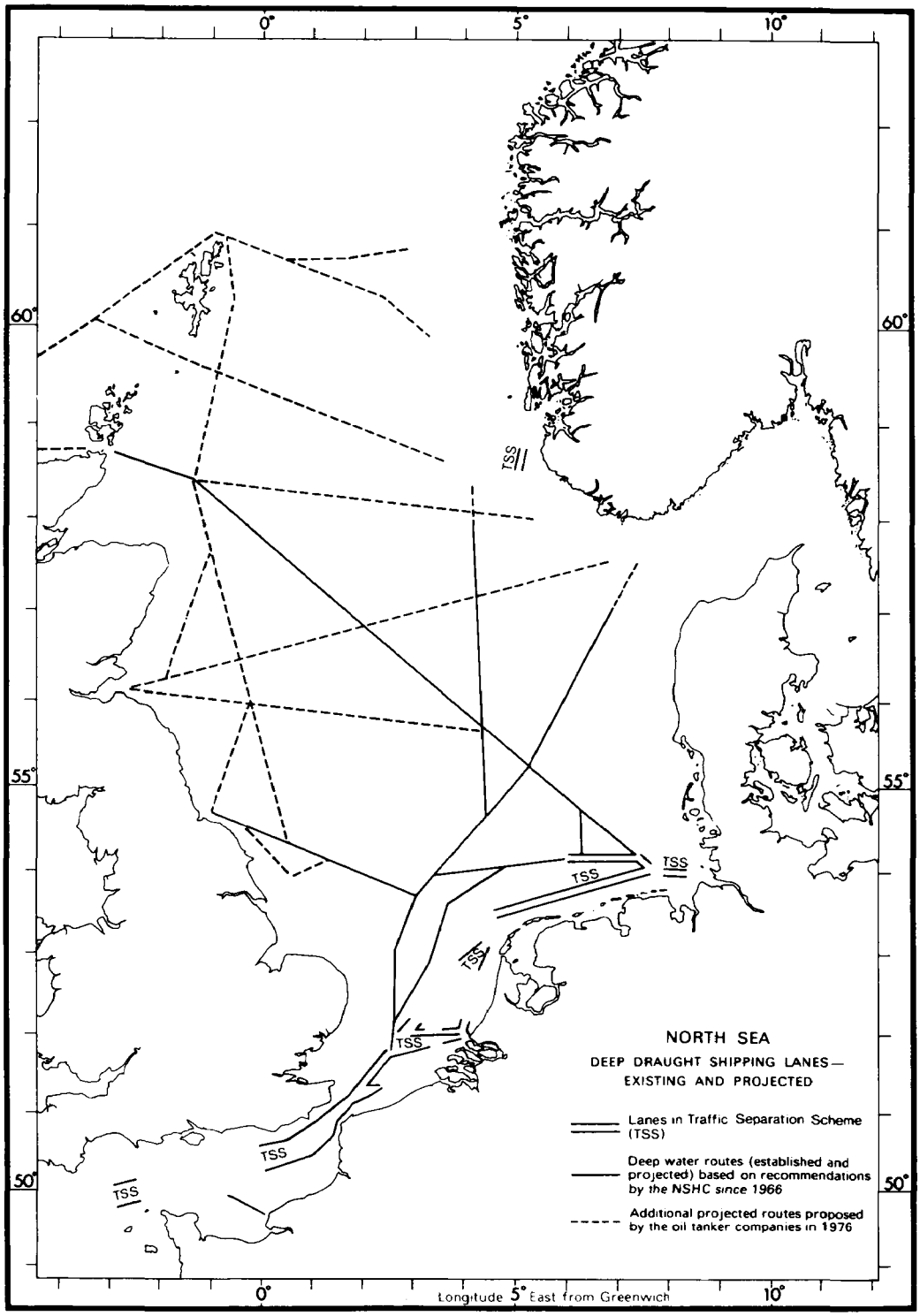
0°
5°
10°
60°
55°
50°
TSS
NORTH SEA
DEEP DRAUGHT SHIPPING LANES—
EXISTING AND PROJECTED
Lanes in Traffic Separation Scheme (TSS)
Deep water routes (established and projected) based on recommendations by the NSHC since 1966
Additional projected routes proposed by the oil tanker companies in 1976
Longitude 5° East from Greenwich

FIG. 2.

surveyed by sidescan sonar had produced some 500 obstructions compared with some 200 revealed in a survey using the best sonar available in 1960/1; many of the newly located dangers in this busy seaway were potentially dangerous to the VLCCs starting to pass along this route.

34. The NSHC, in 1978, therefore, adopted new criteria and two special categories which have been incorporated in subsequent "NSHC Survey Progress Charts" by the use of a coloured overprint. The definition of these categories, i.e. "Changeable areas requiring periodic resurvey" and "Areas which have had an adequate comprehensive survey", are contained in a statement agreed at the 1978 NSHC, i.e. :

(a) "Adequate Comprehensive Survey" is the classification applied to those areas where the existing surveys are of such a standard that detailed re-examinations of the area concerned are unlikely to be required in the foreseeable future. In areas where the seabed is subject to changes, periodic resurveys are required at least every 10 years.

(b) The assessment of "adequacy" of the existing survey is based on professional opinion which takes into account such factors as the general depth and nature of the area, the present and expected future use of the area, the likelihood of wrecks and other obstructions and the limitations (if any) imposed by the techniques used during the survey.

(c) Involved in the use of this classification is the need to review periodically the areas to which it has been applied so as to cater for the possibility of changes in the factors referred to in paragraph (b).

Figure 3 shows — at smaller scale — the "NSHC Survey Progress Chart" adopted at the 14th NSHC Conference in June 1983; this also gives details of part of the English Channel, which, since France joined the NSHC, is regarded as lying within the areas of "The North Sea and its entrances" as defined in the NSHC statutes (paragraph 21 above). Strict applications of the 1978 standards (paragraph 34) inevitably resulted in a large proportion of the existing surveys being regarded as obsolete or inadequate; the relatively small area which has had "adequate comprehensive surveys" is shown on figure 4. Thus, despite the considerable amount of progress which has been made by all NSHC nations since 1963, the present situation is that most of the central and northern North Sea and much of the western part of the English Channel — whilst reasonably safe for ships of conventional draught, i.e. under 12 metres — is still in need of modern comprehensive surveys. Many of the deep-draught routes are now overdue for resurvey of those parts which lie in unstable areas.

36. It must be emphasized that the establishment of shipping routes in international waters is the prerogative of the International Maritime Organization (IMO). It has always been a pre-requisite to the introduction of an IMO Deep-Water (DW) route that a detailed hydrographic examination and sonar check had been carried out along the length of the projected route before it was adopted. However, such a specific requirement has not been a feature of Traffic Separation Schemes submitted to IMO for adoption. Therefore, in November 1983, IMO took action to formally emphasize this aspect and relevant additions are being made to the General Provisions set out in the IMO publication "Ships' Routeing".

ERRATUM

International Hydrographic Review
Vol. LXII(1), January 1985

In the second address of the TRAC IVB (QUBIT) advertisement please read:

Qubit Pty Limited

instead of "Qubit UK Limited".

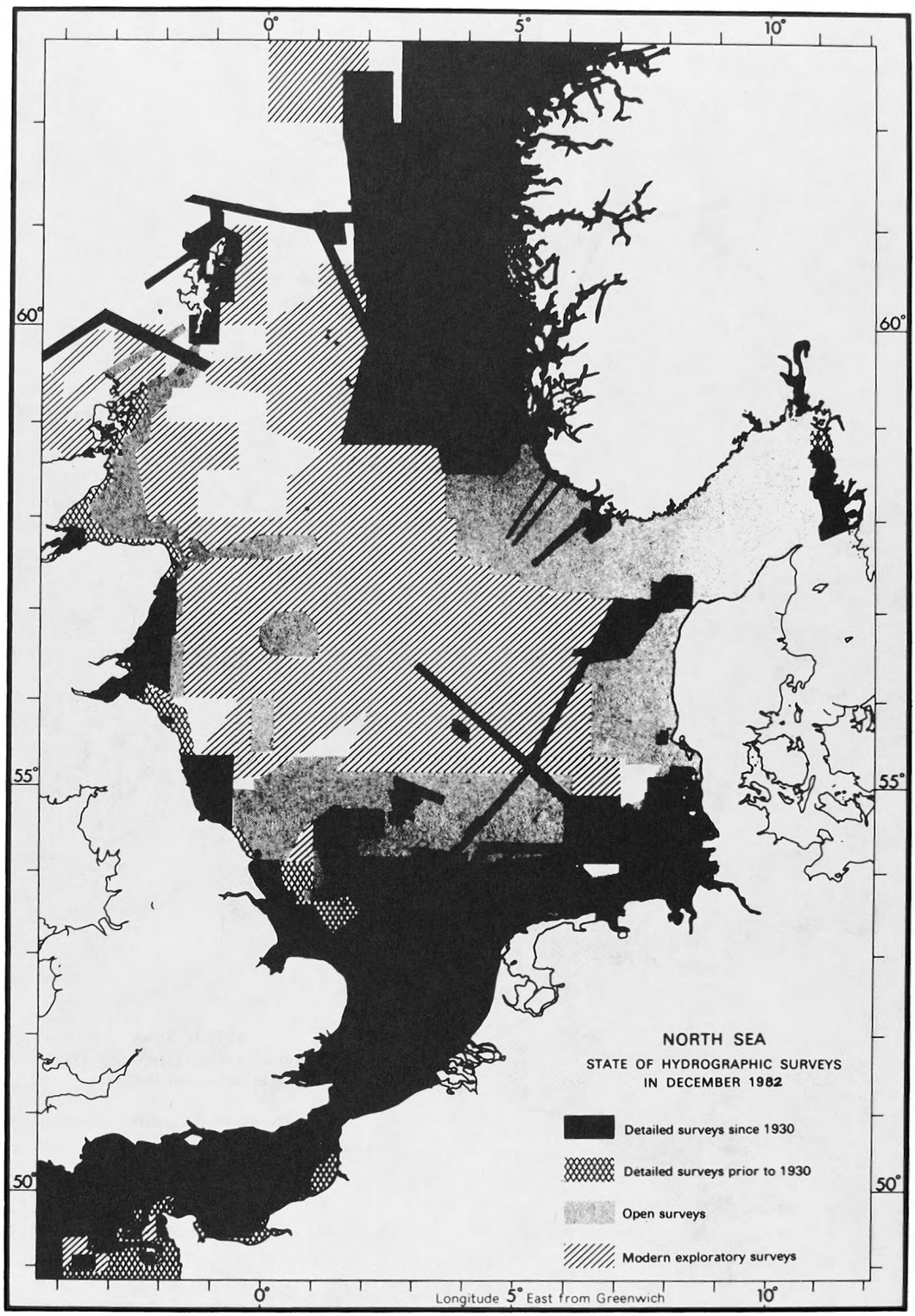
0°
5°
10°
60°
55°
50°
NORTH SEA
STATE OF HYDROGRAPHIC SURVEYS
IN DECEMBER 1982
Detailed surveys since 1930
Detailed surveys prior to 1930
Open surveys
Modern exploratory surveys
Longitude 5° East from Greenwich

FIG. 3.

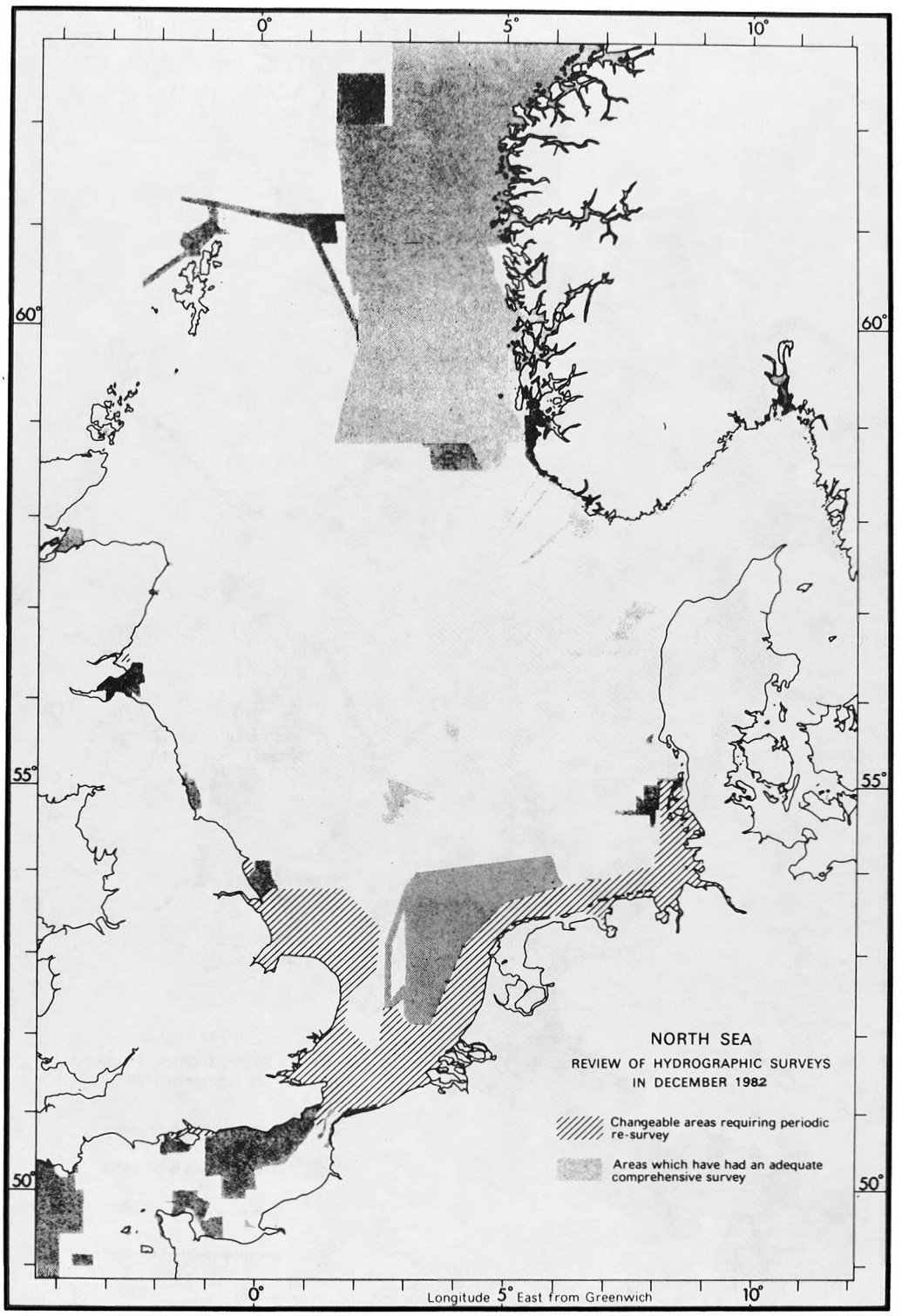
0°
5°
10°
60°
55°
50°
NORTH SEA
REVIEW OF HYDROGRAPHIC SURVEYS
IN DECEMBER 1982
Changeable areas requiring periodic re-survey
Areas which have had an adequate comprehensive survey
Longitude 5° East from Greenwich

FIG. 4.

37. The cost of undertaking surveys for navigational safety is high; much depends on the general depth and the complexity of the area, but a figure of from about £ 1,000 to £ 1,500 per square nautical mile (at 1983 prices) would perhaps not be excessive. But the costs of clearing up any pollution damage and of replacing a VLCC and its cargo are even more enormous.

38. The original pattern of projected traffic lanes compiled by the NSHC has since been considerably modified (see Fig. 2). Ship owners and masters are not always keen to concentrate their vessels in narrow lanes as this increases the risk of collision and it has been hard to bring some of them to a full appreciation of the dangers from uncharted hazards. The mariner tends to place almost too much faith in the accuracy of his chart and not to take into account the adequacy for his purpose of the data on which it is based; he often considers that a chart published by an established hydrographic office in, say, 1983, is fully up to date and therefore adequate for his use. Too often it is not realized that although the chart may well be of recent issue, the data on which it is based may be more than 150 years old, or that an area is left blank on the chart not because it is safe but because there are no soundings to put in the blank space.

Other Achievements of the NSHC

39. A fundamental problem studied by the NSHC in 1963 was the lack of reliable tidal data — on which accurate charted depths depend — in the central North Sea. Valuable offshore observations became feasible when oil and gas drilling rigs and platforms were placed in the area; observations from a total of 152 stations ashore and at sea, in conjunction with a reassessment of hypothetical assumptions and calculations, helped to produce — between 1971 and 1974 — three comprehensive charts of co-tidal lines and tidal ranges in the North Sea. At the 14th NSHC meeting, in June 1983, it was agreed to refine this further from more recent observations.

40. Following discussion at the 1972 NSHC conference, it was agreed that students from all NSHC countries could attend the RN Hydrographic School at Plymouth. Officers from Denmark or the Netherlands have served on the staff of this school for the last 10 years and several exchange appointments have taken place.

41. Each NSHC conference includes wide-ranging discussion of experiences with every type of equipment — from ship-borne systems to those used in the compilation and production of charts — of management matters, communications, and aid to developing nations. All relationships are uniquely cordial and the NSHC family approach has resulted in the common problems of surveying the North Sea and English Channel being progressed much more effectively and economically than could have been remotely possible otherwise.

Charting

42. However effective the surveying co-operation may be, all such work would be useless unless the results are made available in the form of navigational

charts and publications, easily available for purchase and subject to on-going correction through Notices to Mariners and issue of New Editions. At quite an early stage, the NSHC promoted the production of a common series of Fisheries Charts at 1 : 300,000 scale covering the whole of the North Sea. This, in fact, was the first attempt at international charting; the series consisted of 43 charts produced to a common specification and six nations shared in the tasks of compilation, platemaking and printing. Although the series has now been abandoned through lack of demand from the fishermen, the experience gained in its production proved very valuable.

43. When, in 1971 (as described in para. 17 above), the IHO approved the concept of small-scale international charts (1 : 3.5 M and 1 : 10 M), the NSHC made a similar local agreement for three INT charts on 1 : 750,000 and one on 1 : 1.5 M of the North Sea. These were compiled, to agreed specifications, by Denmark, the Netherlands, Norway and the UK, and reproduction material was made available for use by any IHO Member State. In addition — and with NSHC agreement — UK produced a set of 11 North Sea offshore charts at 1 : 200,000 scale to serve the needs of the offshore industry in the vicinity of the extensive exploration and exploitation sites in the North Sea.

44. At the 10th International Hydrographic Conference (IHC) in Monaco, in 1972, a North Sea International Chart Commission (NSICC) was established to study the problems of producing a standard set of medium- and large-scale charts suitable for ocean-going ships operating internationally and worldwide. This involved two main tasks : firstly, the drawing up of comprehensive specifications, setting out charting principles, symbols and abbreviations to be used on charts internationally; and, secondly, as a specimen region, the scheming of a complete set of charts on medium and large scales covering the North Sea, British Isles and Iceland. Completion of this task took 10 years; the very comprehensive specifications, in six volumes, were adopted at the 12th IHC in 1982 and production of the INT charts has now begun with the production of sheets in the agreed regional series by Denmark, France, the Netherlands and the UK. Work has also begun on the regional scheming of similar INT charts in other parts of the world, using the same specifications and principles.