

Met.O. 850

The Marine Observer

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VOL. XLII

No. 237

JULY 1972

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*Letters to the Editor, and books for review, should be sent to the Editor, "The Marine Observer,"
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EXCELLENT AWARDS 1971

Ever since the inception of *The Marine Observer* in 1924, the July number has contained the names of the masters, principal observing officers and, since the war, the radio officers who, by the standard of the meteorological logbooks which they have sent here during the preceding year, have earned the Excellent Award. The list for 1971 appears on pages 95 to 97 of this number and once again we have very great pleasure in congratulating those who are named in it.

The assessment of the meteorological logbooks and the placing of them in an order of merit is a task which is not lightly undertaken. It is always done by a seaman who has constantly in mind the varying opportunities of precise and continuous observations in different types of ships and different trades. He realizes, for instance, that observing in a small two-mate ship in the North Sea equipped with only R/T calls for more effort than observing in a four-mate passenger liner on a fine weather run with the radio office manned 24 hours a day. He marks the books accordingly.

In the year 1971 the highest marks were gained by the following eight ships:

- m.v. *Hertford*, Captain J. M. Burn
- m.v. *John Biscoe*, Captain M. J. Cole
- m.t. *Northern Reward*, Skipper W. Harris
- m.t. *Ross Orion*, Skipper A. Osler
- m.v. *Turakina*, Captain A. C. Rollinson
- m.v. *Prometheus*, Captain F. N. Curphey
- m.v. *Somerset*, Captain J. D. Hellings
- m.v. *Glenfruin*, Captain P. J. Broomfield

This is the eighteenth year in which we have published a 'short list' and it is noteworthy that the *John Biscoe* is making her fourth appearance, the *Hertford* and the *Northern Reward* are coming up for the third time whilst the *Ross Orion* and the *Prometheus* have each appeared once previously. The customary photographs of three top ships appear opposite page 108, *John Biscoe's* photograph appearing for the second time, the previous one being in 1963.

Awards to 'Marid' ships (vessels in the short sea trades taking and transmitting sea temperatures only) and to trawlermen making and transmitting non-instrumental observations are also listed on pages 97-98. Their work seldom hits the headlines but it is not too much to say that without it the forecasters' task and climatological knowledge of both home and Arctic waters would be very much impaired.

The recipients of the awards will, as in past years, be individually notified by letter. If, however, an officer sees his name in this list before he receives the official letter or sees it in a modified list in his own company's house journal, we would be glad if he would write to us here in Bracknell, claiming the award and giving us an address to which he would like it sent. Correspondence is subject to so many delays nowadays and officers, especially radio officers, change ships with alarming frequency; it may be months before a letter catches up with an officer.

The World Atlas has been proved to be by far the most popular award, a close runner-up being a Dictionary. Thus we usually contrive to give an officer an Atlas for his first award and a Dictionary for his second but if any officer qualifying for the first or second time does not want either of these we would be glad if he would let us know and we would send him the book *Lost Leviathan*, by F. D. Ommanney.

L. B. P.

EXCELLENT AWARDS (Year ended 31st December 1971)

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Excellent Awards (contd.)

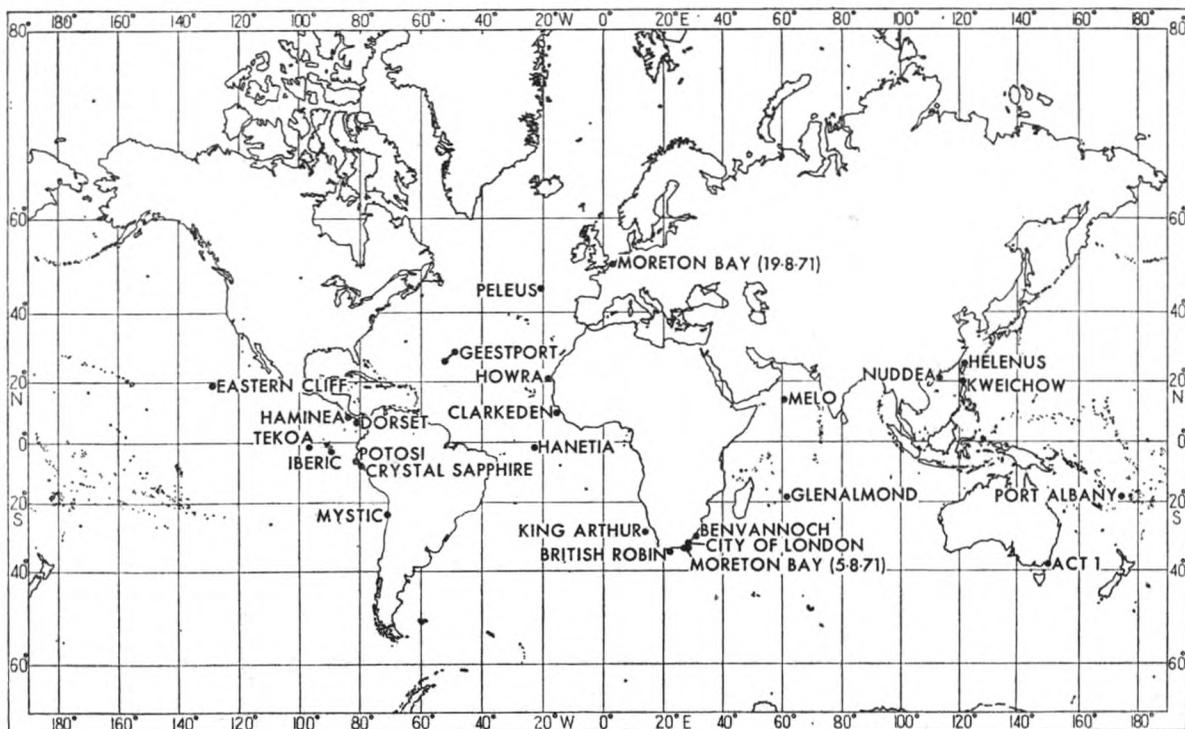
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Position of ships whose reports appear in "The Marine Observers' Log".



July, August, September

The Marine Observers' Log is a quarterly selection of observations of interest and value. The observations are derived from the logbooks of marine observers and from individual manuscripts. Responsibility for each observation rests with the contributor.

Observing officers are reminded that preserved samples of discoloured water, luminescent water, etc. considerably enhance the value of such an observation. Port Meteorological Officers in the U.K. will supply bottles, preservative and instructions on request.

TYPHOON 'ROSE'

South China Sea

s.s. *Nuddea*. Captain A. Dennison. Hong Kong to Singapore. Observers, the Master and ship's company.

15th–16th August 1971. The vessel sailed from Hong Kong at 1000 GMT on the 15th; wind SE, force 6 with a moderate swell. The speed was reduced at 1500 due to heavy weather as the vessel approached Typhoon Rose. Course 172°T at 9 kt; wind ESE, force 9; pressure 999.8 mb, falling to 996.9 mb by 2100. At 2200 vessel to Commander's orders, courses various. At that time the vessel was pitching and rolling heavily; visibility approx. 100 yd and rain set in. During the next hour the wind increased to force 12; pressure 994.7 mb and visibility nil (until 0400) due to rain and sea-water. Vessel still pounding and rolling heavily, engines on stand-by with speed adjusted to keep vessel's head to wind and sea. These conditions prevailed until 0400 on the 16th when the vessel entered the eye of the storm. The wind which had been SE'ly, force 12, ceased suddenly and visibility improved to about 3 miles. Pressure had fallen to 959.0 mb. The sun could be seen occasionally through breaks in the cloud. The sea remained rough but the vessel stopped shipping water and her average roll was only $5\text{--}10^{\circ}$ as opposed to a maximum roll of 28° before entering the eye. At 0545 the vessel was approaching a rain belt. Wind commenced as suddenly as it had ceased, S'E, force 9. Pressure at its lowest, 953.7 mb. Visibility then nil. The vessel was steering with wind approx. 2 points on port bow but was altering course as necessary to keep vessel up to wind. At 0630 the pressure was still 953.7 mb but it then started to rise and was 955.7 mb by 0700. By then the wind had veered to SW and had increased to a sustained speed of over 130 kt. The radar scanner and bridge sun-deck were carried away. The vessel was shipping heavy water for'ard and the bridge windows (height 52 ft) were constantly awash. At 0800 ship's course 230°T ; this course was maintained for the next 5 hours until the weather abated. At 1500 the wind was SW'W, force 8 and the visibility nil due to rain; course altered to 209°T . At 2300 the wind had dropped to force 4. The vessel's position was obtained from a German ship bound for Hong Kong.

Position of ship at 2300 on 16th: $20^{\circ} 11' \text{N}$, $113^{\circ} 49' \text{E}$.

Note 1. Rose developed into a typhoon early on 10th August in about 14°N, 142°E and moved WNW and later NW to cross northern Luzon on the night on 13th/14th. The typhoon continued on a NW'ly course in the China Sea and later curved north to strike the coast in the vicinity of Hong Kong late on the 16th where it caused considerable loss of life and extensive damage, both ashore and afloat. The chief disaster was the capsizing of the Hong Kong-Macao ferry *Fatshan* in which 76 lives were lost. The wind data supplied by the *Nuddea* suggests that Rose attained super-typhoon strength (maximum sustained wind 130 kt or more) on the 16th, although the 'eye' pressure of 954 mb is higher than that usually associated with super-typhoons.

Note 2. The *Nuddea* is a Hong Kong Selected Ship.

TYPHOON 'BESS' at Keelung, Taiwan

s.s. *Helenus*. Captain J. Banna. At anchor. Observers, the Master and ship's company.

The following observations were made in the port of Keelung when the vessel was in the vicinity of Typhoon Bess.

22nd September 1971

GMT

0800: Wind N'E, force 7, occasionally gusting to force 8. Pressure 995.3 mb.

1000: Wind NNE, force 8. Pressure 991.6.

1100: Wind increased to force 10. At 1130 the electrical cables ashore were seen to part in a shower of sparks. A few minutes later green flashes were observed, lighting up the sky (possibly lightning seen through rain or more electrical damage).

1230: Storm-force winds gusting to approx. 80 kt; the windward thermometer screen was carried away so the leeward screen was taken in.

1310: The wind started to veer and decrease to force 9; from 1350 there was a lull which lasted 50 min.

1400: Wind ENE, force 4. Pressure at its lowest, 956.1 mb.

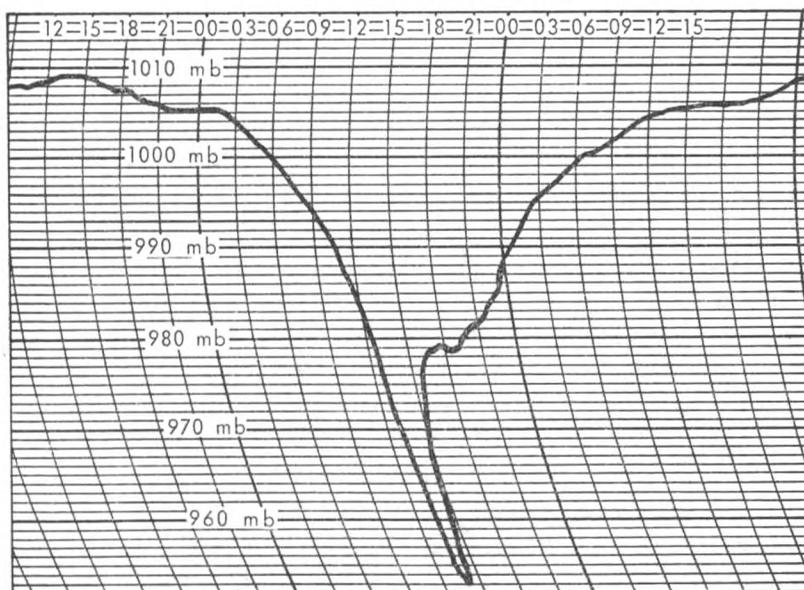
1440: Wind ESE, force 12. Visibility nil in heavy rain.

1600: Wind E'S at 80 kt. Pressure 977.2 mb. Visibility 220 yd.

1800: Wind SE'E at 80 kt. Pressure 979.8 mb. Visibility 550 yd.

2000: Wind decreased to 52 kt and by midnight was 28 kt.

Position of ship: 25° 08'N, 121° 44'E.



Note. Typhoon Bess, born east of the Marianas on 16th September, moved steadily WNW. After temporarily attaining super-typhoon strength from 19th to 20th it crossed northern Taiwan on the 22nd close to the south of Keelung with maximum sustained winds of 100 kt.

VIGOROUS DEPRESSION at East London

m.v. *City of London*. Captain N. A. Perry. In port. Observers, the Master and all officers.

21st–22nd August 1971. The following observations were made while the vessel was moored starboard side to at East London.

LMT

1600: Wind ESE, force 8. Pressure 1013 mb. Port closed; heavy swell across bar.

1700: Moorings parted and being replaced.

1830: Wind ESE, force 9. Pressure 1010 mb.

2030: Wind SSE, hurricane force. Pressure 1008 mb. Torrential rain. Visibility about 40 yd.

2100: Wind SSE, force 10–11. Pressure 1005 mb. Violent thunderstorm.

22nd

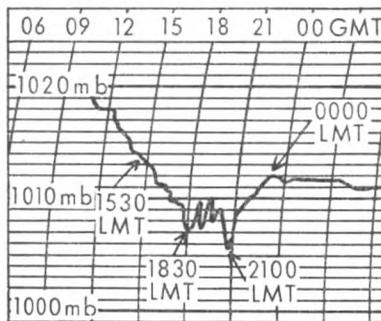
0001: Wind SSE, force 7. Pressure 1012 mb.

0300: Wind NW, force 4. Pressure 1012 mb.

0600: Wind NW, force 3–4. Pressure 1011 mb.

The port of East London remained closed for a further 24 hours due to flood waters coming down the Buffalo River. Gusts of up to 93 m.p.h. were recorded by the Port Office.

Position of ship: 33° 01'S, 27° 54'E.



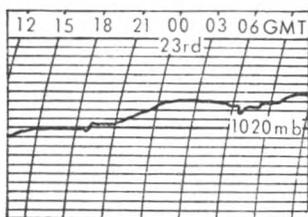
Note. The violent weather was associated with a vigorous depression which further intensified as it moved seawards across the eastern Cape Province coastline late on 21st August. The complex nature of the depression centre is indicated by the oscillations in the barograph trace from the *City of London*. Gales and torrential rainfall affected the coastal belt between Cape Town and Durban, resulting in flooding in many river valleys. On the 21st more than 2.5 inches of rain fell at East London—more than 1½ times the average for the whole month of August.

SUDDEN SQUALLS North Atlantic Ocean

m.v. *Geestport*. Captain D. N. Boon. Dominica to Barry, Glam. Observer, Mr. P. G. Gough, 2nd Officer.

22nd–23rd August 1971. At 1900 GMT on the 22nd a small rain-cloud approached the vessel from the starboard bow (wind E'ly, force 4), giving rise to torrential rain which was so heavy that the clear-view screen was quite unable to cope with the amount of water. The barograph was seen to fall rapidly by 0.5 mb and then rise 1 mb sharply as the cloud passed overhead.

The next day, at 0615, something similar occurred but this time it was more sudden. It was a very clear night with many stars visible. There was some Cb above the horizon but otherwise the sky was perfectly clear except for a small but very dark cloud, base about 1,000 ft. The cloud was approaching the ship from the starboard side with the wind E's, force 3. As the cloud passed overhead there was sudden torrential rain, a little more severe than on the previous day. Pressure was seen to



fall rapidly by 1.5 mb. As soon as the cloud had passed the wind suddenly freshened to force 5 for approx. 10 min and then decreased to force 3 once again.

Position of ship at 1900 on 22nd: $26^{\circ} 18'N$, $52^{\circ} 18'W$.

Position of ship at 0615 on 23rd: $28^{\circ} 55'N$, $49^{\circ} 40'W$.

Note. Squalls associated with westward-moving disturbances in the north-east trades are a feature of the wet season (May to November). These disturbances have the pressure characteristics of temperate-latitude troughs, so that their passage is associated with a fall and then a rise in pressure; the latter is sometimes enhanced by a 'rain-high' effect, a sudden rise in pressure which accompanies almost any tropical downpour. The short time interval between the occurrences reported by the *Geestport* is unusual—they are more commonly separated by 3 or 4 days.

UNUSUAL WAVES

South African waters

s.s. *Moreton Bay*. Captain R. A. Wilson. Fremantle to Zeebrugge. Observers, the Master, Mr. R. T. Wood, 1st Officer, Mr. D. R. Embery and Mr. B. V. Chipperfield, 2nd Officers.

5th August 1971

GMT

0400: Wind w's, force 8–9. Pressure 1005.7 mb.

0500: Wind wsw, force 9–10. At 0505 vessel hove to, heading into wind and sea.

0600: Wind wsw, force 9–10. Pressure 1007.3 mb. Air temp. $15.3^{\circ}C$, wet bulb 10.3° . Position of ship: $33^{\circ} 30'S$, $28^{\circ} 06'E$.

0700: Wind w's, force 11. Pressure 1007.8 mb. Air temp. 15.2° , wet bulb 12.1° .

0800: Wind wsw, force 11. Pressure 1008.8 mb. Air temp. 14.5° , wet bulb 11.5° .

The swell at this stage was from sw'w, varying occasionally, sometimes long but mostly steep with a height of 40–50 ft. The vessel was on half speed, just making headway and keeping the bow up to wind; (normal speed of half-ahead is 11 kt).

0900: Wind wsw, force 11–12. Pressure 1008.7 mb. Air temp. 15.0° , wet bulb 11.1° .

At 0902 we could see a wave 2 miles ahead, towering above the others by 20 ft or so, and when the vessel passed over it the wave was estimated to be 80 ft high, closely followed by another of the same height, estimated as follows. The height of our bridge wing is 70 ft and, as the stern slid down the back of the wave, the crest came level with the bridge wings on both sides and, as it moved astern, was above the heads of those on the bridge. We were regularly experiencing 50–60 ft waves at this time; they were towering over our foremast which is 50 ft above the water level at an average sailing draught. Sometimes the leading edges of these waves were almost vertical and seemed to be about to break (as is seen on surf beaches) which they did sometimes but then only slightly. The after edge of these waves was very long with our vessel being completely on one edge of a wave as we ran down into the trough. Incidentally, our vessel is 745 ft long with 'all-aft' accommodation.

At 1000 the pressure had risen to 1009.7 mb but at 1100 the wind was still wsw, force 11–12. At 1230 we again encountered a wave estimated to be 80 ft high. The wind had lessened to force 10 by 1600 and at 1643 the vessel crossed the 100-fm line. Shortly afterwards the wave just about halved in height; the change was very

sudden and very noticeable. At 1700 the wind was w's, force 9 and the pressure 1013.4 mb. At 1800 the vessel resumed her normal course and was able to start increasing her speed.

Position of ship at 1200: 33° 42'S, 27° 36'E.

Position of ship at 1800: 33° 54'S, 26° 54'E.

Note. During the night of 4th/5th August 1971 a vigorous depression, travelling ESE at about 35 kt, passed southward of the Cape. Those waves generated within the depression, whose speed would probably have been about 40 kt and which were travelling in some E'ly direction, would have remained within the influence of very strong winds for a considerable time, certainly long enough to become fully developed. (Given these conditions of depression speed matching speed of waves moving in the same direction, very rough seas may suddenly occur in any area affected by the depression but more especially in these regions on the equatorward side of the low.) Under the hurricane-force conditions which prevailed at the time of this report, it is not surprising that 60-ft waves were frequently observed and that occasionally wave heights of an estimated 80 ft were reported.

The wave-length commensurate with a speed of 40 kt (estimated) and period of 15 sec (details extracted from the logbook) is about 1,100 feet. The fact that the trailing edge of the large waves were at least 745 ft long (the length of the *Moreton Bay*) indicates that the leading edge, especially at its upper parts, must have been exceptionally steep. The mean slope of the leading edge was probably 1:6 and even steeper towards the crests: an unstable condition in which the crests would break, as sometimes they were observed to do.

It is this feature, the steepness of the waves, which is characteristic of the reports of large waves along the shipping lanes off the SE coast of South Africa (reports which range over a distance of about 250 miles between the latitudes of Great Fish Point and 30½°s). In all reports the waves are running from a sw'ly point, directly opposing the sw-setting Agulhas Current which sometimes runs at 3-4 kt. This 'wind against tide' condition may well go some way towards accounting for these steep waves.

RAPID FALL IN SEA TEMPERATURE **west of Galapagos Islands**

m.v. *Tekoa*. Captain F. S. Angus. Balboa to Auckland. Observers, all deck officers.

9th September 1971. At 1630 GMT the sea temperature dropped to 18.3°C. On consulting the quarterly surface-current chart this would appear to be fairly normal for the time of year but the interesting point is that the temperature dropped with such rapidity. At 1200 it was 23.3° which in itself had been a big drop from 0600 when it had been 26.1°. Between 1200 and 1400 the sea temperature remained steady but then it began a rapid descent to the minimum of 18.3° which remained constant until 1900. This means that in 10½ hours (210 miles) the sea temperature had fallen 7.8 degc which is surely unusual for even this latitude.

Position of ship at 1800: 00° 12'S, 96° 30'W.

Note. Upwelling of cold sub-surface water, produced by the divergence of the Peru Current resulting in strong sea-surface temperature gradients, is a feature of the region around the Galapagos Islands. The *Tekoa* report quotes a gradient which must lie close to an extreme for this area; it can perhaps be explained by unusually strong upwelling.

SUBMARINE EARTHQUAKES **at Antofagasta, Chile**

m.v. *Mystic*. Captain E. H. Gregson. At anchor. Observers, the Master and ship's company.

17th June 1971. At 2105 GMT, while the vessel was lying at Antofagasta, violent vibrations were experienced on board for about 5 sec. Ashore, buildings were seen to shake and were evacuated by the inhabitants. On sailing, the pilot informed us that

the epicentre, magnitude 7, had been at Port Taltal, 106 miles to south of Antofagasta. On passing the area 8 hours later no appreciable increase in swell was noticed.

Position of ship: $23^{\circ} 50's$, $70^{\circ} 30'w$.

South Atlantic Ocean

s.s. *Hanetia*. Captain E. H. Phillips. River Congo to Curaçao. Observers, Mr. C. J. Selfe, 2nd Officer and Mr. A. I. G. Gilchrist, A.B.

5th August 1971. At 0200 GMT severe and violent vibrations were felt throughout the ship which lasted an estimated 4–5 sec. The vibrations coincided with what seemed like a muffled explosion and a definite feeling of the ship rising. It was soon established that the source of the vibrations was not from within the ship; the engine functioned normally with no change of revolutions and steering was not affected. The night was clear with a bright moon, wind ESE at 10 kt and a slight to moderate sea. There was no visible change in the sea surface either before or after the incident. No soundings were obtained from the echo-sounder. The violence of the vibration may be judged from the fact that the barograph pen oscillated several millibars each way and ink was thrown from it.

Position of ship: $2^{\circ} 15's$, $23^{\circ} 20'w$.

Note. Mr. R. C. Lilwall of the Global Seismology Unit, Institute of Geological Sciences, Edinburgh, comments:

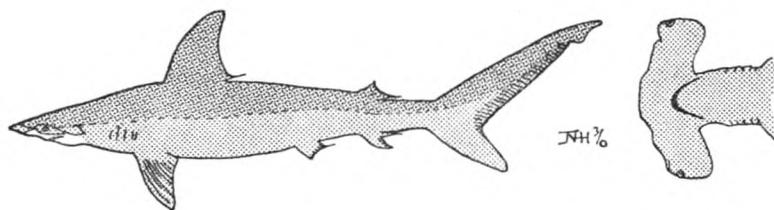
“The vibrations on board the *Hanetia* were probably caused by a magnitude (Mg) 7.0 earthquake on the Central Mid-Atlantic Ridge. The location of this event was $0.9^{\circ}s$, $22.1^{\circ}w$ and the time 01h 58m 51.7s GMT on 5th August 1971. Events of this size are unusual on the Mid-Atlantic Ridge.”

SHARKS

North Atlantic Ocean

m.v. *Howra*. Captain C. R. S. Monk. Durban to Avonmouth. Observers, Mr. J. N. A. Hallmark and all other officers.

4th August 1971. At 1300 GMT, about 46 miles off Cape Doubouchage, the vessel encountered an extensive gathering of hammerhead sharks (*Sphyrna zygaena*) and steamed through it for about 3 hours. The sharks were travelling in groups of two or three, many passing quite close to the ship and surfing in the pressure waves. The



average length appeared to be between 5 and 6 ft and their colouration ranged from slate-grey on the back to a dirty white on their undersides. Some larger specimens of about 7 ft were seen. Each group of sharks was attracted to the ship, turning to swim towards her as she steamed past. All sharks sighted were passively basking on the surface and swimming slowly with the tips of dorsal and caudal fins exposed.

Position of ship at 1300: $20^{\circ} 30'N$, $17^{\circ} 52'W$.

BIRDS

North Atlantic Ocean

s.s. *Peleus*. Captain H. O. Williams. Dublin to Curaçao. Observer, Mr. S. T. Houldsworth, 2nd Officer.

4th July 1971. At approx. 1100 GMT, when the vessel was about 600 miles north-east of the Azores, a pigeon was seen to land on deck. It was given food and water and was very reluctant to leave. (Although the vessel called at Curaçao and passed through the Panama Canal it still remained with us.) The bird was a blue-grey and seemed to be in excellent condition when it arrived on board. On the right leg was an aluminium ring with the symbols 1HU 65 3032; on the left leg was a red rubber band. Wind W'N, force 5-6. Course 234° at 18 kt.

Position of ship: 45° 18'N, 20° 24'W.

Note. Major L. Lewis, M.B.E., Secretary of The Royal National Homing Union Council comments:

"This was in fact an Irish pigeon and it seems strange that a pigeon of the Irish Homing Union should connect up at sea with a ship sailing from Dublin."

Eastern South Atlantic

m.v. *King Arthur*. Captain L. H. A. Bainton. Rotterdam to East London. Observer, Mr. A. J. Stewart, Chief Officer.

4th July 1971. At 0600 GMT, while the vessel was making 10½ kt into a headwind of force 4, an albatross was observed keeping abeam of the bridge. It was 'tacking' from within 5 yd of the bridge wing to about 5 yd off, at all times keeping level with the bridge. There were two swell patterns at the time, a long 20 ft s'ly swell from 3 points on the starboard bow at intervals of 9 sec and a 12 ft swell at 6 sec intervals from ahead. At no time did the albatross seem to be using the wind deflected by the ship, nor did it flap its wings but still made a forward speed of 10½ kt into the 14 kt wind. It kept this up for about 20 min before peeling off after the galley slops.

Position of ship: 29° 40'S, 14° 12'E.

S.W. Indian Ocean

s.s. *Benvannoch*. Captain T. P. Barr. Durban to Bremen. Observers, Mr. D. Sutherland, 1st Officer, Mr. R. Lawrie and Mr. L. Macintosh, Cadets and all deck officers.

22nd-24th September 1971. At 2230 GMT on the 22nd, when about 40 miles south of Durban, a bird similar to a Wandering Albatross was blown viciously against the housing, stunning itself. Upon examination we found that its beak was cracked, broken and bleeding badly. At this time we could handle it quite easily so we removed it to the shelter of the accommodation. Next day the bird was more lively and the beak had stopped bleeding. On approaching it, it made advances to attack and was spitting and hissing at us.

The following day we took the bird out on deck as its beak was healing well and it was full of life. After several minutes' hesitation it ventured over the ship's side and flew away confidently, gliding low over the waves in a NE'ly direction towards the coast. During its stay with us it did not eat anything offered. The bird's beak was yellow, 4-5 inches long with a hook at the end. Wing span was about 6 ft. Plumage: silver-grey body, upper wings brownish-white, under wing silvery grey, head snow-white. The feet were large, yellowish and webbed.

Position of ship at 0001 on 23rd: 30° 54'S, 30° 30'E.

Note. Captain G. S. Tuck, Chairman of the Royal Naval Birdwatching Society thought that this was a Shy Albatross (*Diomedea cauta*).

Indian Ocean

m.v. *British Robin*. Captain A. M. B. Ferguson. Bandar Ma'shūr to Lobito. Observers, Mr. R. Wilson, 2nd Officer and Mr. D. Rundle, Chief Officer.

27th–28th July 1971. We include the following purely as 'an interesting experience' and although the exact details of the central characters are somewhat vague we hope the story contains some points of interest.

Albert the Albatross arrived aboard our ship some time on the 27th and there are several theories as to how he came to be where he was but one thing was certain, his arrival was not intentional and he objected to being on board.

Albert, a Black-browed Albatross (*Diomedea melanophris*) was discovered at 0430 LMT on the morning of the 28th during a slight panic when the ship's engines failed whilst storing at Cape Town. He (or she) was sitting on a lower deck which ran around the midship's housing; he had occupied a position at the for'ard star-board corner of this deck which is only a few feet wide and which was almost totally blocked by Albert's vast bulk.

Obviously everyone on the ship had read stories of how stranded albatrosses have to be launched off a ship because there was plenty of advice on how to launch Albert but not many volunteers to do it. There was also a small snag: it was more than likely that Albert had collided with the midship's housing so there was the possibility that he may have damaged his wings, but the extremely intimidating effect of Albert's large beak and the habit he had of turning his head and fixing the gaze of his evil eye (his black brow gave his eyes the appearance of those of a cartoon villain) on to whoever was nearest precluded any attempts to examine him.

So it was decided to launch him and hope for the best. The Chief Officer, the ship's authority on wild life (he supplied the technical information) volunteered to do the launching. Albert's head was covered with a sack (a safety measure taken to prevent any opening of the Mate's blood vessels) and he was placed on the ship's rail, the sack was removed and Albert was launched.

Whatever information is now in print about launching an albatross it was obvious that Albert had not read any of it because he did not play his part and his large bulk plummeted in an undignified manner to the water. On reaching the water Albert must have decided that it would be safer to get airborne. After a comical mixture of flapping and paddling his huge feet Albert slowly became airborne and, without as much as a 'thank you' or victory roll, he departed.

Position of ship at 1200 GMT on 27th: 34° 54'S, 21° 18'E.

m.v. *Glenalmond*. Captain I. R. Atkinson. Hamburg to Port Swettenham. Observers, the Master and all officers.

24th September 1971. Whilst on evening rounds of the vessel a large sea-bird was observed on the main deck. Although it seemed to be unharmed it was reluctant to be moved and made that known by vicious stabbing with its rather menacing beak. From its beak to the tip of its tail it measured approx. 30 inches. The beak was 3–4 inches long, deep red and pointed; the feet were black and half webbed. The wingspan was approx. 3½–4 ft and on its white body there were black markings round the eyes, wing tips and tail. The most striking thing about the bird was that it had a single deep-red feather protruding from its tail about 15 inches in length. Wind SSE, force 3–4 with a moderate sea.

Position of ship (approx.): 18° 06'S, 61° 24'E.

Note. Captain Tuck identified this bird as a Red-tailed Tropic-bird. (See the following report and the photograph opposite page 109.)

North Pacific Ocean

m.v. *Eastern Cliff*. Captain G. C. Taylor. Panama to Yokohama. Observers, the Master and all hands.

28th July–21st August 1971. At 1300 GMT on 28th July a Red-tailed Tropic-bird was discovered lying on deck with injured legs and wings. It was presumed to have hit the rigging and fallen to the deck. The bird was very ill, excreting excessively and would eat nothing for several days. After the third day it was forcibly fed with chopped squid, using chopsticks and after the sixth day was eating well by itself. Due to apparent recovery by the bird it was placed in the swimming pool on 5th August to encourage it to take off and look after itself. Its feathers became saturated very quickly and it was removed from the pool. After this date the bird's health appeared to decline a little and it was given to Osaka Zoo on 21st August. For the first two days on board the bird had been very aggressive to anyone who approached but after this was amenable to all and allowed, without protest, any handling by anyone.

It appears obvious that the deterioration in condition was due to insufficiency of the proper foods, our stores being only frozen fish and squid with nothing fresh. Bad condition was noticeable especially in its feathers which became very dry with no natural grease. Apart from this and the injuries, the bird appeared to be in a fair state and nowhere near an emaciated condition as reported in the *Japan Times* [newspaper cutting was enclosed].

The bird did, however, appear very distressed at times in port, where the weather was very humid and hot. It was this, coupled with its injuries, which persuaded us to give the bird to Osaka Zoo. Enclosed photograph (*see* opposite page 109) by On Chung Kai, 5th Engineer. At 1300 on 28th July: Air Temp. 22.8°C, sea 22.5°C. Wind NE'E, force 3. Low sea and swell.

Position of ship at 1300 on 28th July: 19° 28'N, 128° 02'W.

Note. The *Eastern Cliff* is a Hong Kong Selected Ship.

Australian waters

s.s. *Act 1*. Captain R. Brownbill. Fremantle to Sydney. Observer, Mr. M. J. Power, 3rd Officer.

23rd September 1971. Whilst approaching Gabo Island several dense groups of birds were seen, all on the surface. As the ship approached one group the birds took off into the force 5 NW'ly wind. What was interesting, however, was the fact that the birds took off into the wind and circled away in a clockwise direction from the outside in. The birds in the centre patiently waited their chance to take off, seemingly oblivious of the approaching danger. When the ship was abeam of the group not all the birds were airborne and some of the birds taking off were seen to hit our deck containers. However, none hit with any force and no damage appeared to be done to any of the birds (or our containers). Obviously the ship and our 3 ft-high container height had robbed the birds of headwind for take-off. The birds appeared to be Short-tailed Shearwaters following a description of these birds given in *The Marine Observer* (July 1971) by the officers of the *Southern Cross* in virtually the same locality.

Position of ship: 38° 04'S, 149° 28'E.

Note. Captain Tuck confirmed that these birds were Short-tailed Shearwaters—returning to breed in the Bass Strait.

Peruvian waters

s.s. *Potosi*. Captain D. J. Houghton. Buenaventura to Pimentel. Observer, Mr. C. G. G. Hawken, 2nd Officer.

25th September 1970. At 1900 GMT an echo on the radar was observed ahead at a distance of 7 miles. The echo, which was approx. 1 mile deep and 2 miles across, turned out to be a very large flock of cormorants circling a large school of porpoise. The school was estimated to be in the region of 500 and was travelling south-east and appeared to be chasing and catching fish. The cormorants, estimated to be

about 5,000, were encircling the porpoises and followed their direction, diving continuously among them to catch the very large shoal of fish being chased by the porpoises. As the vessel proceeded through the shoal, the porpoises and cormorants seemed to lose completely their sense of direction. The porpoises turned into line with the ship and the cormorants circled above the vessel and ceased diving into the sea. After about a mile, the porpoises crossed astern of the ship and continued their chase of the fish in a SE'ly direction. The cormorants resumed diving among the porpoises. An interesting observation was that a flock of about 70 pelicans attempted to enter the large flock of cormorants but were pushed aside and attacked by them.

Position of ship: 6° 39's, 80° 37'N.

Note. This report was received too late for publication last July but is included here because of its similarity to the following report from the *Crystal Sapphire*. Captain Tuck comments:

"There is only one species of cormorant, the Red-legged Cormorant, and one pelican, the Chilean Pelican, along the west coast of South America. I would have rather expected Peruvian Boobies (Guano birds) which are more plentiful in the region."

m.v. *Crystal Sapphire*. Captain D. Patrickson. Salaverry, Peru to Balboa. Observers, Mr. T. M. Tait, 2nd Officer, Mrs. Tait and most deck officers.

14th July 1971. At about 2000 GMT extremely large flocks of assorted sea-birds, pelicans, cormorants and Guano plus many others not identified, were sighted converging on an area of disturbed water. As the vessel neared the area it was ascertained that the cause of the disturbance was a large shoal of fish 6-9 inches in length, together with hundreds of tunny fish and a large school of dolphin (approx. 100) which were milling around and jumping about all within a radius of 100 yd. Some 15 min after passing this area the vessel steamed into a flock of Guano which were sitting on the water, so dense that the sea appeared black over a ½-mile-diameter patch. As we entered this patch, the birds all seemed to take off at once and the air was alive for about 5 min with the sound, similar to hissing, of flapping wings and the splashing of running feet. The noise was so loud that to those on deck and on the bridge the sounds of the engine and all other machinery were drowned out. Wind SSW, force 2. Sea temp. 18.2°C. Course 320° at 13.5 kt.

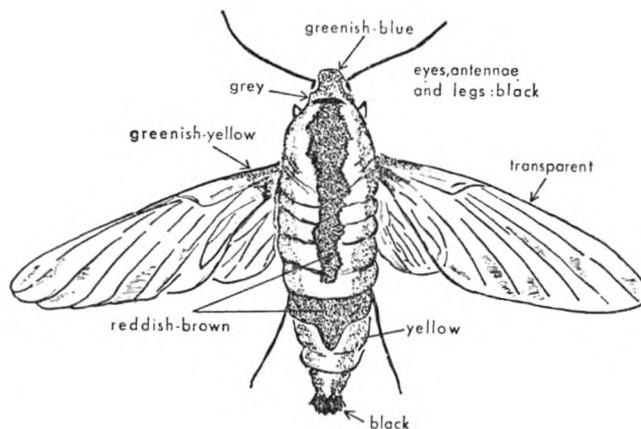
Position of ship: 7° 45's, 79° 54'W.

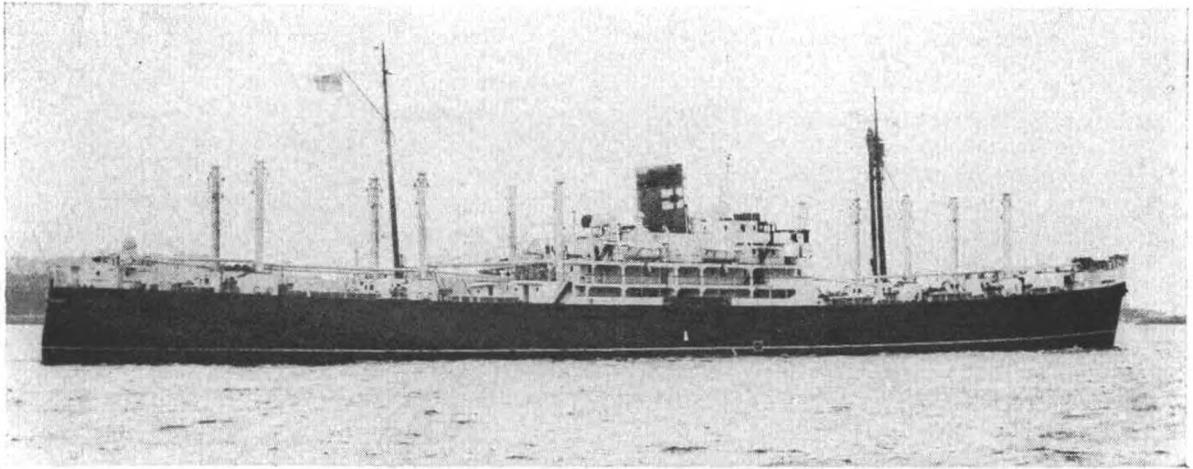
INSECTS

North Atlantic Ocean

m.v. *Clarkedon*. Captain W. Stockley. Monrovia to Glasgow. Observers, Mr. G. MacGregor, 2nd Engineer and others.

26th July 1971. At 2200 GMT numerous moth-like insects landed on the vessel.





Hertford (P. & O. Steam Navigation Co.), Captain J. M. Burn



John Biscoe (British Antarctic Survey), Captain M. J. Cole

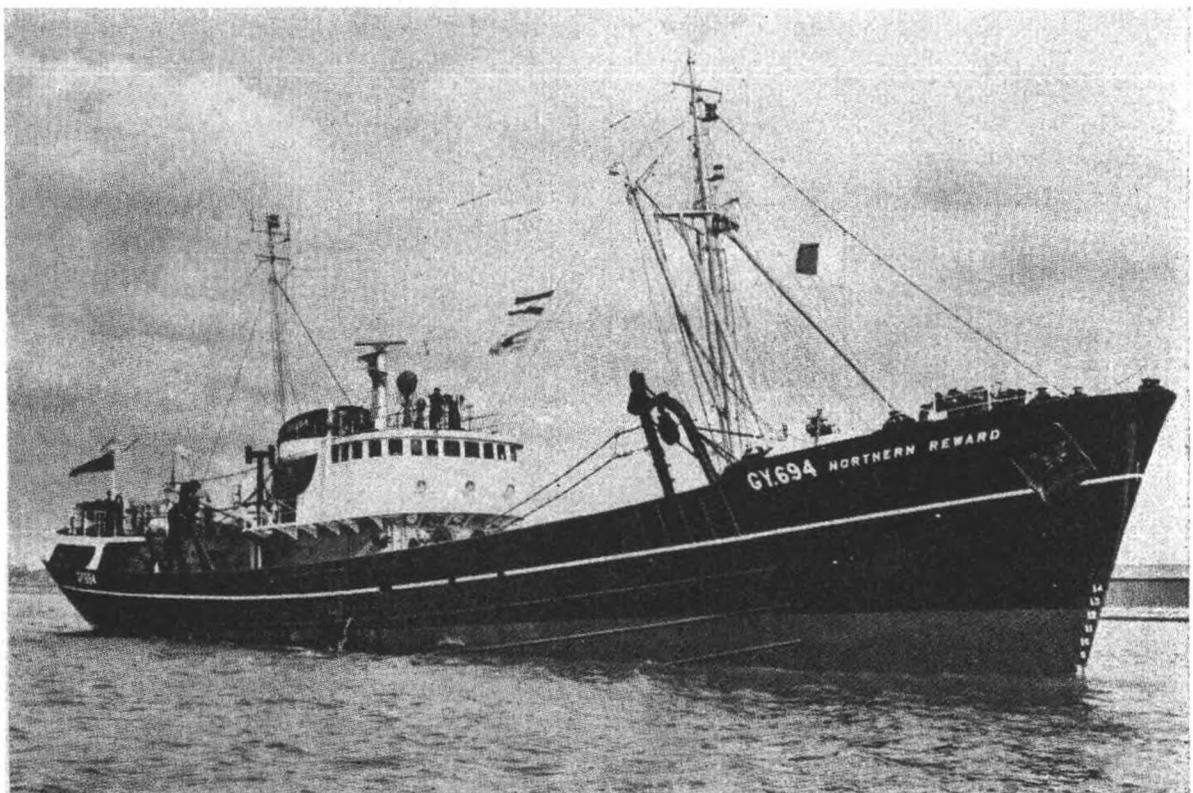
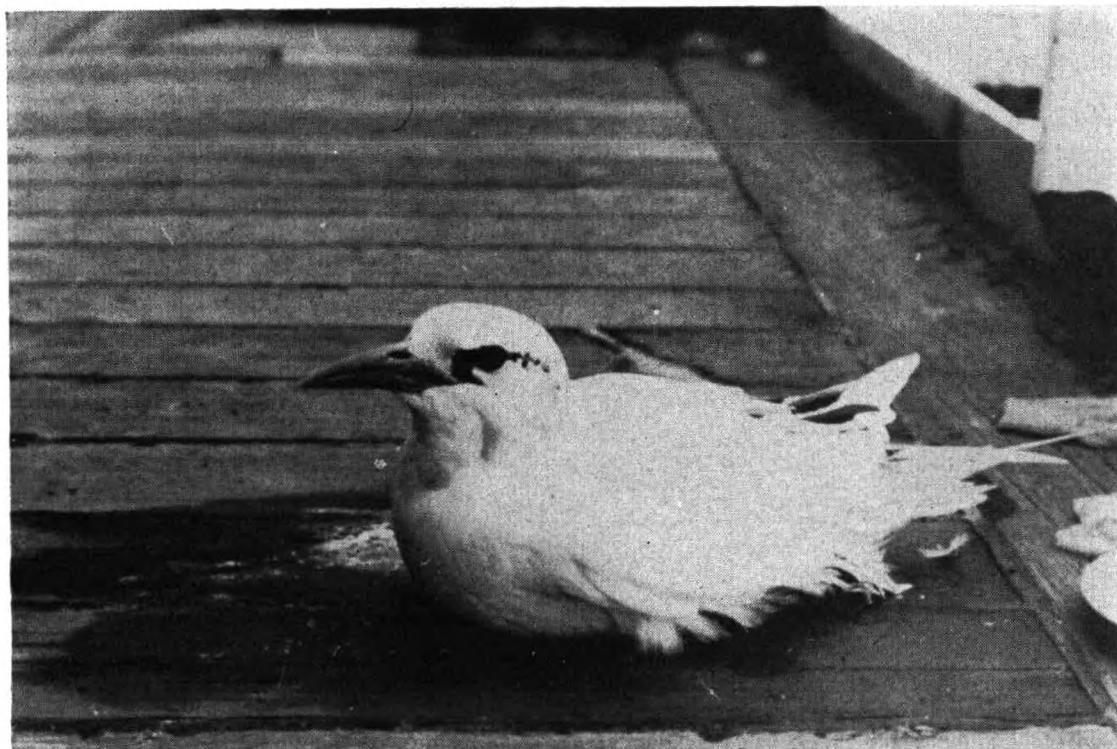


Photo by courtesy of the Trawling Times

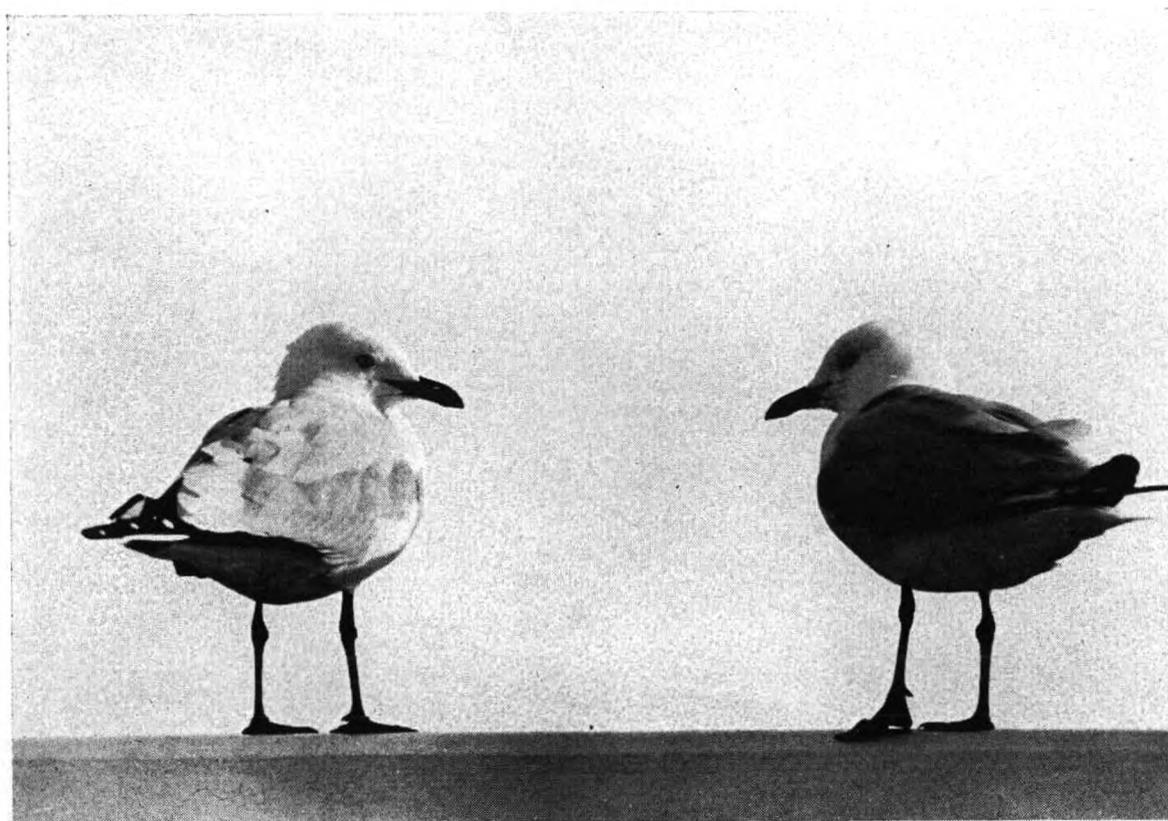
Northern Reward (Northern Trawlers Ltd.), Skipper W. Harris

THE THREE SHIPS WHICH GAINED THE HIGHEST MARKINGS FOR THEIR METEOROLOGICAL LOGBOOKS DURING THE YEAR 1971 (see page 94).

(Opposite page 109)



The Red-tailed Tropic-bird which was found injured on board the *Eastern Cliff* (see page 106).



Silver Gulls (*Larus novae-hollandiae*) photographed on board the *Eastern Rover* by Mr. J. W. Burton while the vessel was in the Bass Strait, May 1971.

An example of one of these insects is shown in the accompanying sketch. The insects varied in size and were accompanied by a smaller insect, brownish in colour and similar in shape and size to the common household blue-bottle, also making the same buzzing sound. The wing span of the larger insect was 54 mm, the length of the body 30 mm and length of its feelers 15 mm. Air temp. 25°C. Wind s'ly, force 4. Occasional rain showers had been encountered previously.

Position of ship: 9° 30'N, 15° 42'W.

Note. Mr. A. Watson of the Department of Entomology, Natural History Museum comments:

"The sketch illustrates a specimen of *Cephonodes hylas virescens* Wallengren, a common African species of Hawk-moth (Sphingidae). You can read more about this insect in Pinhey, 1962, *Hawk-moths of Central and Southern Africa* (Longmans)."

Eastern North Pacific

s.s. *Haminea*. Captain H. G. Sangster. Panama to Los Angeles. Observer, Mr. A. W. Gibbs, Navigating Cadet.

15th July 1971. At 1800 GMT a large locust was captured. Body 4½ inches long, orange-red in colour with black hoops at end of segments. The head was orange with green areas behind the eyes. Legs were orange and pink with green spots on the orange areas. Wings 8 inches from tip to tip, green in colour, turning greyish-brown at tips.

It possibly boarded the ship during passage through the Panama Canal 24 hours previously.

Position of ship: 7° 48'N, 83° 18'W.

Note. Mr. J. Huxley of the Department of Entomology, Natural History Museum, comments:

"This insect is almost certainly a very large grasshopper, possibly one of the species *Eutropidacris*, though unfortunately there is insufficient morphological detail in the description to be certain of the genus. However, I can be confident in saying it is not a locust in the strict sense; the term is often used loosely to apply to any large grasshopper."

Eastern North Pacific

s.s. *Dorset*. Captain S. G. Robinson, M.B.E. Balboa to Wellington. Observer, Mr. C. R. Dalzell, 3rd Officer.

31st July 1971. At 1330 GMT a medium-sized cicada was captured in the accommodation, approx. 2 inches long from head to wing tip (with wings closed), body 1 inch long and ⅝ inch wide. The colouring was mainly green and black in a pattern from the front of the head to about two-thirds along the body where it went into green and black bands to the end of the body which was spade-shaped. Underneath, the colouring was mainly green but again went into bands two-thirds along the body. There were two sets of wings, a small pair slightly longer than the body and a large pair extending ½ inch further, which were transparent with fine hair-like markings and several small dark patches. It had large protruding eyes set into the head and three pairs of legs. The cicada was found by a crew member who applied liberal amounts of strong insecticide to kill it, so, not being sure of action of the insecticide on the insect, it was placed in a solution of water and formalin and, when handed to the Port Meteorological Officer in Wellington 20 days later, appeared to have suffered no visible deterioration. Air temp. 24.6°C, wet bulb 23.8°, sea 27.6°. Wind NW, force 3.

Position of ship: 6° 54'N, 80° 54'W.

Note 1. Mr. L. Hudson, Entomologist at the Dominion Museum in Wellington, wrote to the *Dorset*:

"From the location of the *Dorset* on the 31st July when the cicada was picked up and the

nw'ly direction of the wind, it would appear likely that the specimen was from the middle American, Cuban region. Unfortunately there has apparently been not much research done on the systematics of the cicadas of this region as indicated by the literature. I have placed it provisionally in the genus *Uhleroides* because of its characteristic green coloration, projection of the sides of the pronotum close to the eyes and the peculiar venation of the wings. Eight species of this genus have been described from Cuba and Mexico but I cannot place the specimen picked up by the *Dorset* into any of these descriptions so perhaps it could be a new species. Thank you for the specimen which I have added to our collection."

Note 2. The above report and Mr. Hudson's comments were sent to the Natural History Museum, London. Mr. W. J. Knight of the Department of Entomology comments:

"The information you sent about the cicada taken aboard the *Dorset* is very interesting. Although it is unlikely that such specimens would establish themselves in a new country, it is of value to have specific evidence of their ability to endure long sea voyages."

Eastern South Pacific

m.v. *Iberic*. Captain J. Gunning. Auckland to Panama. Observer, Mr. M. L. Miller, 3rd Officer.

17th September 1971. At 1600 GMT, whilst the vessel was stopped approx. 140 miles from Galapagos Islands, a wasp was found hovering around the wheelhouse. It was placed in a bottle of surgical spirit for preservation. Wind SE'ly, force 2.

Position of ship: 2° 44'S, 89° 08'W.



Note. Dr. Paul Freeman, Keeper of Entomology, Natural History Museum, comments:

"The wasp was of the *Polistes* species, probably *P. major*, distributed from U.S.A. through entire Central and South America. A wasp which nests in colonies ('paper' nest)."

Later Mr. C. R. Vardy of the Department of Entomology asked for further details of the *Iberic's* voyage before reaching the Galapagos Islands as the wasp appeared to be more interesting than was formerly suspected. After we had sent the details from the logbook, Mr. Vardy wrote:

"The wasp has been finally identified as *Polistes jadwigae* Dalla Torre. We have specimens only from China, Japan, India, Tahiti and Hawaii. I have written to the Dutch expert in Pacific and Oriental *Polistes* to ask whether this species occurs in any other of the East Pacific Islands. Meanwhile it would be helpful to know where the *Iberic* was before Pitcairn." (The information was supplied from the logbook).

Atlantic, Indian and South Pacific Oceans

s.s. *Moreton Bay*. Captain B. N. Hinderwell. N.W. Europe to Australia via Cape of Good Hope and return. Observers, the Master and ship's company.

August–October 1971. Forms of common lady-birds were observed to settle on the ship after arrival at Zeebrugge on 19th August. Some information regarding the life span and dietary requirements of these creatures would be most welcome because 7 weeks, 5 ports and 17,000 miles later there was still evidence of a few having

survived, some still appearing active, nimble and obviously not overawed by their achievement.

If you maintain statistics or have access to any concerning lady-birds we would be pleased to know how ours fare in the 'Lady-bird long-life and durability stakes'. Their diet has, of necessity, been limited; in fact it is impossible to think of one single item in the bridge inventory that would tickle their gastronomic fancy. This lack of food, coupled with their having had to resist the violent ministrations of a sadistic Radio Officer, makes our little friends in our eyes extremely resilient, durable and potentially stout support in a crisis. Admittedly they have not been subjected to great extremes of climate, the temperature range in the wheel-house being limited by air conditioning, but the outside temperature has varied between 10° and 30°C. One imagines that greater extremes of temperatures would have killed them all far sooner but it is their lack of sustenance that is remarkable and for that reason we submit this report in all seriousness.

Whether or not the lady-birds have bred aboard is in doubt though some three-quarter-size black versions of the adults have been observed from time to time during the voyage. It was a deliberate move not to nurse or nurture these creatures but to give them a free rein to employ their initiative and resourcefulness, an exercise which we consider to have been completed with flying colours and which we hope might have furthered, through your Office, man's knowledge of this breed. They are creatures that we shall never take for granted again, having become to us intelligent, resourceful, hardy but elusive, enigmatic and rather mysterious. We hope that you will be able to solve the enigma and remove the mystery.

One further point deserves mention: all corpses found have been or appeared to be completely hollow, mere husks in fact, although the colours were still bright.

19th October. A lady-bird observed on bridge wing, very active.

Position of ship on 19th August: 51° 19'W, 3° 12'E.

Position of ship at 1200 GMT on 19th September: 37° 30'S, 132° 42'E.

Position of ship at 1200 on 19th October: 00° 00', 09° 36'W.

Note. Mr. R. D. Pope, Officer-in-Charge, Coleoptera Section, Department of Entomology, Natural History Museum, comments:

"I am interested to hear of the lady-birds coming aboard at Zeebrugge on the date in question. At about that time mass movements of lady-birds were reported from the coast of East Anglia and also near Danzig on the Baltic coast. These movements are thought by some to be evidence for migration, by others to be the dispersal following a population explosion and resulting famine.

"The lady-birds would not have bred while at sea. Although adults can be kept alive for long periods on such things as crushed dates, chopped liver or simply sugar and water, the grubs need insect food such as green-fly in order to develop. The three-quarter-size black versions will have been variants of another species of lady-bird, probably the two-spotted lady-bird.

"I have no figures which would enable me to decide your lady-birds' stamina rating, but I have seen records of them being kept alive for more than two years on an artificial diet. Total lack of both food and water would not give them much of a chance unless the temperature was so low for most of the time that the insects became dormant. Your comment on the hollow corpses would seem to indicate that they died eventually from starvation and water loss.

"I regret that I am unable to be more specific and thank you for the interesting observations."

LUMINESCENCE

Arabian Sea

s.s. *Melo*. Captain J. Morrison. Persian Gulf to Liverpool. Observers, the Master, Mr. A. F. Devanney, 2nd Officer, Mrs. Devanney and ship's company.

30th July 1971. At 2320 SMT, on a moonless night during the sw monsoon, the

whole sea surface took on a milky appearance, an effect which was found to disappear around the vessel when the deck floodlights were switched on. The phenomenon lasted until first light; throughout that time the white horses were still visible and had a slightly phosphorescent appearance.

Nobody on board had ever seen anything like this before, not even the Captain in all his years at sea. As this seemed to be such a rare thing I thought you might be interested to hear about it and have some idea as to what it was, though there was some speculation by my wife that it was to do with plankton and marine life under the sea. Air temp. 24°C, sea 25°. Pressure 1008.5 mb. Wind sw, force 7-8. Good visibility. Partly cloudy.

Position of ship: 14° 20'N, 60° 52'E.

Note. There is no doubt that the observers were witnessing the phenomenon known as 'milky sea' or 'white water'. This is a very distinctive phenomenon, manifesting itself as a bright, even, opaque glow, often extending over vast areas of sea. Mrs. Devanney's speculation that this was to do with plankton and marine life under the sea is not very far from the truth for that is in fact what it is generally believed to be. The main difficulty in getting at the root of the matter is the fact that virtually no planktological analysis has been carried out on samples from an area of white water, for such samples are rarely taken by ships that observe the phenomenon. From time to time we have published similar observations in *The Marine Observer*; one can also find something about the phenomenon on page 19 of the *West Coast of India Pilot* and on page 15 of *The Red Sea and Gulf of Aden Pilot*. Quite the best book on the subject is *The Open Sea: the World of Plankton*, by Sir Alister Hardy, published by Collins and now available as a paperback.

South China Sea

m.v. *Kweichow*. Captain J. N. Bolton. Kobe to Bangkok. Observers, Mr. B. Hibberdine, Chief Officer and Mr. Chan Muk Shai, Q.M.

17th September 1971. At 1150 GMT, while off the Babuyan Islands, the vessel was passing through heavy rain. The wind, previously sw'ly, force 4, had momentarily lulled and the sea, still running, was smoothed by the rain. A blinding flash of lightning occurred followed shortly after by thunder. A few seconds later the sea lit up all around the ship and looked like the dimmed neon lighting used to display living coral polyps in aquariums. The bioluminescence danced and shimmered around the ship. The rain had eased to a moderate drizzle by this time. In the overall lighting effect were stronger patches of light. The whole effect gave the most eerie feeling of steaming through seas lit by flashing, shimmering, subterranean lighting as though somebody had gone crazy with the controlling rheostat! The phenomenon lasted for approx. 1 min.

At 1200 the 3rd Officer noticed that the tip of the whip aerial made fast to the port wing of the bridge at a height of 20 ft was glowing like a neon light. This effect lasted for some 20 min. Air temp. 25°C, sea 29°. Course 234° at 14 kt.

Position of ship: 19° 14'N, 121° 01'E.

Note. The *Kweichow* is a Hong Kong Selected Ship.

ACTIVE VOLCANO

Late Island

m.v. *Port Albany*. Captain G. D. B. Thomas. Panama Canal to Brisbane. Observer, Mr. J. A. Hawkins, 3rd Officer.

24th August 1971. At 1200 GMT when the vessel was about 18 miles north-east of Late Island [in the Tonga or Friendly Islands group] a whitish light was visible,

varying in intensity, high up on the island. On closer approach the cause of the light was seen to result from vapour rising from a crater situated on the west side of the island. The vessel passed within 2.4 miles at 1320 when molten lava became visible, apparently on the lip of the crater. When the vessel was to the north-west and up-wind of the island the oval outline of the crater was clearly defined by a line of broken, molten lava and there was a strong smell of burning wood. The red glow from the lava remained visible for a distance of approx. 30 miles. A radio message was sent to OBS METEO NANDI via Suva Radio.

Position of ship at 1200: $18^{\circ} 36'S$, $174^{\circ} 23'W$.

Position of ship at 1320: $18^{\circ} 45'S$, $174^{\circ} 41'W$.

Note 1. This report was sent to the Hydrographer of the Navy with reference to the *Pacific Islands Pilot*, Vol. II, 9th Edition, p. 424.

Note 2. The *Port Albany* is an Australian Selected Ship.

AURORA

The following notes have been received from Mrs. Mary Hallissey of the Aurora Survey:

"Listed briefly below are reports from British ships of aurora observed during the three months July–September 1971.

"The dates when geomagnetic activity reached a figure above the half-way mark in the 10-point scale were 21st, 26th July, 17th August, 17th/18th, 25th and 26th/27th September, but on no occasion was the high figure maintained for more than a few hours and the monthly mean of solar activity followed an unusual downward path from July to October. The only sunspot of notifiable magnitude was visible between 17th and 30th August.

"Auroral displays, however, were more evident during September than these figures might lead one to expect. The brilliant display in the early morning of 18th September, reported and sketched by observers in the *Gladys Bowater*, was seen at the same time and in the same form at Wick meteorological station, but unfortunately was hidden by cloud from the weather ships at points between.

"A bright display, seen in the Western Atlantic on 20th September, was reported from the *St. Margaret* and the *Afghanistan* (plus sketches) and from the U.S. weather ship at Station 'Bravo'. Only a glow between cloud was visible in the north of the British Isles on that occasion.

"On 24th/25th September aurora was plotted from reports from the *Manchester Crusade* off the west coast of Newfoundland, from an aircraft east of Newfoundland, the *Gladys Bowater* in mid-Atlantic, the *Weather Surveyor* at Station 'India' and from meteorological stations in Scotland.

"On 26th/27th September there was a large-scale display again reported in detail from the Western Atlantic and over the British Isles. Sketches from an observer in the *Afghanistan* show evidence of the classic forms and behaviour of the display. No colour seems to have been noted.

"The report made by observers in the *Cape Howe* of an iridescent patch seen at 2020h on 7th September referred to a rocket fired from South Uist. It was widely reported, though this is the most southerly point of observation recorded here.

"A report has been received from an observer on the *Ross Orion* for 14th January 1972, and although this is outside the period covered by these notes, we thought perhaps a reply might be appreciated to the query as to whether the sighting was of a possible halo. The ship was off N.E. Iceland and the time 0800 GMT. Mr. Paton writes, "The moon was at 5° elevation in the south-east and only 0.05 illuminated so this could not have been a lunar halo. The sun was not very far below the horizon but it is difficult to see how it could produce a halo in the north-north-east. The ship was in the auroral zone and, though magnetic activity was slight, this may have been a weak aurora."

"We greatly appreciate the variety of your reports and sketches and would like to say again how grateful we are for the time and trouble that you take on our behalf."

DATE (1971)	SHIP	GEOGRAPHIC POSITION		Λ	Φ	I	TIME (GMT)	FORMS
6th Aug.	<i>Weather Monitor</i>	58°44'N	19°22'W	070	65	+72	0100-0200	N
15th	<i>Manchester Crusade</i>	54°00'N	48°00'W	030	64	+75	0001	N
20th	<i>Manchester Crusade</i>	54°45'N	43°20'W	040	64	+74	0300	N
22nd	<i>Manchester Crusade</i>	56°24'N	21°06'W	060	63	+71	—	N
16th Sep.	<i>Weather Surveyor</i>	58°58'N	18°47'W	070	65	+72	2310-0002	P
17th	<i>Weather Surveyor</i>	58°58'N	18°47'W	070	65	+72	0045-dawn	HA, N
18th	<i>Gladys Bowater</i>	48°38'N	59°33'W	010	60	+75	0130-0413	RB, RR
	<i>Weather Surveyor</i>	58°57'N	19°24'W	070	65	+72	2240-0145	P, N
20th	<i>Afghanistan</i>	E. of Belle Isle		020	63	+75	0230-0600	HB, RB, N
	<i>St. Margaret</i>	50°00'N	61°51'W	010	61	+75	0300-0400	RB, RR
	<i>Weather Surveyor</i>	59°00'N	19°25'W	070	65	+72	2245	N
21st	<i>Weather Surveyor</i>	59°01'N	19°25'W	070	65	+72	0140-dawn	N
23rd	<i>Weather Surveyor</i>	58°40'N	19°10'W	070	65	+72	0140-dawn	N
24th	<i>Northern Reward</i>	66°45'N	17°30'W	080	72	+77	2020-2200	P
25th	<i>Manchester Crusade</i>	50°00'N	59°50'W	010	61	+75	0330-0600	HA, P
	<i>Gladys Bowater</i>	55°35'N	43°42'W	040	65	+74	0340-0410	SB
							0530-0540	RR
	<i>Weather Surveyor</i>	59°00'N	19°10'W	070	65	+72	0345	HA
26th	<i>Weather Surveyor</i>	59°00'N	19°02'W	070	65	+72	2038-2110	RB, P
	<i>Afghanistan</i>	53°28'N	43°30'W	030	62	+73	2300-0200	RA, RB, RR, P
	<i>Manchester Crusade</i>	—	—	—	—	—	—	N
27th	<i>Manchester Crusade</i>	55°41'N	36°00'W	050	64	+72	0100-0500	N
	<i>Weather Surveyor</i>	59°00'N	19°00'W	070	65	+72	0345-0500	N
29th	<i>Weather Surveyor</i>	59°05'N	18°50'W	070	65	+72	0145, 0445	P, N

KEY: Λ = geomagnetic longitude; Φ = geomagnetic latitude; I = inclination; HA = homogeneous arc; HB = homogeneous band; RA = rayed arc; RB = rayed band; R(R) = ray(s); P = Patch; V = Veil; S = striated; N = unidentified auroral form.

North Sea Storm Surges

By R. D. HUNT, B.Sc.

(Meteorological Office, Bracknell)

Definition and generation of a surge

A storm surge can be defined as a change in sea-level due to meteorological causes, a rising of sea-level being called a positive surge and a lowering being called a negative surge. They frequently accompany the passage of a depression over or near to a sea area and can last for a period of between one or two hours and a few days. They can occur in any sea region, although most serious surges occur in shallow seas which are either partly or completely enclosed, and their presence is detected by discrepancies between the astronomically-predicted tidal heights and those actually observed.

The two meteorological forces most important for the development of surges are, firstly, the tractive force of the wind on the water surface which is proportional to the square of the wind speed and which results in water being dragged in the general direction of the wind, although being deflected to the right of the wind direction in the northern hemisphere by the rotation of the Earth, and, secondly, the effect of changes in atmospheric pressure on the water surface. If the air pressure is reduced then the water surface rises, a fall of pressure of 1 mb being accompanied by a rise in the water surface of 1 cm and vice versa. Of these two effects, the wind effect and the static pressure effect, the former is, on the whole, the more important in shallow seas.

Once having been generated, the surge is propagated according to appropriate laws of motion and if it reaches a coast and is sufficiently large and positive then flooding may occur in certain circumstances as was the case, for example, on 31st January and 1st February 1953 when flooding was disastrous on the coasts of the Netherlands and eastern England (Grieve¹). Alternatively, if the tide is lower than was predicted astronomically, i.e. in the case of negative surges, then serious navigational problems can arise in shallow-water areas with the possibility of large ships running aground. Another point concerning surges in general is that in shallow water the effects of bottom topography become much more noticeable and the surge profile is modified considerably wherever the height of the surge is not negligible compared to the total depth of water, such as near beaches.

To measure the height of a surge, the height of the astronomical tide must be subtracted from the total water height, leaving just the effects of the meteorological forces. Thus surges are measured in terms of 'residuals', the residual at a point being the difference between the observed tidal height and the astronomically-predicted tidal height at that particular point and time. As an example of the height a surge can attain, residuals of over 12 feet were measured during the 1953 surge in parts of the southern North Sea.

Surges in the North Sea

For most purposes the North Sea can be considered as a closed, rectangular basin with shallow water at the closed southern end and somewhat deeper water in the north, where the sea opens into the Norwegian Sea. Frequently, a surge is generated to the north-west of Scotland and propagates into the North Sea in the form of a progressive long-wave, being modified as it does so by local winds, local coastal features and, particularly on reaching the shallow southern North Sea, by surge-tide interaction. The effect of Coriolis force is to cause the wave to travel anti-clockwise round the North Sea, affecting firstly the east coast of Britain as it travels southwards and then on to the Belgian and Dutch coasts. It can sometimes still be

identified as it reaches the Norwegian coast. The speed of the surge is about the same as that of the astronomical tide which, being a similar long-wave feature, is propagated in a similar fashion. It takes about 27 hours for the surge to travel from Aberdeen to Bergen on the Norwegian coast.

The effect of wind stress is to pile up the water at the leeward end of the sea so northerly and north-westerly winds blowing over the North Sea not only tend to increase the total amount of water in the sea by forcing it to enter at the open northern end but also to pile up water at the closed southern end. As mentioned above, the water is deflected to the right of the wind direction and so north-westerly winds also have the effect of raising the sea-level on the east coast of Britain.

One point which should be mentioned here is that the southern end of the North Sea is not completely closed. The narrow Straits of Dover act as a small but important outlet for excess water during positive-surge conditions in the south of the sea.

The most common kind of positive surge is a combination of the two effects described above, partly caused by the propagation down the east coast of a surge generated outside the North Sea and partly caused by wind effect within the North Sea. On some occasions, however, positive surges develop entirely within the North Sea, either in the extreme northern part (although it is difficult to distinguish these from the first type) or in the southern part with water forced westwards against the south-east coast of England.

The propagation of negative surges is somewhat less easy to explain. A wind over the North Sea from between south-westerly and south-easterly in direction causes a general lowering of sea-level. If the wind field is uniform over the whole sea then the negative surge appears to occur almost simultaneously at coastal points in the southern North Sea, i.e. there is little evidence of southward progression. On the other hand, a southerly wind blowing only over the northern part of the sea produces a negative surge there which does appear to propagate southwards down the east coast in a similar fashion to a positive surge.

Surge-producing meteorological situations

The meteorological situations which tend to produce surges in the North Sea have been described in some detail by Keers² and earlier by Corkan.³ However, a summary of them would be in order here. The most common situation for producing a positive surge is a depression moving eastwards between Scotland and Iceland and then either continuing eastwards towards Norway or turning south-eastwards into the North Sea. This situation is characterized by southerly or south-westerly winds over the North Sea which veer to between westerly and northerly behind the south-eastwards passage of a trough down the British east coast. A steady north-westerly wind blowing for many hours or even days over a large part of the sea is a second situation which can give rise to a positive surge. A third situation is a strong wind from between east and north-east blowing over the Thames Estuary and Flemish Bight regions. In this relatively rare case the surge is restricted to the coast of south-east England and, in particular, the Thames Estuary.

Negative surges are most commonly generated by strong winds between south-westerly and south-easterly blowing over the sea and, therefore, often precede the positive surge type caused by the eastwards passage of a depression to the north of Scotland. A negative surge caused by south-westerly winds ahead of a trough is followed by a positive surge after the winds have veered behind it. A depression slow-moving to the west or north-west of the British Isles is another favourable situation for negative surge development with south-westerly winds possibly lasting for several days and, in this case, the negative surge may not be followed by a positive surge.

The effect of surge-tide interaction is to create a tendency for the positive surge peak, i.e. the greatest residual, to occur on the rising tide and rarely at high tide, as was shown, for example, by Keers.⁴ The surge height generally falls quite rapidly

towards the time of astronomically-predicted high water. Now for flooding to occur at a particular place, there must usually be a large residual of several feet occurring at high water. The main effect of surge-tide interaction is, then, to decrease the likelihood of a particular surge causing flooding in coastal regions where the water is shallow and this effect is important. (The size of the residual required to produce flooding, however, depends on the height of the astronomical tide, and so, in cases of very high astronomical tides, only a small residual at high water may be sufficient.)

An example of a surge occasion is shown in Figs. 1 and 2. The first of these charts shows a depression to the north-west of Scotland at 0600 GMT on the 28th September 1969 with strong south-westerly winds ahead of it over the northern part of the North Sea. The second chart, twelve hours later, shows the depression having moved east-north-eastwards to the north-east of Scotland and its associated cold front travelling south-eastwards down the North Sea followed by strong north-westerly winds. Fig. 3 is the residual diagram for this occasion. The staff of the Storm Tide Warning Service (STWS), who are responsible for issuing warnings, plot the residual (in feet) against time at each of the eight reference ports they use, namely Stornoway, Wick, Aberdeen, Tyne entrance, Immingham (on the Humber estuary), Lowestoft, Harwich (although, since 1970, Walton in Essex has taken over from Harwich) and Southend. The time of astronomically-predicted high water is shown at each port by a short vertical line. The passage of a negative surge down the east coast of Britain is clearly shown, this being followed by a positive surge which reaches a peak of 2.2 feet at Stornoway and 7.4 feet at Southend. A rapid decrease of the surge height can be seen at the shallow-water ports in the south just before the time of astronomically-predicted high water.

Special cases of the positive-surge-producing meteorological situations involving resonance between the tide and the forces causing the surge are the most likely to give large residuals at high water. The most serious situation arises when a depression moves south-eastwards into the North Sea with a trough swinging south-eastwards behind it at approximately the same speed as the tide. If the wind veers from near westerly in front of the trough to between northerly and north-westerly behind it and, simultaneously, strengthens a few hours before the time of high water at a particular coastal point, then the residual may be large at high water. This was the case in the 1953 surge (although in this case the trough was not well-defined, the wind veered and increased steadily through the important period).

Frequency of North Sea surges

To give a figure for the frequency of surges, a more precise definition than was given earlier must be used. STWS define a positive surge as occurring when the maximum residual is 2 feet or more at more than one of the eight reference ports already mentioned. Similarly, a negative surge occurs if the residual reaches minus 2 feet or less at high water at more than one of the reference ports.

Using this definition, the average number of positive surges per STWS operational season (which runs from September to April—the period when nearly all the surge-producing conditions arise) has been found to be just over 15 since 1953 when regular data collection began. The amount of data in existence for negative surges is much less than for positive surges as it is only in recent years that the increased draughts of some of the ships in the North Sea have led to them becoming important; however, as an example of their frequency, there were 10 in the 1970–71 season.

Forecasting of North Sea surges

The advantages in being able to forecast surges at least a few hours in advance are apparent when one considers the action that can be taken by relevant bodies either to lessen the effect of flooding or to alter the course taken by a ship.

The development of forecasting techniques used by the STWS has been with the

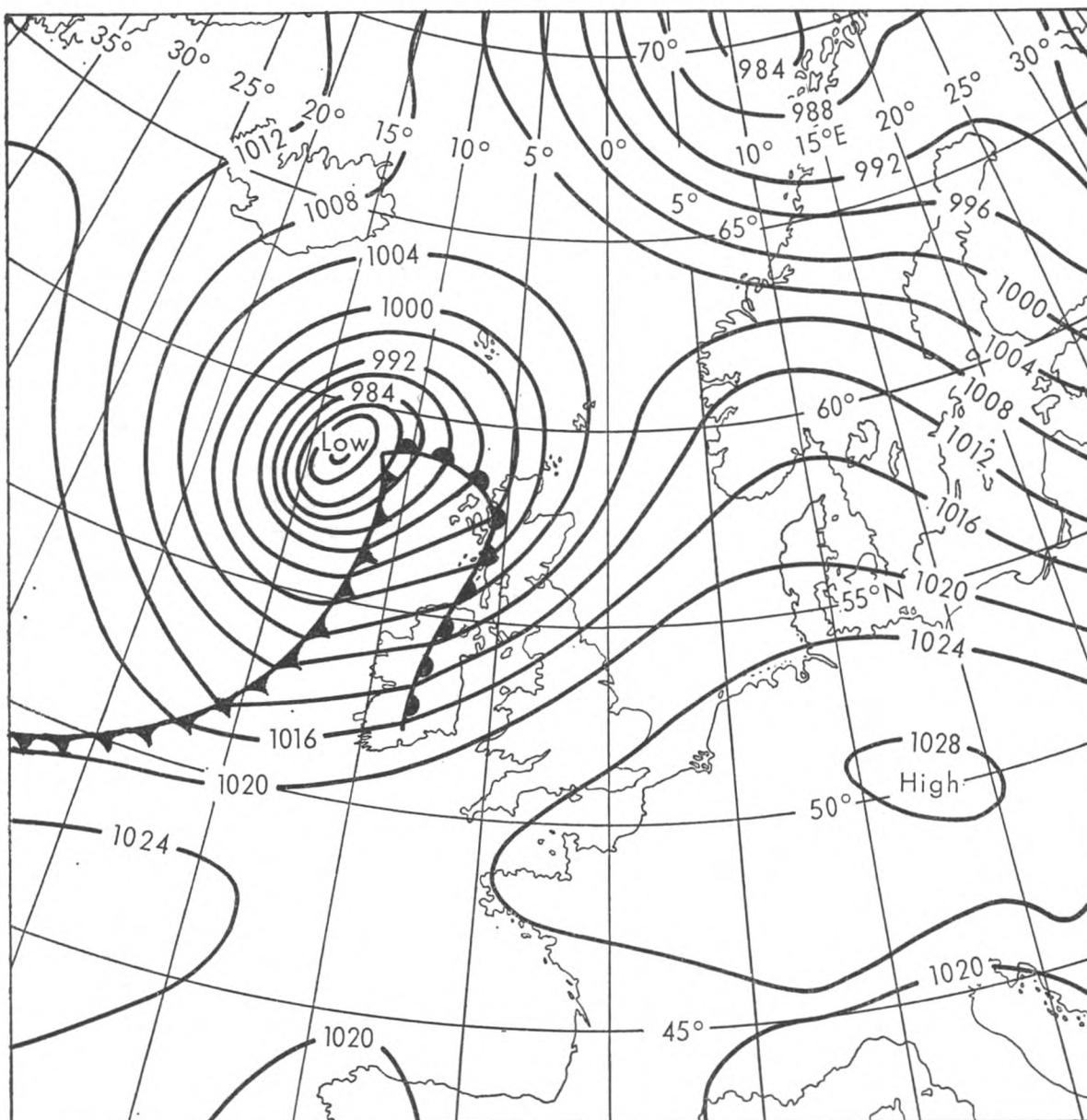


Fig. 1. Synoptic situation at 0600 GMT on 28th September 1969.

aim of producing a preliminary high-water-residual forecast one tidal period (i.e. about 12 hours) ahead for each of the eight reference ports mentioned above, and then a final surge height estimate some hours later. This aim has, to a large extent, been achieved in recent years in the Meteorological Office using a system of empirical formulae which give forecast residuals at the eight ports in terms of parameters found to be significant. Empirical techniques were studied some years before this system was developed by, for example, Dines⁵, Corkan³ and Rossiter.⁶

Before describing the system in detail it is desirable to distinguish between the requirements of forecasting systems for positive and negative surges. The largest difference arises because only the residuals at high water are important in positive surge situations, whereas some idea of the surge profile over the whole tidal cycle is ideally necessary for negative surge forecasting. Only small reductions in depth in some areas may be important to ships' navigators at any time. The other main difference is in the areas which need to be covered by the forecasts. Negative surge forecasting is only useful for shallow-water ports on the southern North Sea coast whereas, although some coasts are more susceptible to flooding than others, positive surges need to be forecast at as many coastal points as possible. On the other hand, predictions for off-shore locations would be desirable during negative surges (in the

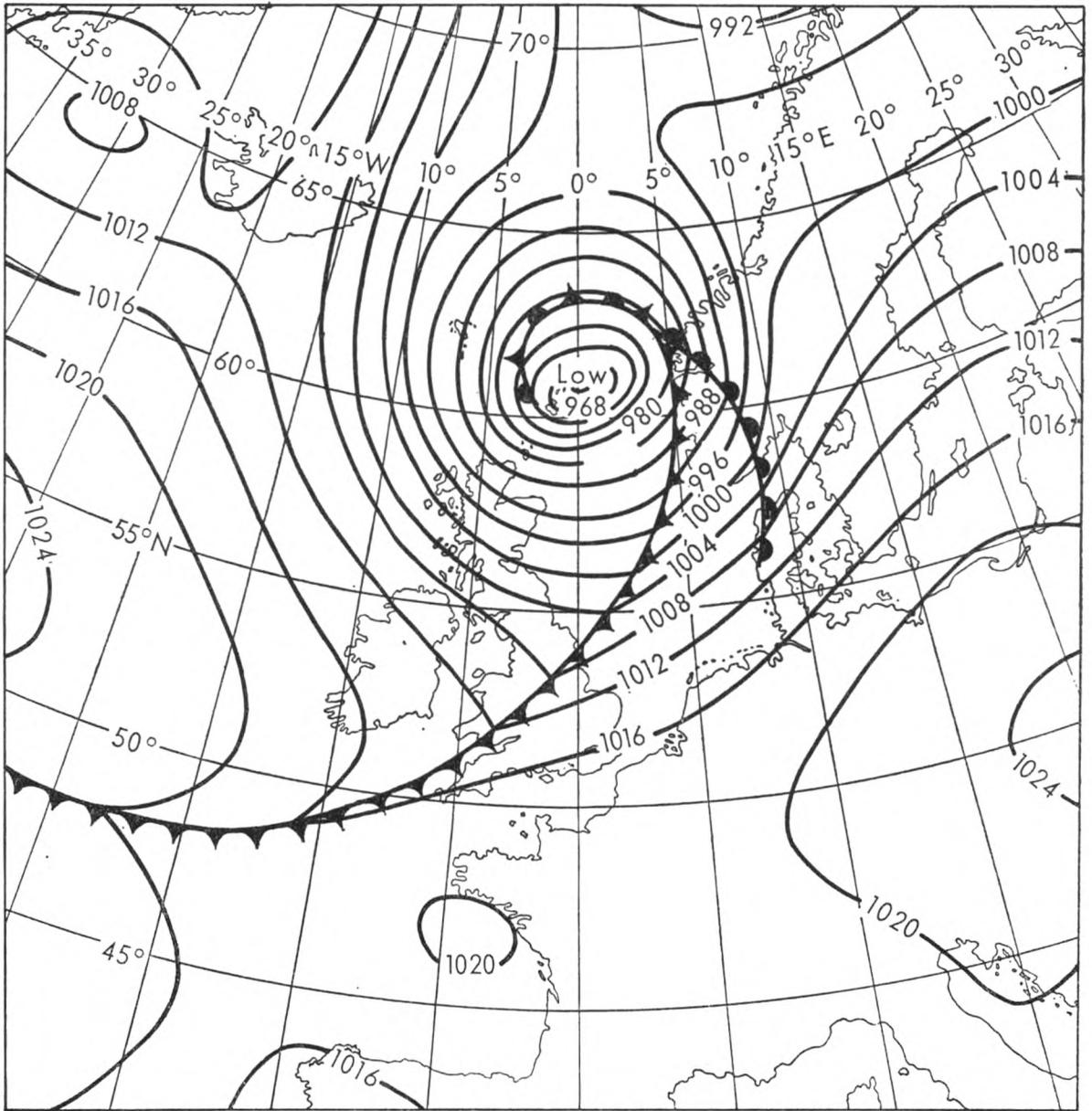


Fig. 2. Synoptic situation at 1800 GMT on 28th September 1969.

Thames Estuary and Straits of Dover for instance), although the lack of off-shore tidal observations make such predictions extremely difficult.

In the main the emphasis has been on forecasting positive surges and so the system has been geared towards high-water forecasts at the eight ports. A system of '12-hour' and '4-hour' surge-prediction formulae has been developed by Keers, P. E. Francis and Hunt (reported in papers to the Advisory Committee on Oceanographic and Meteorological Research). These formulae are applied 12 and 4 hours respectively before high water at each of the ports, the former serving as the preliminary estimate as required and the latter as the final estimate.

Most of the 4-hour formulae produced have been for positive-surge prediction and were derived from the large sample of positive surges for which data are now available (about 170 for Southend for example, all occurring since 1953). Much use was made in the construction of the formulae of the fact that most surges propagate southwards down the east coast and are modified by local winds as they progress. To incorporate this local wind effect into the formulae, areas of the North Sea were used over which the wind was found to be important in determining the surge height at one or more of the ports. There are five of these areas, subsequently called 'wind areas', each of 60 n. miles radius and all in the western part of the sea as shown

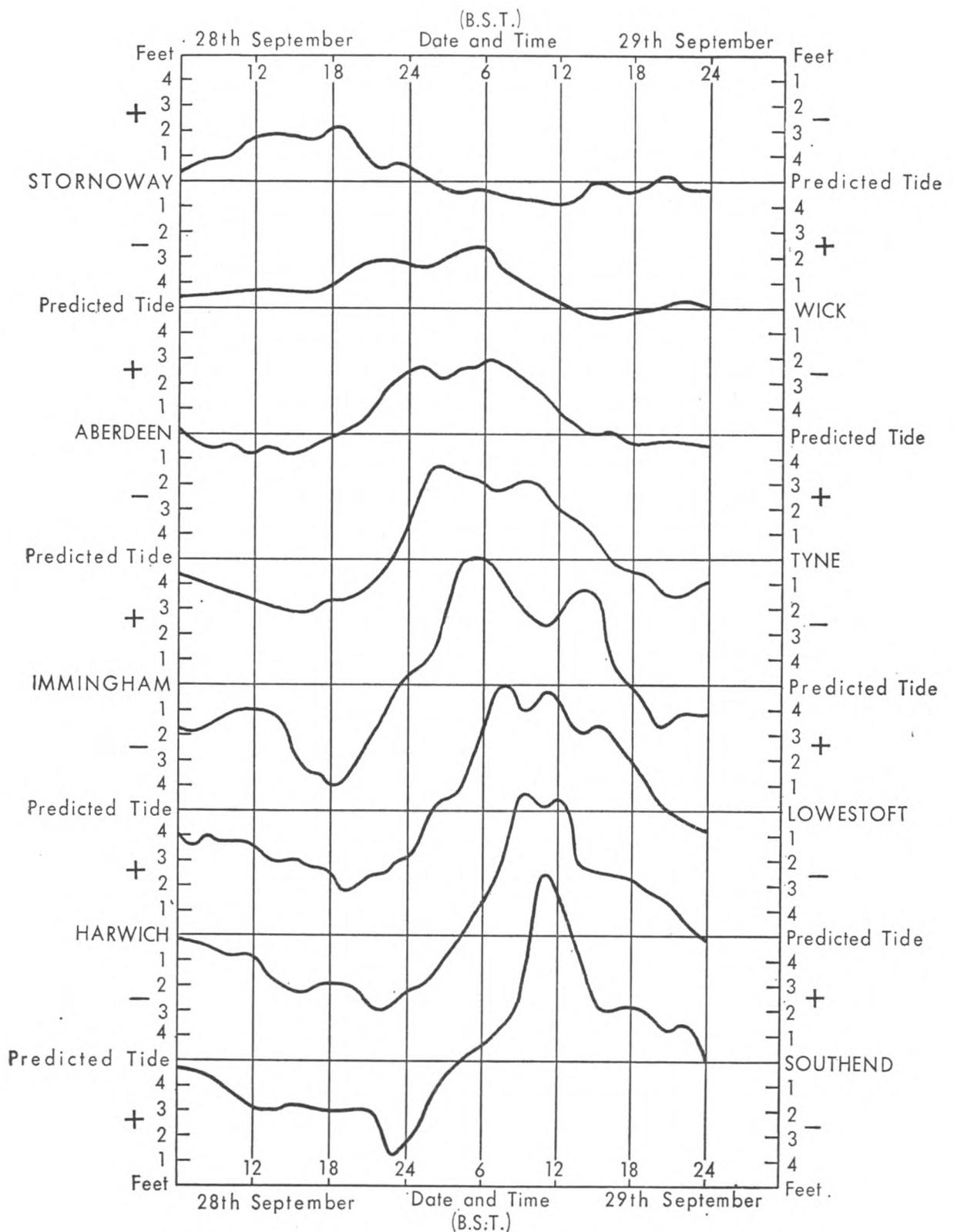


Fig. 3. Surge-residual diagram, 28th-29th September 1969.

in Fig. 4. Data have been collected for positive surge occasions since 1953 (using the STWS definition of a surge as stated previously) and, more recently, for all negative surges. The data consists of residuals at various times in the tidal cycle at each of the ports, geostrophic winds over each of the wind areas at hourly intervals for nearly a day, and surface pressure at various points on the east coast and also to the north of Scotland on each surge occasion. Surface winds have also been noted at a few coastal stations. Geostrophic winds are used rather than surface winds in the wind areas because of the greater ease in estimating geostrophic wind over the sea regions.

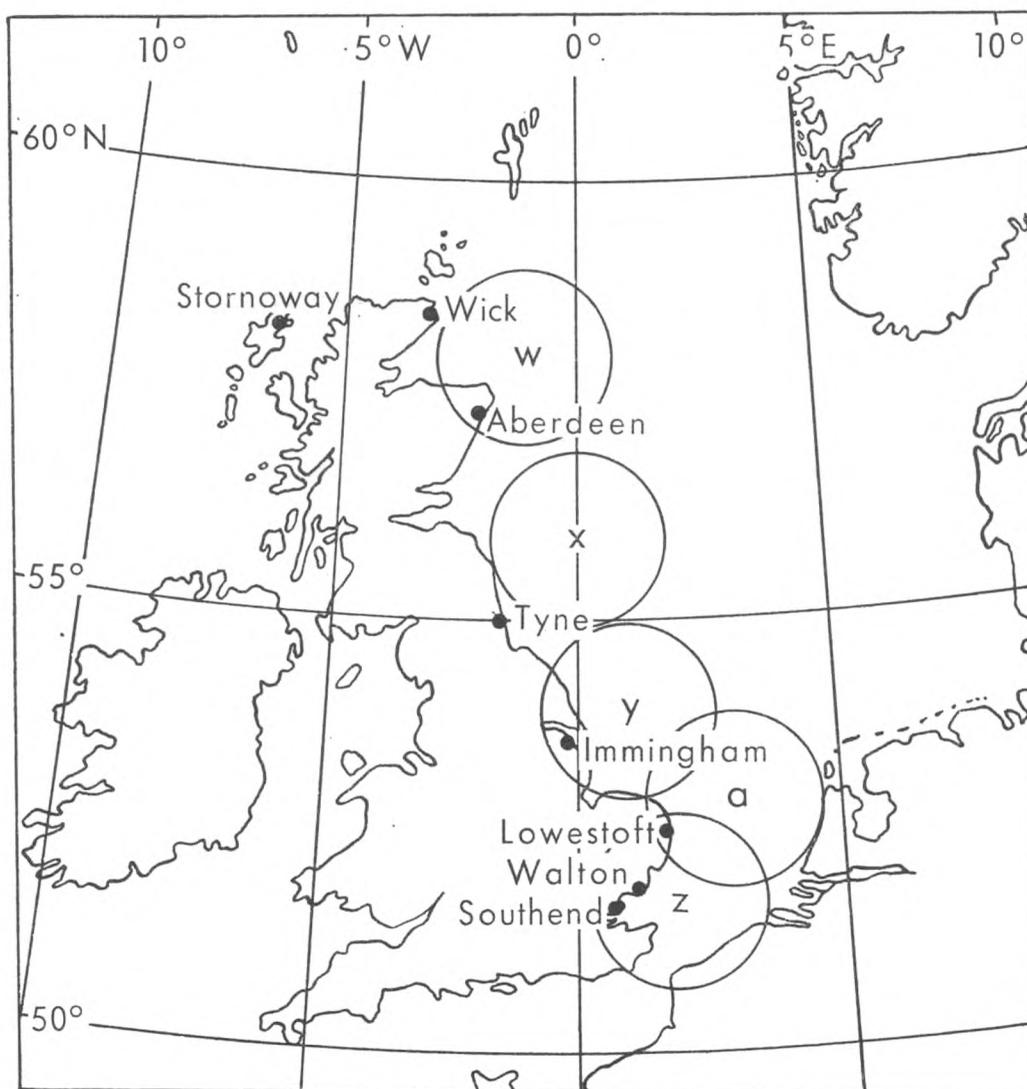


Fig. 4. Reference ports and wind areas.

Multi-regression techniques were used to determine the most significant forecasting parameters at each port (about four or five parameters were chosen from an original list of about forty) and to calculate their coefficients in the regression equations. One important point to arise as a result of this procedure was that the barometric effect was only found to be significant at Stornoway for predicting the surge generated to the north-west of Scotland. At all the east coast ports, the 'southward propagation factor' and the wind effect were dominant. So the factors included in the formulae to predict high-water residuals are, generally, the high-water residual at one or more ports further north to take account of the progression of the surge and which, owing to the southward movement of the tide, has in many cases already been observed at the time of application of the formulae, and some component of the geostrophic wind in one or more of the wind areas some hours before high water to allow for time lag. Tide-surge interaction is represented in a simple fashion in a few of the formulae. These 4-hour formulae have produced surge-height predictions with root-mean-square errors (RMSE) of the regression estimates of about 0.4 feet—slightly less for the northern ports, slightly more for the southern ports. An example of such a formula, which predicts the high-water residual at Southend, is:

$$R_s = 0.29 + 73R_L + 0.38R_I - 0.57R_{L-3} + 0.007V_{a,t-6}^{330}$$

where R_s is the high water residual at Southend (in feet), R_L , R_I are the high water residuals at Lowestoft and Immingham (high water at Lowestoft and Immingham occurring 3 and 7 hours respectively before that at Southend), R_{L-3} is the residual 3 hours before high water at Lowestoft (this factor is a simple way of representing

tide-surge interaction) and $V_{a,t-6}^{330}$ is the 330° component of the geostrophic wind (in knots) in wind area 'a' (refer to Fig. 4) 6 hours before high water at Southend. The RMSE of the regression estimates for this formula is 0.46 feet while the maximum error is 1.2 feet. The formulae for the other ports are similar to this, some using surface-wind values at Fair Isle as a predictor rather than geostrophic wind over a wind area.

A formula has also been calculated to be used in the easterly surge situation in the Thames Estuary with a residual prediction for Southend, but this has been derived from a rather small sample and consequently less confidence can be placed in results from its application.

The 12-hour formulae were derived from balancing sets of positive and negative surges to allow them to be used in a greater variety of situations. They could then indicate whether a positive or negative surge or no surge at all was going to occur during every tidal period. Apart from this difference the 12-hour formulae were calculated in much the same way as the 4-hour ones. In operation, because the forecast is for 12 hours ahead, values for the various wind components and high-water residuals need to be forecast some hours ahead for inclusion in the formulae. As a result of this, these formulae are less accurate than the 4-hour ones in practice.

A 12-hour formula of special interest is that of Stornoway. It implies that the effect of pressure changes is greater than would be expected from applying the static pressure law. This is probably due to the existence of continental-shelf waves causing an enhanced pressure response of the sea surface on the western side of a land mass if a continental shelf exists, and serves as an example of one of the advantages of this empirical method. It has implicitly taken into account an effect which would have been difficult to include explicitly using this or any other technique.

Other formulae

At the present time, only a 4-hour final estimate of negative-surge height for Southend high water has been developed but not yet used operationally. As the amount of data recorded for negative surges is appreciably less than for positive surges and their propagation appears not to be as straightforward, the formula is not as accurate as the corresponding positive surge formula. Another recent move has been an attempt to construct a 12-hour low-water formula for Southend to attempt, at least in part, to meet the requirement for forecasts of negative surges. Here, the data problem is even worse and much more will be needed before it can be put into practice.

A further recent development in the empirical technique has been to produce formulae which use observed and predicted tidal heights rather than residuals as parameters. This was done after investigations had revealed that there was a marked tendency for the formulae to predict large residuals less well than smaller ones for the southern ports and for the errors to be mainly under-predictions. A possible solution to this problem was to give extra weighting to the important surges in the sample from which the formulae were derived. However, these were not necessarily those with the largest residuals but those with the largest observed heights, i.e. largest heights of tide plus surge, and so a new set of formulae were calculated using observed and predicted heights.

Other developments in the surge-forecasting field

The empirical methods described in the previous section have been largely successful, producing, on the whole, quite accurate predictions on the occasions when they have been applied. In fact the errors the formulae give are often of the same order as errors in the astronomical predictions. Also, they are cheap both in

production and application. Another advantage, the ability to include factors implicitly, has already been discussed.

Navigational considerations have, however, led to the idea that at some time in the future a routine service should be introduced, issuing forecast heights of tide plus surge on a daily basis. This would, ideally, involve forecasting for low water and possibly other points in the tidal cycle as well as for high water and extensions of the empirical technique to meet this requirement would produce problems. The method is inherently inflexible. The formulae can only be applied at fixed places and times and use winds and residuals as predictors at fixed places and times. Not only are the effects of possibly important small-scale features and of rapidly changing meteorological conditions omitted, but also any extension to forecasting for new places and for different times involves the acquisition of vast amounts of data which may take an appreciable time to amass. The result of such a development would be a rather cumbersome set of formulae and the basic simplicity of the technique could be lost. A limited extension to include, for instance, low-water forecasts at some southern North Sea ports would, nevertheless, be reasonable and it was with this aim in view that the low-water formula for Southend, already described, was developed.

Other developments in surge-forecasting methods have taken place in this country at the Institute of Coastal Oceanography and Tides (ICOT) and at the National Institute of Oceanography (NIO). At ICOT a numerical model for the water surrounding the British Isles is being developed (Heaps⁷). The hydrodynamical equations describing the motion of the sea produced by meteorological forces are linearized, integrated with respect to depth and solved using a finite difference scheme and a fine grid. Recently, a non-linear model for the shallow waters of the southern North Sea and Thames Estuary has been added to this basis and attempts to reproduce the non-linear surge-tide interaction effects actually observed have been made.

A major problem with these models is the introduction of meteorological data. If they are to run operationally, some form of wind or wind-stress field and surface-pressure field will be required as input. Test runs of the models have been made using as input estimated surface wind values over certain sea areas and, more recently, the surface-pressure field to calculate both the barometric effect and the geostrophic wind effect. In the future, some kind of output from the numerical-weather model will clearly be required although the exact form is uncertain.

At NIO an analogue model has been constructed, sets of response functions having been calculated for a large number of points in the North Sea giving the response of the sea surface to a variety of surge-producing forces acting over small areas. Providing the surge is treated as linear, then the total response at each point to forces acting over the whole sea can be found by adding all the contributions from the small areas.

Finally, it is important to note that all methods for surge forecasting suffer from lack of off-shore tidal data, making it impossible to determine surge heights at any points other than on coasts. Off-shore tidal measurements would seem to have a vital role to play in the future of surge forecasting.

Acknowledgement

The author would like to thank Dr. P. E. Francis for discussions and criticism of the manuscript.

REFERENCES

1. GRIEVE, Hilda. *The Great Tide*. Chelmsford, Essex County Council, 1959.
2. KEERS, J. F. The meteorological conditions leading to storm surges in the North Sea. *Met Mag, London*, 95, 1966, pp. 261-272.

3. CORKAN, R. H. Storm Surges in the North Sea. H.O. Misc., No. 15072, Vols. 1 and 2, Washington, 1948.
4. KEERS, J. F. An empirical investigation of interaction between storm surge and astronomical tide on the east coast of Great Britain. Hamburg, *Dt. hydrog. Z.*, **21**, 1968, pp. 118-125.
5. DINES, J. S. Meteorological conditions associated with high tides in the Thames. *Geophys. Mem., London*, **5**, No. 47, 1929.
6. ROSSITER, J. R. Research on methods of forecasting storm surges. *Q J R Met Soc, London*, **85**, 1959, pp. 262-277.
7. HEAPS, N. S. A two-dimensional sea model. *Phil. Trans. R. Soc., London*, **A265**, 1969, pp. 93-137.



Meteorological Office staff inspecting equipment on the Royal Sovereign Light-tower during a visit made by RAF helicopter, April 1972.

(Opposite page 125)



The pilot and crew of the helicopter from H.Q. No. 38 Group, RAF Odiham, which took the Meteorological Office staff to the Royal Sovereign Light-tower.

The Tragedy of the m.v. *Marjorie McAllister*

(This article is reproduced from *Safety at Sea International*, No. 36, 1972, by kind permission of the Editor.)

On 2nd November 1969 a motor towing vessel, the m.v. *Marjorie McAllister*, sank off the coast of North Carolina with the loss of all hands. Since there are no witnesses to the casualty, and since the vessel itself has not been located, the piecing together of exactly what happened that day involves a large measure of speculation.

What is actually known of the casualty is that the *Marjorie McAllister* departed New York City shortly before noon on 30th October, bound for Jacksonville, Fla. She was making this voyage without tow. The voyage went routinely until 1st November. About 1000 that day, her Master reported via radio-telephone to the dispatcher's office in New York that she was 50 miles south off Chesapeake Light in 8-foot seas with 25-knot winds. The Master did not report any problems; he was informed that one of the company's other tugs had sought refuge in Morehead City, N.C. due to high winds and mountainous seas. He was also informed that gale warnings were posted from Florida to Cape Hatteras. The Master said that he would continue south, as the weather was not too bad in his present position, and that he intended to put into Morehead City if refuge from the weather became necessary. The Master, both mates and a deck-hand all lived within 20 miles of Morehead City. Had the Master known what lay ahead for the tug and her crew of six his decision would undoubtedly have been different.

The weather along the Atlantic Coast on the evening of 1st November and in the early morning of 2nd November was severe. By 1200 on the 1st gale warnings had been posted for the entire coast from Virginia Beach, Va. to Charleston, S.C. At midnight on the 1st the salvage vessel *Curb*, located approximately 60 miles south-east of the last known position of the *Marjorie McAllister*, logged its weather as wind north-east, Force 10 (48–55 knots), height of seas 30–35 feet. The *Curb*'s log shows that by 0300 on the 2nd the wind had increased to Force 13 (in excess of 70 knots).

At about 1630 on 1st November the Master of the tug again reported to his dispatcher. The tug had made headway to a position 14–17 miles south of Diamond Shoals, near Cape Hatteras, N.C. She was now in south-easterly winds of about 23 knots. At 0025 on 2nd November the U.S. Coast Guard Group, Fort Macon, N.C., received radio-telephone communication from the *Marjorie McAllister*. She was in distress, she reported, taking on water in her engine-room and experiencing electrical difficulties. She gave her position as 6 miles west of Cape Lookout Shoals Buoy 14. This position, incidentally, lies along the track-line normally used by vessels approaching Morehead City from the north. The vessel indicated to Group Fort Macon that no Coast Guard assistance was needed, but she requested that the Coast Guard station stand by on 2182 kHz.

Only 24 minutes later the vessel again contacted the Coast Guard at Fort Macon and requested assistance. At the request of the towing vessel, an attempt was made to shift frequencies. During the course of the attempted shift, all communications between the vessel and the Coast Guard were lost. The *Curb*, however, had overheard the transmissions between the distressed tug and the Coast Guard. Her Master called the *Marjorie McAllister* from about 60 miles away and volunteered to relay her position and any other information to the Coast Guard. The tug acknowledged this transmission and asked the *Curb* to stand by. This was the last word heard from the *Marjorie McAllister*.

Air and surface search

An extensive air and surface search was initiated. Equipment and debris, identified as coming from the *Marjorie McAllister*, were recovered from the general

vicinity of her last known position. Included among the recovered items were several life-preserving devices, none of which was apparently used by the crew. This fact attests to the probability that the vessel sank suddenly. No bodies were recovered; the six crew members were presumed dead.

The above account of the casualty relates all the confirmed details. It obviously leaves the reader with many questions. They can be answered only by putting together bits of information regarding the tug's construction and her crew and then eliminating the least probable occurrences. The story that evolves from these deductions is one of a chain reaction ending in tragedy.

Neither the *Marjorie McAllister* nor her Master were veterans of this type of voyage. The towing vessel had made only two coastwise voyages since her delivery trip from New Orleans to New York in 1968. Each of those trips was made with tow. Although not required to be inspected by the Coast Guard, she was classed for 'Unrestricted Ocean Service' by the American Bureau of Shipping. ABS had issued her a valid load line certificate under the provisions of the International Load Line Convention, 1966. However, since her keel was laid prior to the effective date of that Convention, she was built to meet the requirements of the 1930 International Load Line Convention. Her master held an expired licence as "Master of Uninspected Motor Fishing Vessels of not over 500 gross tons upon Coastwise Water not to exceed (50) fifty miles off shore and tributary waters from Eastport, Maine to Port Isabel, Texas". He held no current Coast Guard issued licence, and none was required for his current employment. He had been a pilot of fishing vessels for about 20 years in the Beaufort-Morehead City, N.C. area, and he had 5½ years of experience on tugs, 2½ of them as a Master. This, however, was his first coastwise off-shore voyage on a tug.

The vessel which he commanded was a welded steel, single-screw, diesel-propelled, 3,600 hp towing vessel. She was 198.3 gross tons, 111.5 feet in length, 30.0 feet in breadth and 10.51 feet in depth. A freeboard at the stern of about 2.5 feet was considered normal.

The vessel had automated controls so that the machinery could be controlled directly from the pilot-house or at the automation control panel located in the upper engine-room in addition to local control in the lower engine-room. Therefore, no regular engine-room watch-stander was necessary, and the tug usually proceeded without one. This was especially true at night.

Perhaps because of the Master's inexperience with this type of vessel in coastwise sailing and his desire to put into a port close to home—if he had to put into port at all—he proceeded into the adverse weather, into rougher and rougher seas, and by late on the night of 1st November decided to head into Morehead City for refuge. For some time the ship had endured the heavy seas, but the tug had been running into the south-easterly swells. Changing course to head for Morehead City would drastically alter the effect of the mountainous seas on the tug. Now the seas would be striking the vessel from astern. With a freeboard aft of only 2.5 feet the stern of the *Marjorie McAllister* would be awash much of the time. The builders of the tug had provided for this by building in very large freeing ports astern. But even in lesser seas than the tug was then encountering, as much as 6 inches of green water would rush up to the after-end of the deck-house before receding again.

Known circumstances

At the after-end of the deck-house was a towing winch. The winch was surrounded on three sides by bulkheads; only the after-end of this enclosure was open. But within the enclosure was a watertight door leading into the engine-room. This door was customarily hooked back in an open position by an automatic hook. Two forced-air ventilators with no permanent closures were located port and starboard within the towing-winch enclosure. The ventilators were 2 feet in diameter and terminated 4 feet above the deck in the enclosure. They provided ventilation through

six outlets in the engine-room. Two of these outlets, one port and one starboard, were located directly over the main engine generators. The lack of permanent closures on these ventilators would not be construed as a violation of the Load Line Regulations nor of the vessel's load line certificate, since they were not located in an 'exposed' position as those regulations have been interpreted.

With the above known, and with the addition of a degree of speculation, the following series of events emerges as the most probable.

Series of events

The Master had changed course for Morehead City. Huge seas poured green water over the stern of the tug. The load of water was too voluminous for the freeing ports and the water, trapped on deck by 30-inch-high bulwarks, was able to gather in the towing-winch enclosure to such a height as to pour into the vessel through the open watertight door to the engine-room. Even if the door was closed, enough water could have collected in the enclosure to enter the tug through the forced-air ventilators. The water cascaded in over the generators and the ship experienced electrical difficulties. With the generators shorting out, someone looked into the engine-room. He reported the tug was taking on water fast and the Coast Guard was contacted. It was felt that the crew could handle the situation as the automatic electric bilge pump was backed up by additional pumps located on the diesel generator engines. These back-up pumps had to be primed and manually started. Since they were rarely used as bilge pumps and since their use as bilge pumps necessitated several changes in valve openings and closures, activating them for emergency back-up services to the automatic bilge pump would have been time-consuming. The crew was unable to activate the pumps; water continued to flood the engine-room. The assistance of the Coast Guard was requested, but communications were lost. The crew continued to struggle to activate the pumps as the master requested the *Curb* to stand by to relay transmissions to Fort Macon. Suddenly all electrical power was lost as the two 75 kW generators were completely shorted out along with the in-port and emergency 30 kW generator located at the same level in the same compartment. Steering was lost due to the electrical failure, and the tug was helpless against the elements and continued to flood. The battery system which provided emergency power for the radio was also located in the engine-room and was rendered useless when the space was flooded. The severity of the weather and the suddenness of the tug's foundering prevented the crew from saving themselves. How ironic that among the few traces of the *Marjorie McAllister* ever found was the fully inflated, but unused life-raft.

The National Transportation Safety Board wrote in its report on the casualty:

The loss of electrical power, as a result of partial flooding, would have caused a loss of steerage and rendered the automatic electric bilge pump inoperative.

The National Transportation Safety Board finds that the probable cause of the loss of this vessel was foundering. Extremely adverse weather, flooding of the engine-room and the sudden capsizing of the vessel were the causes of the foundering and the loss of all hands. Other contributing factors were:

- (a) The master's decision to proceed south into the storm in lieu of seeking refuge in the Chesapeake Bay area;
- (b) The apparent change in course to proceed into Morehead City, which created a following sea condition;
- (c) The design of the vessel in regard to its freeboard, the area of the freeing ports, without permanent closing devices on the weather deck where boarding seas could accumulate sufficiently to inundate the vents;
- (d) The fact that all three generators were located at the same level in one engine-room, thereby greatly increasing the probability of losing all sources of power at the same time;
- (e) The loss of electrical power as a result of partial flooding, which would have caused a loss of steerage and rendered the automatic electric bilge pump inoperative.
- (f) The combination of adverse conditions which greatly increased the possibility that the

operating personnel were unable to place the two emergency bilge pumps in operation;
(g) The fact that the door between the engine-room and the towing-winch enclosure was routinely latched open while the tug was underway, thus exposing the engine-room to boarding seas.

The U.S. Coast Guard Marine Board of Investigation concluded, among other things regarding the casualty:

The possibility of entrance of water due to a structural defect in the hull is quite remote. The vessel was essentially double-hulled due to the number of double-bottom tanks and wing tanks throughout most of the vessel. The closed fresh water engine cooling system and the limited number of branch lines and valves from a single sea chest reduced the probability of flooding due to failure of salt water piping or fittings. Although the scantlings, construction, and basic design of the vessel appear suitable for ocean service, certain features such as the low freeboard, low forecastle, open foredeck, pilot-house windows, and the location of vents, louvres, and doors on the weather decks are more compatible with a tug in harbour or inland service. The vessel was equipped with the required amount of approved lifesaving equipment and there is no evidence that the failure of any of this equipment contributed to the casualty.

This casualty may have been prevented if *Marjorie McAllister* had sought shelter after the Master became aware of the heavy weather ahead or if she had been designed in such a manner as to be able to withstand the extremely adverse wind and sea conditions without shipping large quantities of water while under way. A vessel design that would have allowed the vessel to remain hove-to without power in seas of the type encountered may also have prevented the casualty. In particular, the casualty might have been prevented if the air intakes to the engine-room had been located at a point other than in a partially-enclosed space into which seas from the stern or quarter could break and build up. Although the means by which the water entered the vessel have not been precisely determined, it is possible that the casualty could also have been prevented by the elimination of the after watertight door from the towing-winch enclosure to the engine-room.

The *Marjorie McAllister*, being a diesel-propelled towing vessel of under 300 gross tons, was not subject to U.S. Coast Guard inspection and certification. The Coast Guard Marine Board of Investigation recommended that action be taken to require licensing by the Coast Guard of masters of towing vessels and that the Coast Guard seek legislation for the inspection of all towing vessels operating in ocean or coastwise service. The National Transportation Safety Board concurred in these recommendations. They also recommended that the Coast Guard, in its special study of towing vessels, also analyse the casualties involving towing vessels operating in inland waters to determine whether there is a need for legislation requiring inspection of all towing vessels. The Safety Board was able to cite six casualties to this type of vessel which have occurred since 9th January 1969, and they stated, "This casualty is only one of several which have occurred within the past two years and further illustrates the need for safety regulations specifically directed to this type of vessel."

The Commandant, U.S. Coast Guard, took action concerning the recommendations of the Coast Guard Marine Board of Investigation as follows:

1. The Coast Guard has consistently and strongly supported legislative efforts dedicated to the several aspects of towboat safety. During the course of hearings on the subject in 1968, the Coast Guard indicated that an operator licensing programme would be a significant first step toward reversing the casualty trend on towboats and that once the programme was in effect, both the impact on maritime safety as well as any need for supplemental legislation could be more accurately assessed.
2. This casualty amply demonstrates that, although a licensing programme would address one of the most significant causes of casualties on uninspected vessels—personnel fault—mandatory inspection is necessary to encompass solutions to the full range of towboat risk problems.
3. Accordingly, the Coast Guard will undertake a review of pending legislative proposals in light of recent casualties which have occurred to towing vessels operating on oceans and coastwise waters.

Perhaps increased safety for the vessels and the men who sail the seas will mitigate the tragedy of the m.v. *Marjorie McAllister*.

(The above article is based upon the Marine Casualty Report of the incident, comprised of the U.S. Coast Guard Marine Board of Investigation Report and Commandant's Action and the Action by National Transportation Safety Board released 29th June 1971.)

ICE CONDITIONS IN AREAS ADJACENT TO THE NORTH ATLANTIC OCEAN FROM JANUARY TO MARCH 1972

The charts on pages 132 to 134 display the actual and normal ice edges (4/10 cover), sea-surface and air temperatures and surface-pressure anomalies (departures from the mean) so that the abnormality of any month may be readily observed. (The wind anomaly bears the same relationship to lines of equal pressure anomaly as wind does to isobars. Buys-Ballot's law can therefore be applied to determine the direction of the wind anomaly.) The summary of iceberg sightings has been discontinued and is replaced during the iceberg season (roughly February to July) by southern and eastern iceberg limits. In any month when sightings have been abnormally frequent (or infrequent) this will be discussed briefly in the text.

The periods used for the normals are as follows. Ice: Eurasian sector, all data up to 1956,¹ North American sector, 1952-56 (for north of 68°N)¹ and all data up to 1963 (for south of 68°N).² Surface pressure: 1951-66.³ Air temperature, 1951-60.⁴ Sea-surface temperature: area north of 68°N, 1854-1914 and 1920-50,⁵ area south of 68°N, 1854-1958.²

JANUARY

A significant change occurred off the eastern seaboard of North America where, due to a strong north-westerly wind anomaly, a large excess developed in the Davis Strait and Labrador Sea. The main deficits occurred in the central Greenland Sea and in the Barents Sea due to very warm air circulating around an anticyclone centred over north-west Europe.

FEBRUARY

The large excess off Labrador and Newfoundland was maintained by persistent north-westerly or westerly winds. A cold south-westerly anomaly established a new excess in the region to the north-east of Jan Mayen. The continued deficit in the Barents Sea was chiefly attributed to a warm sea-surface temperature anomaly due to warm water being driven into the region by persistent south-west to west winds. The furthest south and east iceberg limits are shown. Though little data are available there are indications that more icebergs than normal had arrived south of 48°N on the Grand Banks.

MARCH

For the third consecutive month a large excess occurred between the Davis Strait and Newfoundland. For most of this quarter the ice edge displayed has been more than 100 miles beyond any known extreme. Due to light winds and low temperatures an excess persisted to the north-east of Jan Mayen but, further north, a deficit was produced by warm easterly winds. The continued supply of warm water, driven by south-west to west winds into the Barents Sea, maintained a large deficit in the east of that area. Iceberg reports received late in the month indicate that an unusually large number of bergs were observed over the Grand Banks of Newfoundland.

R. M. S.

Note. The year '1971' should be deleted from the 2nd line of the legend in each ice chart shown in the January 1972 (pages 33-35) and the April 1972 (pages 84-86) editions.

REFERENCES

1. Washington, D.C., U.S. Navy Hydrographic Office. Oceanographic atlas of the Polar Seas. H.O. Pubn. No. 705, Part II: Arctic, 1958.
2. Washington, D.C., U.S. Naval Oceanographic Office. Oceanographic atlas of the North Atlantic Ocean. Pubn. No. 700, Section III: Ice, 1968.
3. London, Meteorological Office. Various publications.
4. Washington, D.C., U.S. Department of Commerce Weather Bureau. World weather records, 1951-60. Vol. 1: North America, 1965.
5. London, Meteorological Office. Monthly meteorological charts and sea surface current charts of the Greenland and Barents Seas. Met.O.575, 1966.

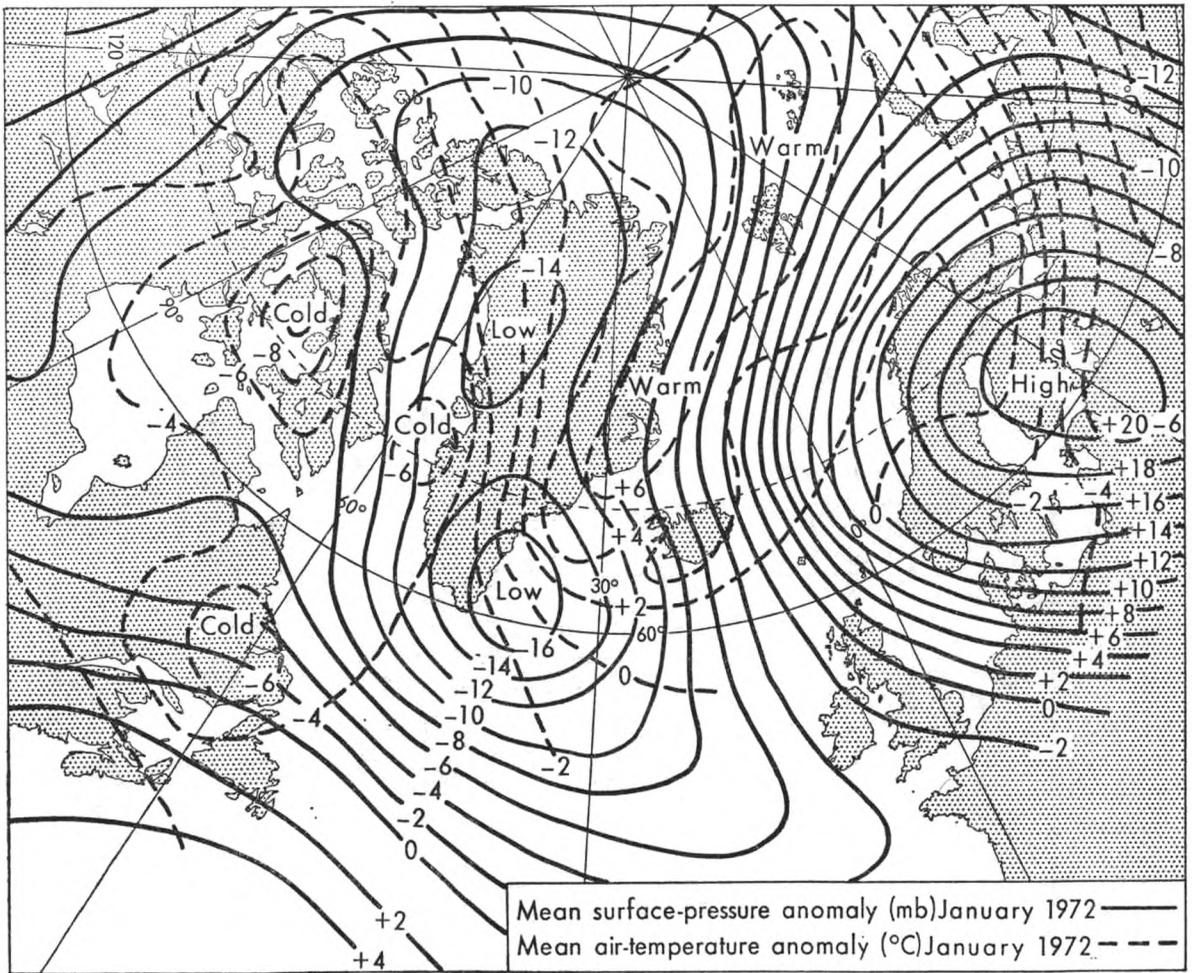
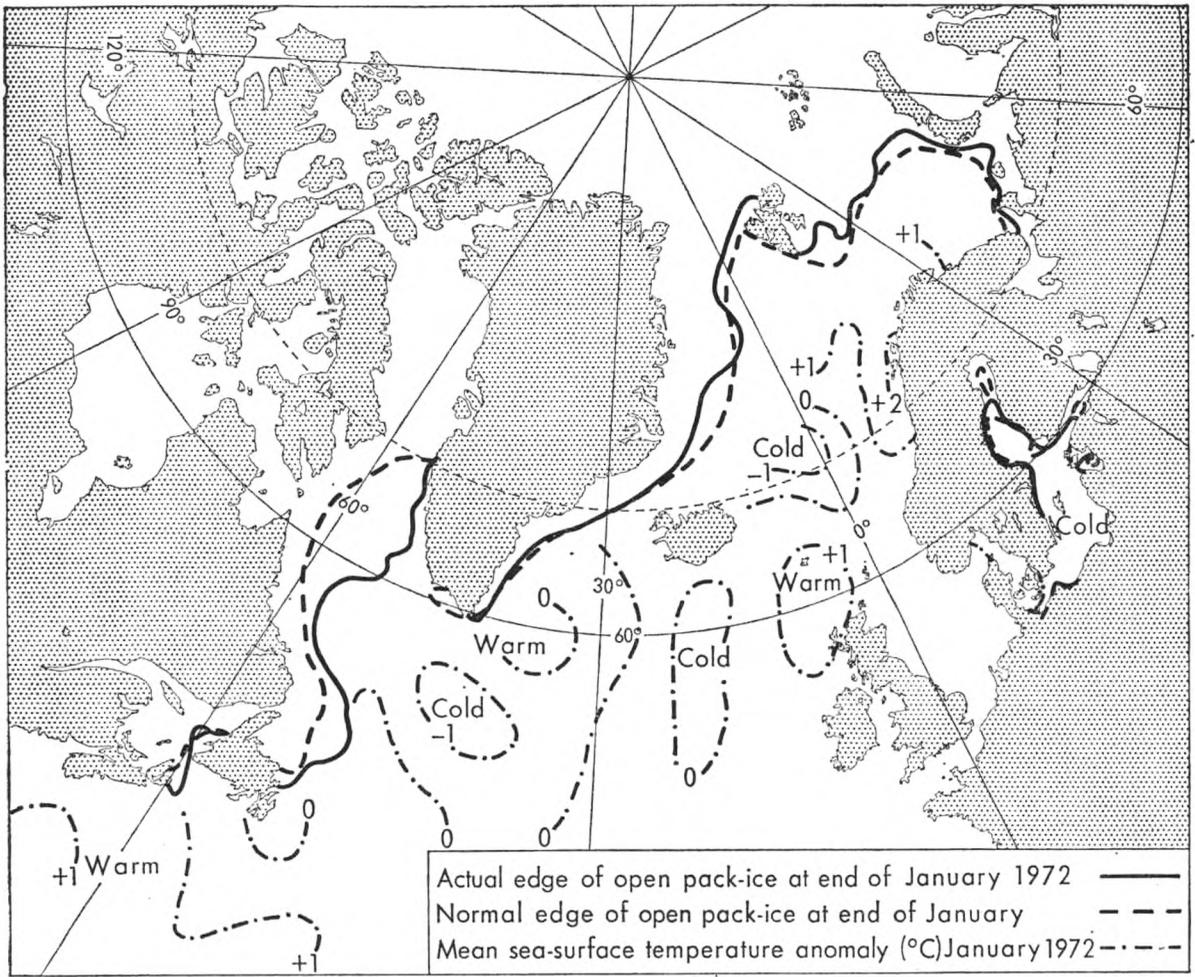
Baltic Ice Summary: January-March 1972

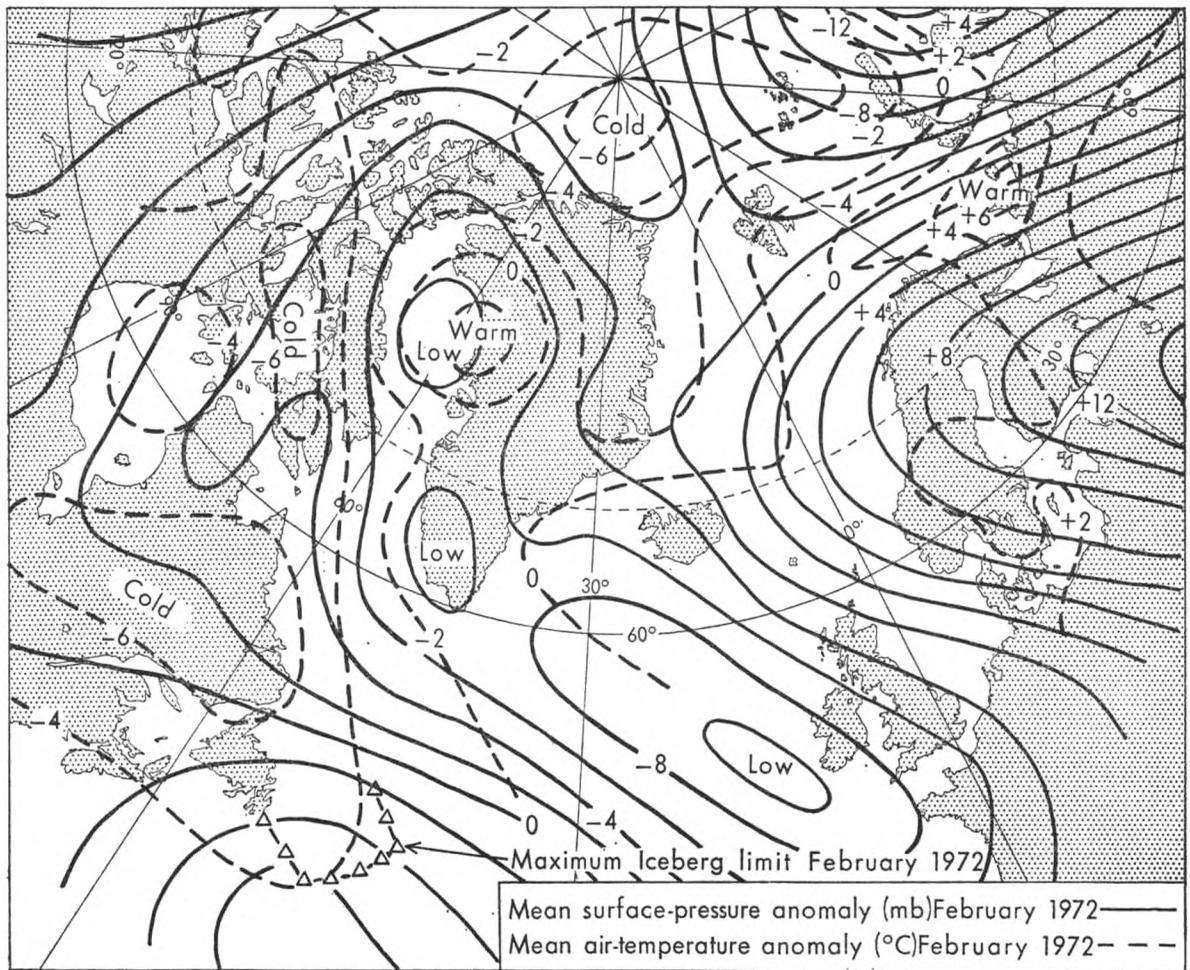
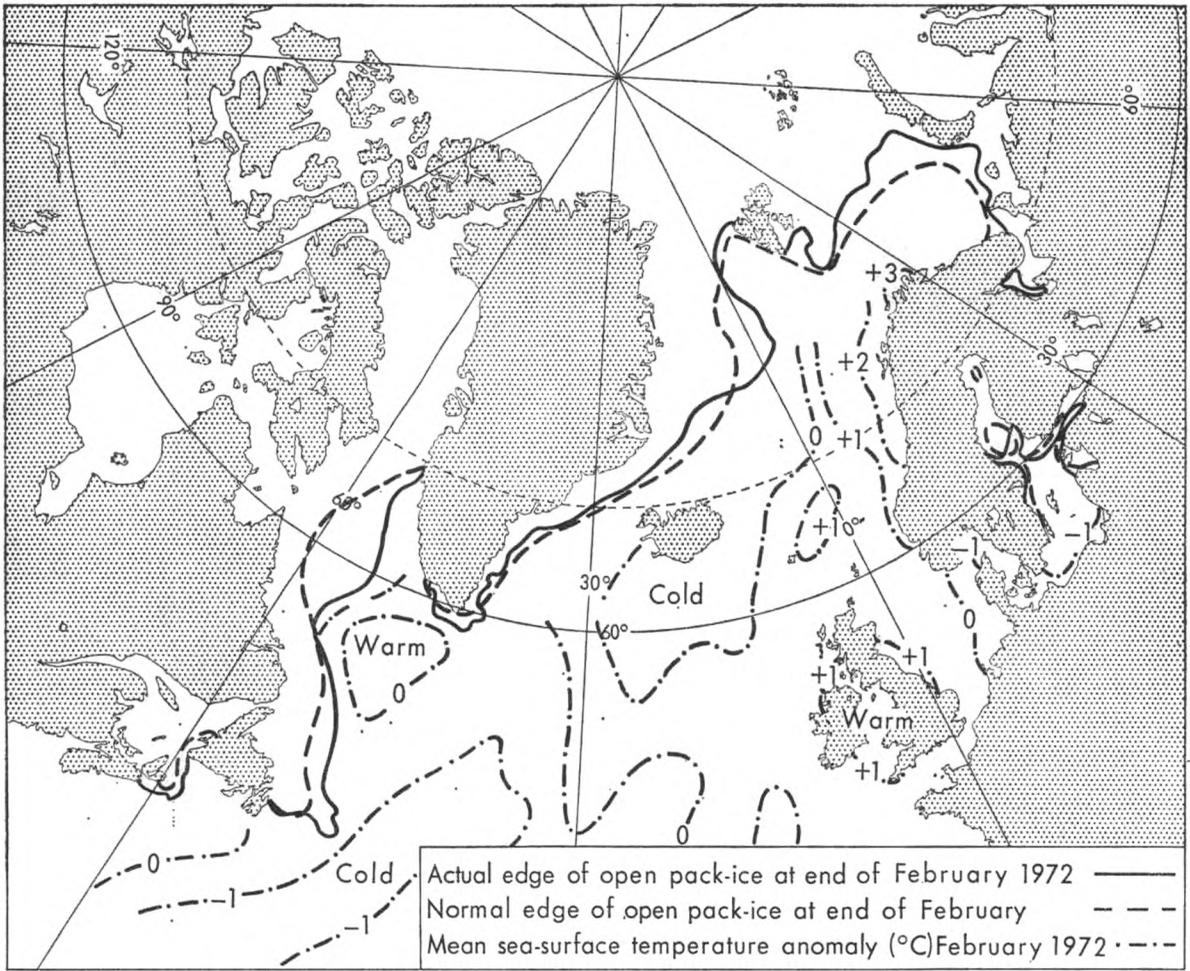
No ice was reported at the following stations during the period: Goteborg, Visby, Copenhagen, Oslo, Kristiansandfjord.

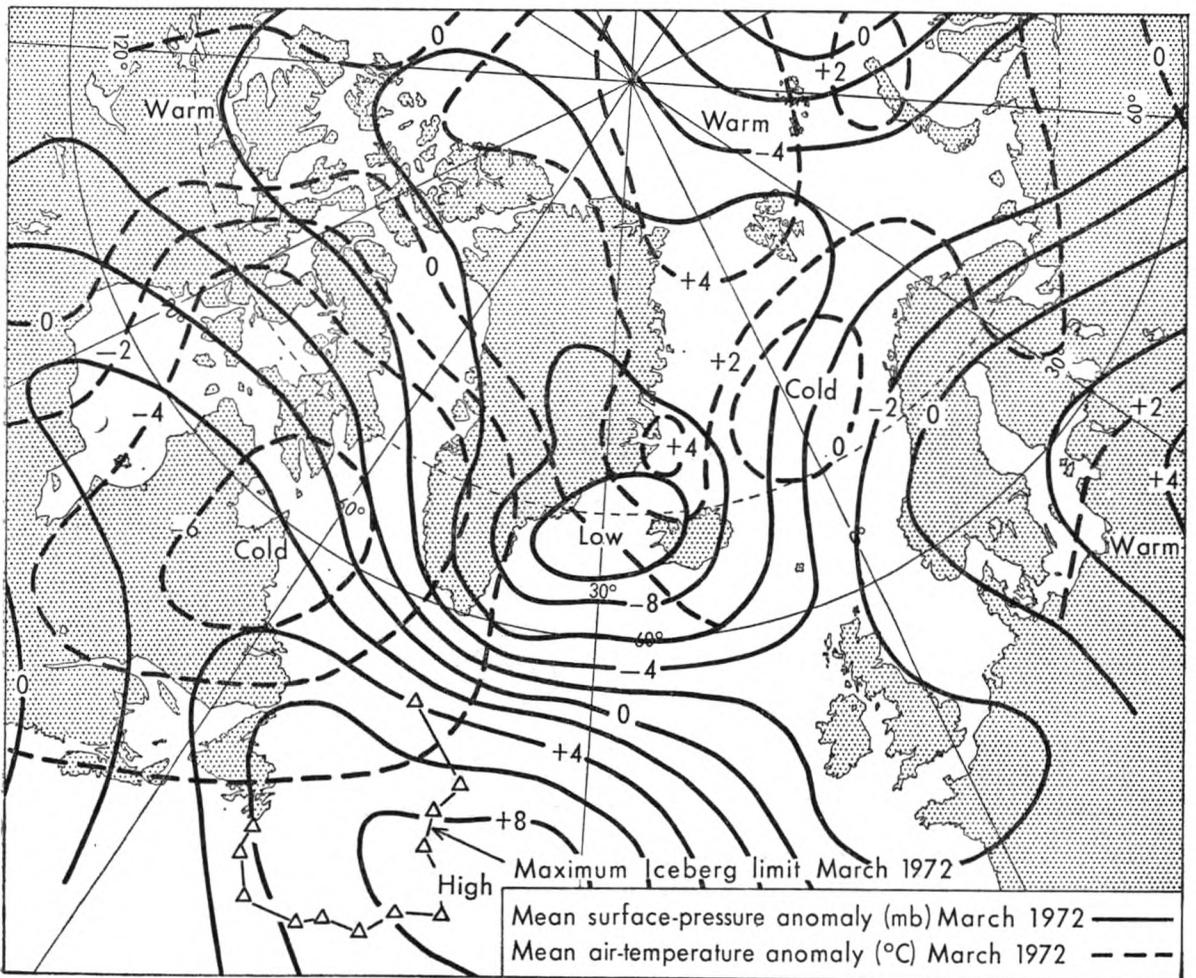
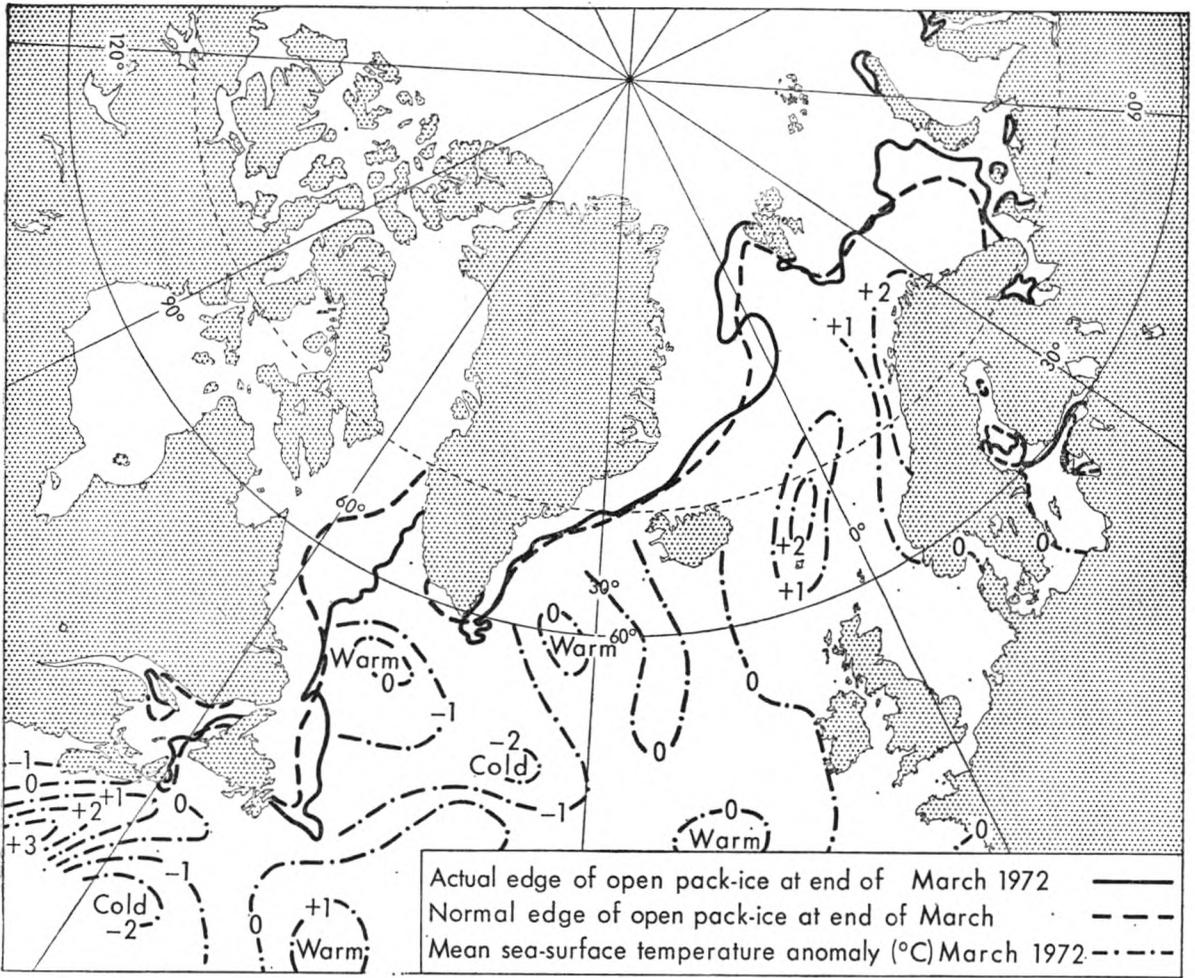
STATION	JANUARY						FEBRUARY						MARCH														
	LENGTH OF SEASON		ICE DAYS			NAVIGATION CONDITIONS	ACCUMULATED DEGREE DAYS		LENGTH OF SEASON		ICE DAYS			NAVIGATION CONDITIONS	ACCUMULATED DEGREE DAYS		LENGTH OF SEASON		ICE DAYS			NAVIGATION CONDITIONS	ACCUMULATED DEGREE DAYS				
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Leningrad	1	31	31	31	0	3	28	0	650	1	29	29	29	0	0	29	0	795	1	31	31	26	0	15	15	1	901
Riga	3	31	23	15	0	15	0	0	291	1	10	9	7	0	6	1	0	343	6	21	15	3	0	10	0	0	328
Pyarnu	1	31	31	31	0	26	5	0	357	1	20	20	20	0	2	27	0	438	1	31	31	31	0	0	31	0	497
Viborg	1	31	31	31	0	0	23	8	—	1	29	29	29	0	0	0	29	—	1	31	31	31	0	0	0	31	—
Klaipeda	6	31	26	0	11	11	0	0	267	1	25	14	0	7	8	0	0	282	6	21	9	0	0	0	0	0	253
Ventspils	17	31	14	0	0	8	0	0	—	1	10	10	0	0	2	0	0	—	10	21	10	0	0	6	0	0	—
Tallin	16	31	15	0	11	0	11	0	—	1	20	20	0	5	16	9	0	—	1	31	31	0	29	1	29	0	—
Helsinki	1	31	31	22	0	12	14	0	421	1	29	29	29	0	0	29	0	559	1	31	31	29	0	7	24	0	655
Mariehamn	14	31	6	0	0	3	0	0	112	1	29	29	24	0	20	0	0	192	1	31	28	24	2	28	0	0	258
Turku	7	31	24	20	0	20	1	0	354	1	20	20	20	0	20	0	0	461	1	31	31	22	0	24	0	0	538
Mantyluoto	5	31	24	1	0	14	5	0	—	1	29	29	22	0	11	18	0	—	1	31	31	29	0	0	31	0	—
Vaasa	1	31	31	31	0	0	31	0	447	1	29	29	29	0	0	29	0	630	1	31	31	30	0	0	31	0	757
Oulu	1	31	31	31	0	0	31	0	649	1	29	29	29	0	0	29	0	900	1	31	31	31	0	0	23	8	1062
Roytaa	1	31	31	4	24	0	18	0	—	1	29	29	0	29	0	29	0	1030	1	31	31	7	21	0	21	10	—
Lulea	1	31	31	31	0	0	31	0	740	1	29	29	29	0	0	29	0	—	1	31	31	31	0	0	31	0	—
Bredskar	1	31	30	26	0	30	0	0	—	1	20	20	24	0	16	13	0	—	1	31	29	23	0	5	23	0	—
Sundsvall	4	31	26	11	0	24	0	0	—	1	29	29	29	0	29	0	0	—	1	31	31	25	0	25	3	0	—
Stockholm	1	31	31	24	0	24	0	0	142	1	29	29	29	0	29	0	0	156	1	31	31	31	0	31	0	0	140
Kalmar	20	31	6	0	0	6	0	0	83	1	29	29	2	0	28	0	0	95	1	21	21	0	0	21	0	0	45
Sikelfted	5	31	27	24	0	12	15	0	—	1	29	29	29	0	0	29	0	—	1	31	31	31	0	0	31	0	—
Emden	19	27	9	0	0	18	1	0	—	1	10	10	0	0	4	0	0	—	0	0	0	0	0	0	0	0	—
Lutbeck	17	31	15	1	0	9	0	0	—	1	10	10	0	5	10	0	0	—	0	0	0	0	0	0	0	0	—
Hamburg	17	31	15	0	1	8	0	0	—	1	13	13	0	4	2	1	0	—	0	0	0	0	0	0	0	0	—
Bremerhaven	17	31	10	0	1	5	0	0	—	1	7	7	0	1	6	0	0	—	0	0	0	0	0	0	0	0	—
Kiel	0	0	0	0	0	0	0	0	—	5	8	4	0	0	0	0	0	—	0	0	0	0	0	0	0	0	—
Flensburg	0	0	0	0	0	0	0	0	—	2	15	14	7	3	13	1	0	—	0	0	0	0	0	0	0	0	—
Stettin	14	31	18	0	0	13	0	0	—	1	29	26	1	0	24	1	0	—	1	3	3	0	0	0	0	0	—
Gdansk	19	27	4	0	0	0	0	0	—	1	7	7	0	0	1	0	0	—	0	0	0	0	0	0	0	0	—
Stralsund	19	31	18	14	0	5	12	0	—	1	20	20	20	0	9	19	0	—	2	9	8	1	5	0	7	0	—
Rostock	15	31	14	3	2	6	2	0	—	1	9	9	8	0	2	0	0	—	0	0	0	0	0	0	0	0	—
Aarhus	0	0	0	0	0	0	0	0	—	3	8	6	0	0	5	0	0	—	0	0	0	0	0	0	0	0	—

CODE:

A First day ice reported. C No. of days that ice was reported. E No. of days of pack-ice. G No. of days assistance required.
 B Last day ice reported. D No. of days continuous land-fast ice. F No. of days dangerous to navigation, but assistance not required. H No. of days closed to navigation.
 I Accumulated degree-days of air temperature (°C) where known. * These figures give a rough measure of first the probability of the formation of sea ice, and later the progress of the growth and of its thickness. They are derived from daily averages of temperature (00 + 06 + 12 + 18 GMT) and are the sum of the number of the degrees Celsius below zero experienced each day during the period of sustained frost.







Book Review

The Value of the Weather, by W. J. Maunder. 9 in × 6 in, pp. 388, *illus.* Methuen & Co. Ltd., 11 New Fetter Lane, London EC4 (American distributors: Barnes & Noble Inc., New York), 1971. Price: £2.00 (paperback) or £3.75 (hardback).

Much of the development of meteorology has been concerned with the description and prediction of the state of the atmosphere, and there are few books which aim to evaluate objectively the development of the science. It is often suggested that if weather could be predicted more reliably and for a longer period of time, and brought under some measure of control, the benefits could be great. Questions on what exactly the benefits and costs of weather are and how they are assessed have not, in the past, been sufficiently investigated before the event. In this book the author discusses these questions in the context of the wider one of the problems, results and possibilities of evaluating the weather as it interacts with man's activities, both economic and social.

The book falls naturally into three parts: firstly, there is an extensive description of weather and man's activities. Many kinds of weather are destructive and costly and these are dealt with in turn, with extreme examples being given to show maximum costs of damage, and also some of the benefits. Other aspects—pollution and weather modification—are also discussed. The effect of the weather on the various activities is considered under the headings of Economic Activities, and Social and Psychological Aspects. These activities range from agriculture and fishing to transport and commerce and from human health to crime. A section on shipping and weather-routing of shipping is also included.

The second part of the book is concerned with the economic analysis of weather and the benefits and costs of weather knowledge. Various econoclimatic models are discussed, together with their limitations and applications on every scale. Types of weather information are described and their value, or potential value, are assessed. Of particular interest is the extensive section on Weather Forecasting, in which the author considers the whole spectrum from presentation to ultimate use of forecasts. The book closes with an account of the Political Planning and Legal Aspects of the weather, and in particular of weather modification.

The paperback edition is well set out, including several indices. The small number of photographs in the centre of the book have no real relevance to the text, but the many tables and diagrams are useful and well presented. In spite of the 'text-book' style of the book it is nevertheless worthwhile reading. The wide range of topics discussed, culled from papers from many fields, introduces the reader to many unusual facets of some problems. The effects of drought, for example, are not always harmful, nor are all the effects of hurricanes. Consideration of the weather and its effect on man are a welcome change from consideration of its effect on his economy. These, together with the many recommendations for avenues of research, make the book of use to meteorologists, economists, geographers and their students, as well as to the ordinary reader concerned with man and his environment.

F. R. H.

Personalities

RETIREMENT.—CAPTAIN C. G. MALLETT retired in March after 50 years at sea.

Charles Gordon Mallett was born at Newcastle-upon-Tyne and signed indentures in 1922 with Messrs. R. S. Dalgliesh & Co. Ltd., making his first voyage in their *Kenilworth*. On passing for 2nd Mate in 1927 he then went across to Messrs. Mungo Campbell & Co. Ltd., also of Newcastle, and was appointed to their *Dalveen*.

The great shipping depression 1930–35 hit Tyne-based shipping harder than most but Captain Mallett was able to find sea-going employment with Messrs. Ridley Son & Tulley of Newcastle, his first ship with them being the *Newton Beech*.

He passed for Master in 1936 and in 1937 he went to the *Farndale* belonging to Messrs. John Morrison & Co. Ltd. of Newcastle. This ship was lost by fire in 1939 after which he joined Messrs. Stephen Suttons & Co. as Chief Officer, firstly of the *Riley* and later of the *Empire Day*. In 1942 the latter ship came under the management of the Lyle Shipping Co. Ltd. of Glasgow on behalf of the Ministry of War Transport. In 1943, Captain Mallett was promoted to command her and remained with the Company, now known as the Scottish Ship Management Ltd., until he retired.

He was torpedoed in the *Empire Day* in 1943. In 1945 he was in command of the *Fort Steele* and was in the second convoy to reach Antwerp after the German occupation. Thereafter, for some months, the ship was employed in running stores etc. from London to Antwerp and for his service during the rather lengthy liberation of Belgium he was awarded the Belgian Croix de Guerre with palms.

After this assignment, the *Fort Steele*, still commanded by Captain Mallett, was the first vessel to enter Rotterdam after the liberation of the Netherlands.

Captain Mallett's record of voluntary observing goes back to 1946 when he was in command of the *Fort Steele*; in that year we received nine meteorological forms from him. His last ship was the *Cape Franklin* from which he had sent us meteorological logbooks continuously for the past twelve years. He received Excellent Awards in 1965 and 1969; in each of those years his ship had proved to be one of the three best observing ships and her photograph was published in the July 1965 and again in the July 1969 numbers of *The Marine Observer*.

We wish him health and happiness in his retirement.

L. B. P.

FLEET LISTS

Fleet Lists

GREAT BRITAIN (Information dated 6.4.72)

The following is a list of British ships which have been equipped with instruments and which voluntarily co-operate with the Marine Division of the Meteorological Office. The names of the Captains, Observing Officers and Senior Radio Officers are given as ascertained from the last written returns received. The date of receipt of the last return received is given in the second column; an asterisk indicates a new recruitment who has not yet sent in a logbook.

All returns received from observing ships will be acknowledged, direct to the ship, by the Marine Superintendent of the Meteorological Office. The Port Meteorological Officers and the Merchant Navy Agent will make personal calls on the Captains and Observing Officers as opportunity offers, or on notification from the ship at any time when their services are desired.

Excellent Awards are made at the end of each calendar year. The names of the Captains, Principal Observing Officers and Senior Radio Officers gaining these awards are published each July in *The Marine Observer*.

It is requested that prior notification of changes of service, probable periods of lay-up, transfer of Captain or other circumstances which may prevent the continuance of voluntary meteorological service at sea, may be made to a Port Meteorological Officer or Merchant Navy Agent, or to the Marine Superintendent of the Meteorological Office at Bracknell.

Captains and Officers are invited to point out any errors or omissions which may occur in the list.

Selected Ships

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Acacus</i>	• 25.2.72	R. E. Annet	A. R. Anderson, R. G. Savage, N. Kaye	J. Phelan	Shell Tankers (U.K.) Ltd.
<i>Achilles</i>	.. .. .	D. R. Hayward	R. J. Edmonds, J. C. Cox	D. Lancaster	Ocean Fleets Ltd.
<i>Act 1</i>	23.3.72	E. R. Jenkins	L. F. Cosden, J. Peddie, J. Laing	N. Maclean	Associated Container Transportation Ltd.
<i>Act 2</i>	26.11.71	P. Packwood	J. E. Chitty, J. Waller	D. Owen	Associated Container Transportation Ltd.
<i>Adelaide Star</i>	.. .. .	D. Gilmour	J. R. Leslie, P. Tann	W. Wade	Blue Star Line Ltd.
<i>Advanturer</i>	31.12.71	A. Moreton, M.B.E.	J. A. Northam, J. Maddison, J. Kennedy	P. C. Bigwood	T. & J. Harrison Ltd.
<i>Advocate</i>	3.5.71	J. H. B. Armstrong	.. .. .	.. .. .	P. & O. S.N. Co.
<i>Afganistan</i>	6.4.72	D. G. Fraser	.. .. .	.. .. .	Common Bros. Ltd.
<i>Ajax</i>	18.11.71	J. Fisher	K. G. Ward, R. S. Wynd, B. C. Graham, B. C. Crombie	R. J. McMilan	Ocean Fleets Ltd.
<i>Aibright Explorer</i>	5.1.72	J. Wise	D. S. Todd, K. J. Owen, J. J. Hall	Chan Kok Soo	James Fisher & Sons Ltd.
<i>Allbright Pioneer</i>	27.3.72	J. H. Kitching	R. J. Jones, M. Rossiter, W. MacMeikion	.. .. .	James Fisher & Sons Ltd.
<i>Alert</i>	7.2.72	J. P. Ruddock, O.B.E.	J. S. Northcott, C. M. Maloney, R. Ferguson-Jones	W. D. Brown	Post Office
<i>Alinda</i>	15.3.72	D. Cooper	.. .. .	.. .. .	Shell Tankers (U.K.) Ltd.
<i>Almaric</i>	28.7.69	C. Downes	D. F. Cammish, D. B. Travis, G. O. Okaroh	A. Bevan	Shaw Savill & Albion Co. Ltd.
<i>Amarna</i>	5.4.72	C. Prescott	S. Venner, J. F. Hannath	C. Hauge	Moss Hutchinson Line Ltd.
<i>Amastra</i>	20.12.71	D. M. C. Renton	J. P. Simcox, D. Toomer, A. W. Abbott	J. Lamb	Shell Tankers (U.K.) Ltd.
<i>Amoria</i>	24.2.72	J. Noyon	A. Joyce, R. C. Ray, R. Aitken	T. F. McCarthy	Blue Star Line Ltd.
<i>Anadara</i>	29.9.71	D. A. Laidler	R. J. Payne, P. J. Watson	J. O'Donoghue	Shell Tankers (U.K.) Ltd.
<i>Annamity</i>	4.1.72	T. R. Johnson	A. P. MacMillan, A. R. Watson	T. R. K. Bermingham	Shell Tankers (U.K.) Ltd.
<i>Antilochus</i>	16.2.72	D. G. Munro	J. A. Campbell, J. A. T. Davies	J. Chadwick	F. T. Everard & Sons Ltd.
<i>Antrim</i>	15.3.72	J. R. Teare	R. Moxon, J. M. Barlow, E. Watterson	.. .. .	Ocean Fleets Ltd.
<i>Aratuén</i>	18.3.72	A. Murray	.. .. .	P. M. Weldon	Avenue S.S. Co. Ltd.
<i>Argentina Star</i>	24.2.72	P. D. Guerrier	H. Goulden, A. Betts, D. Captain	A. T. Irwing	Trinder Anderson & Co. Ltd.
	20.5.71	H. W. McNeil	W. A. Walker, J. Clarry, R. Aitken, G. R. Evans	J. Scarr	Blue Star Line Ltd.

Selected Ships (contd.)

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Brasil Star</i> ..	21.3.72	A. H. Dare	B. Yelland, M. Bamford, P. B. Watson, A. Warmole	O. O'Shaughnessy	Blue Star Line Ltd.
<i>Britannic</i> ..	1.9.71	G. Muirson	A. Webber, J. Calder	J. Yates	Shaw Savill & Albion Co. Ltd.
<i>British Ambassador</i> ..	24.3.72	W. V. Frost	R. A. Marsh, R. F. Fraser, A. A. Beattie	E. A. McGauran	B.P. Tanker Co. Ltd.
<i>British Bombardier</i> ..	17.3.72	M. J. Goulding	R. N. C. Stevens, J. Taylor, J. E. Williams	R. Quinn	B.P. Tanker Co. Ltd.
<i>British Confidence</i> ..	5.4.72	D. W. Powell	J. B. Hood, J. Brennan, S. G. B. Elder	D. Cronin	B.P. Tanker Co. Ltd.
<i>British Fulmar</i> ..	24.3.72	A. G. Smith	A. R. Duggins, D. Fowler, S. Gammage	D. Bone	B.P. Tanker Co. Ltd.
<i>British Hero</i> ..	24.1.72	J. Mackay	R. J. Doe, R. Thompson, I. M. Peterson	R. Lowe	B.P. Tanker Co. Ltd.
<i>British Holly</i> ..	15.1.71	W. Hare	P. D. Dalby, J. R. Hodgkinson, P. A. Martin	P. Mobbs	B.P. Tanker Co. Ltd.
<i>British Kiwi</i> ..	20.12.71	J. R. Ramsey	M. Openshaw, R. Cribbald, T. C. Robinson	D. C. Noble	B.P. Tanker Co. Ltd.
<i>British Merlin</i> ..	2.12.71	J. Forrest	I. T. Anderson, M. J. Searie, R. Hiron	A. G. Patterson	B.P. Tanker Co. Ltd.
<i>British Sailor</i> ..	5.1.72	K. H. Lewis	T. Bellis, P. A. Edwards, G. C. Main	I. G. Jones	B.P. Tanker Co. Ltd.
<i>British Trust</i> ..	5.4.72	N. J. Packard	S. A. Syed, J. B. Harvey, A. J. Richards, R. J. Dreher	R. Haigh	P. & O. S.N. Co.
<i>British Valour</i> ..	8.2.72	W. S. Counsell	P. A. Woods, A. J. Booth, R. K. Prakej, D. Bell	C. R. More	Canadian Pacific Steamships Ltd.
<i>Buccleuch</i> ..	30.3.71	J. D. Smythe	R. K. Prakej, A. J. Booth, D. A. MacMahon	N. H. Prince	Canadian Pacific Steamships Ltd.
<i>C.P. Discoverer</i> ..	4.4.72	J. D. Jeavons	P. C. M. Adair, I. C. Samples	J. W. Barrie	Canadian Pacific Steamships Ltd.
<i>C.P. Explorer</i> ..	4.10.71	T. Parker	B. Powney, K. S. Rennison	A. D. Marsden	Canadian Pacific Steamships Ltd.
<i>C.P. Tyader</i> ..	20.12.71	C. Beck	P. A. Woods, D. A. Rowan, G. H. Wright, A. MacMahon	V. G. Merriott	Ocean Fleets Ltd.
<i>C.P. Voyager</i> ..	4.4.72	P. J. Roberts	L. J. Drummond, R. G. J. Wiltshire, M. Brew	A. W. Hay	Blue Star Line Ltd.
<i>Calchas</i> ..	4.4.72	C. J. Cheshire	N. Martin, R. Young	D. Briggs	Fyffes Group Ltd.
<i>California Star</i> ..	12.8.71	A. Thomson	S. Jones, R. Cumbers	C. O. Auld	Blue Star Line Ltd.
<i>Camito</i> ..	16.2.72	A. J. Chivers	D. Marsh, D. E. Norman, R. Tonge	P. Arnold	Shaw Savill & Albion Co. Ltd.
<i>Canberra Star</i> ..	4.10.71	C. A. S. Borthwick	A. M. Powell, P. V. Hunter, G. Coleridge	P. S. Henderson	Blue Star Line Ltd.
<i>Canopic</i> ..	13.3.72	G. D. Easton	R. W. Davidson, I. Moist, L. O. J. Llewellyn	D. Hynd	Lyle Shipping Co. Ltd.
<i>Canterbury Star</i> ..	14.2.72	J. J. I. Barclay	B. W. Lawson, A. G. Maxwell, T. R. Upson	C. Richie	Lyle Shipping Co. Ltd.
<i>Cape Clear</i> ..	6.4.72	I. G. Mallett	L. J. Gilhooly, A. Wear, J. Paget, J. Callan	D. Gudgeon	Lyle Shipping Co. Ltd.
<i>Cape Franklin</i> ..	8.2.72	J. Macnab	I. G. Robertson, J. McNeil, M. Naismith-Beeley	L. Cameron	Lyle Shipping Co. Ltd.
<i>Cape Horn</i> ..	27.3.72	C. Strachan	J. C. Gibson, S. W. Wright, R. Mullen	M. L. Bird	Lyle Shipping Co. Ltd.
<i>Cape Howe</i> ..	20.12.71	A. C. Hunter	T. K. Walker, G. McGregor, A. R. Lanfear	A. Stewart	Lyle Shipping Co. Ltd.
<i>Cape Nelson</i> ..	13.12.71	T. R. Baker	P. C. Mackay, P. M. Cooney, R. D. Kincaid	D. P. Bidmead	Sir Wm. Reardon Smith & Sons Ltd.
<i>Cape Sable</i> ..	18.2.72	D. S. Gordon	J. R. Francis, R. W. Sumner, C. J. Brazier, G. T. Parker	A. Brown	Ocean Fleets Ltd.
<i>Cape York</i> ..	20.12.71	A. B. Sutherland	M. W. Martin, A. E. J. Coates, P. J. Barratt	S. F. Bence	Jardine Matheson & Co. Ltd.
<i>Cardiff City</i> ..	20.12.72	D. Lloyd	D. MacIntyre, D. Pavri, R. Lyon	J. MacFarland	G. Heyn & Sons Ltd.
<i>Cardiganshire</i> ..	20.12.72	K. Millar	C. R. Doren, B. Kane, H. MacCowan	J. W. Field	Shaw Savill & Albion Co. Ltd.
<i>Carré</i> ..	26.1.72	J. D. Savage	T. B. Miller, J. Park, R. Mallam	J. A. C. Richards	P. & O. S.N. Co.
<i>Carrigon Head</i> ..	22.11.71	J. G. Street	R. G. Tull, K. A. Long, R. H. M. Syvret, K. Papworth	J. Visenga	John I. Jacobs & Co. Ltd.
<i>Cedric</i> ..	5.4.72	D. P. Barry	J. D. Nicholson, I. A. MacDonald, N. S. Sodhi	H. Jones	W. A. Souther & Co. Ltd.
<i>Chaklara</i> ..	30.12.71	F. L. Heard	A. Zembrak, R. A. Wazacz, M. J. Chambers	N. Volland	Ministry of Agriculture, Fisheries & Food
<i>Chaklia</i> ..	20.10.71	J. E. M. Balfour	P. M. Stobbs, T. Rowlands	R. B. Cooper	Ellerman Lines Ltd.
<i>Cherrywood</i> ..	30.12.71	J. S. Cunningham	W. J. Saxby, F. W. Brown, E. N. Williams	R. J. Kerr	Ellerman Lines Ltd.
<i>Cheviot</i> ..	30.12.71	J. Walker	A. A. Thorpe, D. W. Bunder, P. M. Comber-Evans		
<i>Civrolana</i> ..	19.1.72	T. Rigg	D. Gregory, P. C. Williams, D. W. Anderson		
<i>City of Auckland</i> ..		D. Brown			
<i>City of Bedford</i> ..					

Selected Ships (contd.)

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Crystal Sapphire</i>	13.8.71	D. Patrickson	T. M. Tait, I. C. Rollo, G. E. Harvey, W. M. Cowan	E. Williams	Sugar Line Ltd.
<i>Cumberland</i>	27.9.71	C. P. Robinson, O.B.E.	W. N. C. Pointon, R. W. W. Baldwin, S. L. Leuty		P. & O. S.N. Co.
<i>Cumbria</i>	26.10.71	W. S. Lewis			Hadley Shipping Co. Ltd.
<i>Cyclops</i>	3.2.72	H. Davies	W. A. Cowan, D. S. Holme	R. A. Wakeley	Ocean Fleets Ltd.
<i>Cymric</i>	3.9.71	F. M. Dickenson	I. M. Anderson, D. Stewart-Taylor, P. G. Fry	J. Cameron	Shaw Savill & Albion Co. Ltd.
<i>Daghestan</i>	6.4.72	I. Burton	W. B. Thomas, L. Laidler, J. Robertson	C. M. Airey	Common Bros. Ltd.
<i>Dalesman</i>	17.3.72	G. A. Cain	T. M. Fitzpatrick, R. J. Smith, R. G. Huggle	W. Macartney	T. & J. Harrison Ltd.
<i>Dalhanna</i>	22.2.72	T. J. Alexander	B. J. Perkins, C. E. Walford, G. Alexander	D. Cooper	Hunting & Son Ltd.
<i>Dart America</i>	28.2.72	E. Irish	R. Q. Palmer, D. S. Wood, G. Bentley	P. A. Cross	Bibby Line Ltd.
<i>Dart Atlantic</i>	27.3.72	N. Childs	T. Nyunt, —, Edwards	M. K. Wilmot	Bibby Line Ltd.
<i>Derbyshire</i>	*	M. C. Mills	C. Hoskison, D. S. Wood, G. Bentley	A. Bath	T. & J. Harrison Ltd.
<i>Discoverer</i>	*	R. H. Williams	M. A. Harding, A. Marsh, M. Bradley, D. A. Pye	G. Ferrand	Natural Environment Research Council
<i>Discovery</i>	1.12.71	G. L. Howe		P. J. Phelan	
<i>Discovery Bay</i>	4.4.72	J. Cosker	A. J. Fee, B. V. Chipperfield, C. A. Sheffield	R. B. Redhead	Container Fleets Ltd.
<i>Donegal</i>	21.1.72	F. J. Adams	P. Thackstone, F. E. Spicer, R. Berry	D. J. Rooms	Trinder Anderson & Co. Ltd.
<i>Dorset</i>	6.12.71	B. Austen-Smith	C. R. Dalzell, P. N. J. Cowdell, R. D. Goodison	J. R. Shepherd	P. & O. S.N. Co.
<i>Duhallow</i>	30.11.71	D. C. Penberthy	J. J. Sharp, K. W. Fulker, N. Muhsin	D. English	P. & O. S.N. Co.
<i>Dukesgarth</i>	8.11.71	N. Richardson	D. M. Wohlgenuth, W. Lowther, W. Locker, P. Evans	G. Minay	Cory Maritime Ltd.
<i>Dunadd</i>	1.11.71	A. J. MacDonald	O. A. Bent, P. E. Shaw	G. Gleeson	J. & J. Denholm Ltd.
<i>Dumbane</i>	5.1.72	M. J. Feltham	T. E. F. Grant, P. Truscott, J. Mackenzie	R. W. McCoy	J. & J. Denholm Ltd.
<i>Duncraig</i>	21.7.71	A. Stuart	J. M. Bullard, K. E. Greest, B. G. Longley	K. File	J. & J. Denholm Ltd.
<i>Dunkwa</i>	24.2.72	F. M. Howe	C. Godderidge, D. Rowland, J. Robinson	J. Davies	Elder Dempster Lines Ltd.
<i>Dunstanburgh Castle</i>	17.11.70	P. S. Gardner	D. M. Daley, P. Crabtree, R. Speight	K. Dillion	W. A. Souther & Co. Ltd.
<i>Eagle</i>	*	G. Renshawe	R. M. Keyzor, K. Brammer, A. F. Wilson	J. Ernest	General S.N. Co. Ltd.
<i>Edenmore</i>	11.10.71	N. A. C. Smith	S. K. Brewster, F. T. Chapman, T. R. Fulthorpe	K. Dillion	Furness Withy & Co. Ltd.
<i>Edinburgh Castle</i>	28.2.72	R. Shattock	I. L. Boxwell, G. Farmer, C. Overall, J. Lewis		Union-Castle Mail S.S. Co. Ltd.
<i>Edwara Wulshaw</i>	11.6.68	N. H. Smith	R. H. Dawson, P. H. Dathan, D. P. Drew	J. Odley	Cable & Wireless Ltd.
<i>Egton</i>	6.12.71	M. Turton	J. N. Maciver, J. F. Beckett, H. MacDonald	C. R. Peet	Roland & Marwood S.S. Co. Ltd.
<i>El Lobo</i>	15.11.72	R. Knowles	M. W. Wats, Q. J. Murray, D. E. Spencer	T. Hardie	Howing S.S. Co. Ltd.
<i>Elizabeth Bowater</i>	30.4.71	P. H. Thomas, R.D.	R. I. Steer, D. H. Cook, D. McNeil	C. D. Pople	Cayzer Irvine & Co. Ltd.
<i>Elmhank</i>	28.2.72	B. Hinderwell	R. F. A. Kendrick, K. R. Strudwick, N. J. Alexander	W. J. Roberts	Bank Line Ltd.
<i>Encounter Bay</i>	25.8.71	J. Calabrese	D. Goodwin, I. Rutherford, J. Jackson	W. F. Shepherd	Container Fleets Ltd.
<i>English Star</i>	26.7.71	R. J. Smith	C. F. Wass, T. Fitzearle	U. In San	Blue Star Line Ltd.
<i>Eraven</i>	9.2.72	R. Michael	K. W. Soulsby, J. Barkess	J. P. Whiteley	John Swire & Sons Ltd.
<i>Essex</i>	25.2.72	R. B. Walker	H. W. Webb, B. Graham, D. A. Tate	D. Leeson	P. & O. S.N. Co.
<i>Esso Caledonia</i>	14.3.72	G. Rowe	K. Hebdon, T. B. Stephenson, B. W. B. Lucas	I. Morgan	Esso Petroleum Co. Ltd.
<i>Esso Hampshire</i>	18.1.72	R. Hyam	J. P. Mitchell, T. J. Lowe	P. Cagney	Esso Petroleum Co. Ltd.
<i>Esso Pembrokehire</i>	28.2.72	I. Borrowdale	G. Watt, D. J. Morrison, S. Baker		Esso Petroleum Co. Ltd.
<i>Esso Ulidia</i>	27.3.72	H. Johnson	P. H. Howard, R. McKenzie		Esso Petroleum Co. Ltd.
<i>Eucaida</i>	29.2.72	W. MacVicar, O.B.E.	M. J. J. Williamson, J. Meador, J. F. Clapham,		Esso Petroleum Co. Ltd.
<i>Eurofreighter</i>	*	A. D. Naismith	R. Taylor		Walter Runciman & Co. Ltd.
<i>Euroliner</i>	*	N. A. MacDonald			J. & J. Denholm Ltd.
<i>Explorer</i>	3.9.71	G. W. McGuinness	J. G. Brown, J. Steven	D. Murphy	T. & J. Harrison Ltd.
<i>Explorer (F.R.S.)</i>	2.2.72	A. M. Finlayson		A. Watson	Dept. of Agriculture & Fisheries for Scotland

Selected Ships (contd.)

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Himalaya</i>	5.4.72	M. R. Prowse	B. T. Kirtley, J. A. Child, L. A. Watson	K. Gibson	P. & O. S.N. Co.
<i>Hinakura</i>	3.2.72	P. Lay	E. Fawcett, M. J. Stopford, A. D. Evans, B. Kay	G. M. Turner	Shell Tankers (U.K.) Ltd.
<i>Historian</i>	21.3.72	S. W. Taylor	N. B. Woodhouse, P. B. Pamment, T. A. Smith	R. Burlington	T. & J. Harrison Ltd.
<i>Horomya</i>	29.12.71	R. P. Jones	R. B. Cox, E. Maxwell, M. Watts, M. Gates	H. G. Sparkes	Shell Tankers (U.K.) Ltd.
<i>Houra</i>	26.10.71	C. J. Whitton	S. Bennett, M. Tormoat, H. A. Johnson	R. P. Robertson	P. & O. S.N. Co.
<i>Hudson Trader</i>	15.3.72	A. D. Johnston	J. B. F. Hewitt, M. J. Wray, D. P. Hall	P. Taylor	Hudson S.S. Co. Ltd.
<i>Humilara</i>	30.9.70	— Taylor	A. Gordon, D. Sutherland, — Collier	D. Griffith	Shell Tankers (U.K.) Ltd.
<i>Huntingdon</i>	31.1.72	W. Thomas	I. Coulman, A. Charlesworth, M. Blight, J. Johnston	C. P. McCann	P. & O. S.N. Co.
<i>Hurutui</i>	27.3.72	A. B. Stalker	T. J. Shone, D. R. Mountford, D. Scott	C. J. Elliott	P. & O. S.N. Co.
<i>Hyalia</i>	4.1.72	J. F. Milner	D. Robertson, M. Bosworth, R. K. Blake	K. J. Roberts	Shell Tankers (U.K.) Ltd.
<i>Icenic</i>	24.11.71	R. Bridgewood	M. L. Pryce, J. Purvis	M. P. Elliott	Shaw Savill & Albion Co. Ltd.
<i>Ilyric</i>	1.3.72	J. Gunning	M. L. Miller, R. A. Wooding, D. G. Lyon	F. O'Farrell	Shaw Savill & Albion Co. Ltd.
<i>Inshoven Head</i>	7.1.72	R. Marshall	J. S. McKechnie, G. McDonald	H. A. Sirett	Shaw Savill & Albion Co. Ltd.
<i>Inverbank</i>	5.1.72	A. Stevens	S. R. T. Miller, J. Bradley, R. Copeland, P. J. Sheriff	R. McIsaac	G. Heyn & Sons Ltd.
<i>Ionic</i>	8.11.71	R. A. Maxwell	K. L. Kitchen, D. A. Macleod, P. Spink	K. Munnear	Bank Line Ltd.
<i>Yamaica Planter</i>	12.11.71	D. J. Rees	S. Barber, N. Lockie, J. Clamp	J. Middleitch	Shaw Savill & Albion Co. Ltd.
<i>Yamaica Producer</i>	8.3.72	C. R. Downes	A. A. Barker, T. Moodie, A. C. W. Lipscombe	M. Pearson	Kaye Son & Co. Ltd.
<i>Jervis Bay</i>	25.2.72	E. J. Warwick	G. W. H. Tennant, J. A. Twisleton, D. S. Olden	I. MacDonald	Container Fleets Ltd.
<i>John Biscoe</i>	17.2.72	G. A. Foulds	K. W. S. Macmillan, C. R. Short, J. R. Penson	C. H. Hodson	Natural Environment Research Council
	7.5.71	M. J. Heron	A. R. Binder, E. M. S. Phelps, S. J. Lawrence, I. Hotchin		
<i>John Murray</i>	18.8.71	P. Maw	B. A. Chapman		
<i>Jumna</i>	29.12.70	L. J. Annett	N. Mubsin, J. Solley, J. Sharp	C. M. Airey	P. & O. S.N. Co.
<i>Karaghistan</i>	15.3.72	J. P. S. Grimason	J. Hebblewaite, I. MacHarnish, J. Swan	J. Kiddle	Palm Line Ltd.
<i>King Alexander</i>	15.4.71	A. W. Jones	K. H. Gear, J. McMurren, G. Phillips	P. E. D. Harris	Frank C. Strick & Co. Ltd.
<i>King Arthur</i>	18.10.71	R. A. G. Simmons, R.D.	I. McLaren, R. T. Flemington, P. I. Philpott, A. B. Ekim	R. M. Miller	Cayzer Irvine & Co. Ltd.
<i>King Charles</i>	1.3.72	L. H. A. Bainton	D. O. Reed, A. J. Stewart, G. D. Mobbs	I. M. Courtney	Cayzer Irvine & Co. Ltd.
<i>King George</i>	14.3.72	T. N. Geesin	L. Robbins, S. J. Ivey, G. D. Mobbs	M. D. Norfolk	Cayzer Irvine & Co. Ltd.
<i>King Henry</i>	20.12.71	J. H. Beavan	R. S. Wadhani, J. Gregson	J. Braddock	Cayzer Irvine & Co. Ltd.
<i>King Malcolm</i>	9.12.70	D. Richards	A. Nisbet, A. Oxley, W. Saunders, P. Nind	P. Mounsdon	Cayzer Irvine & Co. Ltd.
<i>Kinnaird Castle</i>	30.12.71	S. M. Grant	R. M. Thomas, P. G. Atkinson, B. F. Fountain	T. J. Martel	Union-Castle Mail S.S. Co. Ltd.
<i>Kohistan</i>	21.3.72	J. E. Sellars	S. Dummer, I. Stroud, P. Sweeney	C. E. G. Pratt	P. & O. S.N. Co.
<i>Laganbank</i>	25.2.72	P. W. Price	R. W. S. Mair, W. Hitchcock, A. R. McBride	J. Fittou	Frank C. Strick & Co. Ltd.
<i>Laomedon</i>	13.9.71	L. E. Steers	G. Winter, C. Duggan, D. Pears	D. Smith	Bank Line Ltd.
<i>Laurentic</i>	27.3.72	J. L. Stobbs	A. G. F. Feal, I. D. Pattison, P. B. Anderson	D. Connolly	Shaw Savill & Albion Co. Ltd.
<i>Leitchworth</i>	9.2.72	A. Hurst	R. Berryman, K. Ferries, A. G. MacInnes		R. S. Dalgliesh Ltd.
<i>Lindsfarne</i>	19.10.71	R. W. Webb	R. M. S. Barrett, R. Carr, M. Bullard	C. W. Lomax	W. A. Souther & Co. Ltd.
<i>London Pioneer</i>	6.12.71	R. A. Markham	J. A. Dunlop, P. C. H. Adair, F. K. Gordon, M. J. Howden	D. McCallum	British & Overseas Freighters Ltd.
<i>Longstone</i>	1.12.71	J. Walker	C. Turner, G. Peto, S. Conn	J. Taylor	W. A. Souther & Co. Ltd.
<i>Lossibank</i>	13.3.72	T. D. Scott	J. L. Lane, E. J. Owen, J. Van Diere-Donk	I. Turnbull	Canadian Pacific (Bermuda) Ltd.
<i>Lyminge</i>		A. L. Wood	J. Gilchrist, R. Harrison, M. Longman, D. H. Gittens	R. Cuthbert	Bank Line Ltd.
<i>Mabel Warwick</i>		N. Oddy		D. Wade	Constants Ltd.
				A. E. de La Grense	Houlder Bros. & Co. Ltd.

<i>Macharda</i>	1.11.71	A. G. M. Ward	P. N. Burgess, C. S. Kingston, N. C. Frampton	J. D. Boardman	Cunard-Brocklebank Ltd.
<i>Mahrona</i>	12.7.71	J. B. Clemenson	R. J. Morgan	M. K. Cook	Cunard-Brocklebank Ltd.
<i>Maiseer</i>	26.1.72	G. D. Symonds	D. J. Thomas, R. E. Roberts, R. C. Winlo	G. Graham	Cunard-Brocklebank Ltd.
<i>Makaria</i>		J. Pascoe	K. Brethrick, W. Whiston, B. Luke	S. A. Brown	Moss Hutchison Line Ltd.
<i>Manapouri</i>	14.9.71	J. D. Guyler	D. J. Tomkiss, J. Hill, H. J. Vercoe, C. G. Rolleston, B. G. Hardy		P. & O. S.N. Co.
<i>Manchester Challenge</i>	17.11.71	J. M. Rushworth	M. Broadhead, W. A. Lowe, D. R. Llewellyn, J. Baker	C. R. Bisby	Manchester Liners Ltd.
<i>Manchester Concept</i>	1.6.71	D. P. Humphrey	R. A. Brown, J. Baker, F. D. E. Kitt	C. R. Bisby	Manchester Liners Ltd.
<i>Manchester Concorde</i>	6.12.71	N. W. Cockshoot	K. Whittaker, D. R. Perry		Manchester Liners Ltd.
<i>Manchester Courage</i>	14.8.70	D. G. Thomas	G. Hughes-Jones, R. Webb, A. McKay	C. R. Bisby	Manchester Liners Ltd.
<i>Manchester Crusade</i>	26.10.71	T. W. Cockshoot	I. R. Norcliffe, D. R. Perry, W. Moss, D. Smith	T. G. White	Manchester Liners Ltd.
<i>Manchester Merit</i>	8.10.71	T. B. Hancock	P. J. Walden, B. Nelson, G. Shadbout	K. Halliday	Manchester Liners Ltd.
<i>Manchester Quest</i>	12.7.71	O. Selwood	K. Graham, D. Geddes, J. Bell, A. G. Lydell	G. A. Evans	Manchester Liners Ltd.
<i>Manipur</i>	5.4.72	J. Moore	N. Mackinnon, L. W. Crump, J. Chalmers	R. P. R. Sibley	Manchester Liners Ltd.
<i>Marabank</i>	15.10.71	D. J. R. Davies	M. Wright, J. Brooks, S. P. Hockley	L. Robinson	Cunard-Brocklebank Ltd.
<i>Maron</i>	23.3.72	J. Bold	R. J. Pace, N. Bolland, P. Foster	J. Peters	Bank Line Ltd.
<i>Mataura</i>	6.4.72	K. Barnett, R.D.	C. P. Wise, P. Donaldson, M. Darling	W. F. Law	Ocean Fleets Ltd.
<i>Medic</i>	4.1.72	H. O. V. Andersen, M.V.O.	M. Littledale, J. S. Merrells, A. J. Haining	D. F. McSweeney	P. & O. S.N. Co.
<i>Meganic</i>	8.3.72	P. M. Wheatley	D. A. Kett, D. M. Dole, M. G. Bullock	T. F. M. Ralph	Shaw Savill & Albion Co. Ltd.
<i>Melbourne Star</i>	24.1.72	P. Stevens	B. Thompson, J. R. Adams, P. Stacey	M. Brooks	Blue Star Line Ltd.
<i>Melita</i>	14.4.71	R. D. Leckie	R. Cook, D. Moreton, R. Blackelock	D. Walsh	Moss Hutchison Line Ltd.
<i>Mercury</i>	30.12.71	P. B. Henderson	J. R. K. Corrin, D. L. Cockin, S. A. McCJure	M. S. McLaren	Ocean Fleets Ltd.
<i>Miranda</i>	22.3.72	G. C. Needham	D. Smeed, A. Joyce, F. Thorpe	G. A. O'Brien	Cable & Wireless Ltd.
<i>Mitra</i>	22.3.72	J. J. Greener	C. J. I. Okpareke, B. Martin, J. Vaisey	I. W. Barnes	Dept. of Trade & Industry
<i>Monksgrath</i>	22.3.72	I. Sharp	N. J. Snowden, T. Groves, I. C. Donaldson	R. Collins	Shell Tankers (U.K.) Ltd.
<i>Montreal City</i>	24.3.72	D. Williams	C. O. Thomas, R. Q. Palmer, J. P. Hobbs	P. Chadwick	Cory Maritime Ltd.
<i>Moreton Bay</i>	27.3.72	M. Champneys	J. N. A. Hallmark, R. Wood, C. H. C. Knight	B. McIntosh	Bibby Line Ltd.
<i>Montreal Star</i>	27.3.72	W. T. Pitcher	J. M. Cully, D. Robinson, D. T. Thomas	E. R. C. Lamb	Container Fleets Ltd.
<i>Mystic</i>	27.3.72	E. H. Gregson	C. G. G. Hawken, I. H. Owens, M. Scott	E. Doyle	Blue Star Line Ltd.
<i>Nardana</i>	28.1.72	R. B. Coates	R. A. Gammie, C. M. Fox, A. Rashid	P. & O. S.N. Co.	Furness Withy & Co. Ltd.
<i>Nevasa</i>	25.10.71	R. Baker	N. Harwood, E. Milne, P. G. Carr, G. McHardy	P. & O. S.N. Co.	P. & O. S.N. Co.
<i>Newcastle Star</i>	24.2.72	A. H. White	T. R. Longman, T. J. Burierton, P. Beckett	R. D. Campbell	Blue Star Line Ltd.
<i>Newfoundland</i>	26.10.71	C. Alison	A. M. Beevor-Reid, N. Waldron, A. J. H. Crowther	A. Ferguson	Furness Withy & Co. Ltd.
<i>New Westminster</i>		M. Higgins			Sir Wm. Reardon Smith & Sons Ltd.
<i>New Zealand Star</i>	8.3.72	J. G. Reeve	F. Silic, P. J. Hurlock, J. E. Abell	D. J. Ellis	Blue Star Line Ltd.
<i>Nicolas Bowater</i>	10.11.70	S. A. Booker	M. F. L. d'Espagnac, J. McKendrick, M. Barrett	B. Wilcox	Cayzer Irvine & Co. Ltd.
<i>Nigaristan</i>	26.10.71	R. P. Royan	P. Ploughman, I. Ridout, A. J. Cook	E. Marks	Frank C. Strick & Co. Ltd.
<i>Nina Bowater</i>	1.12.71	J. Harper	P. Masters, D. McWilliam, B. L. Reid, C. H. Vickers	J. McNeil	Cayzer Irvine & Co. Ltd.
<i>Norse Marshall</i>	6.12.71	J. E. Roddam	W. Campbell, A. Lewis	D. R. A. Young	Sir R. Ropner & Co. Ltd.
<i>Norse Viking</i>	17.1.72	D. T. Mouldley	G. Hindmarch, R. C. Jackson, C. Williams, D. N. McLeod	P. J. O'Carroll	Sir R. Ropner & Co. Ltd.
<i>Northern Star</i>		R. Gibson	C. D. Marshall, P. Boucher, V. H. Ridges, N. Watkins, R. Perks		Shaw Savill & Albion Co. Ltd.
<i>Northumberland</i>	8.1.72	B. W. Jones	H. M. Munro, D. A. Forster, M. V. Darling	D. J. Lendrum	P. & O. S.N. Co.
<i>Nova Scotia</i>	3.3.72	W. Alexander	R. E. Fairley, M. Baker	G. Smith	Furness Withy & Co. Ltd.
<i>Novelist</i>	26.10.71	B. A. Hills	G. Batchelor, D. Newton, K. A. Ellis	P. Dennehy	T. & J. Harrison Ltd.
<i>Nurmahal</i>	24.2.72	R. K. C. Thomas	C. V. Umrigar, R. Lindsey, J. Cobban	G. S. Thomson	P. & O. S.N. Co.
<i>Ocean Monarch</i>	17.1.72	E. G. Towland	D. Stansbury, M. Eden-Smith, J. Grant	W. Fryer	Shaw Savill & Albion Co. Ltd.
<i>Orcades</i>	22.12.71	J. W. Terry	M. W. Knight, J. Smith, S. Winter	W. Rance	P. & O. S.N. Co.
<i>Orcoma</i>	23.7.71	C. W. Alison	Holland-Lloyd, H. Burgess, D. Whiteley	J. McConnell	Furness Withy & Co. Ltd.
<i>Oreida Bridge</i>	4.11.71		D. Abbott, T. Pearson-Bish, R. Cropper	C. Gammell	Furness Withy & Co. Ltd.
<i>Orita</i>			I. C. Palliser, J. Browne, J. Joyce	G. W. Evans	P. & O. S.N. Co.
<i>Oronsay</i>			T. Sax, M. Lodge, C. Arnold, S. R. Brown	T. Croft	Furness Withy & Co. Ltd.
<i>Oropesa</i>					

Selected Ships (contd.)

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Orotava Bridge</i>	24.2.72	G. V. Spong	J. W. Beveridge, J. H. W. Bletsoe, W. Crook	R. Thorburn	Ore Carriers Ltd.
<i>Oroya</i>	14.9.71	J. T. Jones	M. R. Greenwood, M. Fenwick, J. Clark	H. Holdridge	Furness Withy & Co. Ltd.
<i>Orsino</i>	24.3.72	W. Stockton	G. W. Patrick, C. Rudd, L. Jessop	G. Thompson	Hellyer Bros. Ltd.
<i>Orsova</i>	8.11.71	F. B. Woolley, R.D.	B. Minter, G. P. D. Combe, F. M. Steeves, R. Karlsson	R. H. C. Berry	P. & O. S.N. Co.
<i>Otato</i>	18.8.71	R. B. Hood	A. W. Noble, D. W. Viner, J. T. Williams	C. G. Heath	P. & O. S.N. Co.
<i>Otobai</i>	5.8.71	J. H. B. Weston	J. Murt, P. Clegg, N. Allwood, I. Thomson	C. Madders	P. & O. S.N. Co.
<i>Pando Cape</i>	5.4.72	J. W. Bonner	J. Reynolds, R. M. Smith, C. Curran	D. Hilliard	P. & O. S.N. Co.
<i>Pando Gulf</i>	*	T. A. M. Lincoln	R. J. A. Brook-Hart, D. A. Dornom, R. P. Bass, R. Coldham	J. M. D. Slade	P. & O. S.N. Co.
<i>Pando Point</i>	12.1.72	R. Bullock-Webster	C. F. Campbell, N. Lampe, S. Alban	M. Anderson	P. & O. S.N. Co.
<i>Pando Sound</i>	7.1.72	G. C. Barrett	I. Gilmour	H. A. Jones	P. & O. S.N. Co.
<i>Pando Strait</i>	10.2.72	E. A. W. Mortleman-Lewis, R.D.	P. J. Footman-Williams, M. H. Hall-Thompson	A. Burke	P. & O. S.N. Co.
<i>Partula</i>	24.3.72	J. M. Clouting	C. J. Rogers	M. J. Foran	Shell Tankers (U.K.) Ltd.
<i>Patonga</i>	18.1.72	C. B. Cooke	A. B. Parry	A. J. Simpson	P. & O. S.N. Co.
<i>Patroctus</i>	25.2.72	L. H. Pond	P. F. Noonam, H. W. Simmonds, S. F. Garside	E. A. Myers	Ocean Fleets Ltd.
<i>Pegu</i>	20.12.71	J. E. Webb	I. G. Jones, T. P. Dodkins	J. Gallego	Ocean Fleets Ltd.
<i>Peisander</i>	21.3.72	J. Banna	T. P. Seel, R. C. Middleton, P. F. Robinson	A. J. Thomson	Ocean Fleets Ltd.
<i>Peleus</i>	8.3.72	J. F. Burnett	D. W. O. Small, A. B. Johnson	R. Stevens	Ocean Fleets Ltd.
<i>Pembrokeshire</i>	7.2.72	W. R. Willis	G. F. Smith, I. Cumming, C. M. Sandy, G. C. Vickary	N. Kinley	Union-Line Ltd.
<i>Pendennis Castle</i>	24.1.72	H. Dryden	G. Peatling, R. Jackman, N. Preston	D. Bristolow	R. S. Dalgleish Ltd.
<i>Pennyworth</i>	10.11.71	N. Storey	C. J. Lang, N. O. Morrice	J. Thompson	Shell Tankers (U.K.) Ltd.
<i>Persaus</i>	20.1.72	G. W. Povey	J. B. Lloyd, A. Hale	D. Griffith	Ocean Fleets Ltd.
<i>Phoinia</i>	18.10.71	K. Reekie	M. Sadek, E. Hutchinson	— Duffy	Stag Line Ltd.
<i>Phyllis Bowater</i>	5.1.72	K. Morton	N. J. W. Middlehurst, R. Ward, C. Finch	J. R. Tomlinson	Cayzer Irvine Co. Ltd.
<i>Pisarro</i>	1.3.72	J. Reid	W. D. Pharmister, A. J. Fulton, J. R. Collins	D. R. Houghton	P. & O. S.N. Co.
<i>Plagiola</i>	20.12.71	K. Slapp	C. Martin-Smith	D. I. O'Brien	Pacific S.N. Co. Ltd.
<i>Plaisida</i>	29.11.71	E. C. Sharples	A. R. Lamb, C. Rogers	M. J. Ennis	Shell Tankers (U.K.) Ltd.
<i>Port Adelaide</i>	21.3.72	J. G. Cormack	M. Rich, J. Waters, R. W. Birch	D. J. O. Berry	Shell Tankers (U.K.) Ltd.
<i>Port Auckland</i>	8.3.72	D. M. Kissane	D. G. Jacobs, P. Muirhead, N. R. Wood	D. Murray	Blue Star Port Lines Ltd.
<i>Port Brisbane</i>	29.5.70	G. Carling	A. I. R. May, D. A. Brown, R. G. Brooks, W. J. Corbett	W. Bradbury	Blue Star Port Lines Ltd.
<i>Port Burnie</i>	24.3.72	A. J. Smith	A. G. Gibb, J. G. Rosie, J. Lewis	P. E. Jones	Blue Star Port Lines Ltd.
<i>Port Caroline</i>	8.7.71	J. Webster	B. A. Atkinson, P. Muirhead, W. Corbett	J. Browne	Blue Star Port Lines Ltd.
<i>Port Chalmers</i>	8.2.72	R. A. Wright	W. Kipling, G. Bortell, J. C. Jones	W. Cumming	Blue Star Port Lines Ltd.
<i>Port Launceston</i>	24.11.71	A. J. Hawkins	C. H. Denny, J. M. Harger, A. J. Kennedy, M. S. Polson	G. A. White	Blue Star Port Lines Ltd.
<i>Port Lyttelton</i>	8.12.71	J. R. dit-Leschery	L. I. Shurkey, R. B. Smith, M. A. Oxley	J. L. Gray	Blue Star Port Lines Ltd.
<i>Port Nelson</i>	12.11.71	J. A. Cullen	J. Nash, J. Sadler, R. Lowry	J. Dent	Blue Star Port Lines Ltd.
<i>Port New Plymouth</i>	20.12.71	M. H. C. Twomey, R.D.	A. Craige-Lucas	C. L. Keeble	Blue Star Port Lines Ltd.
<i>Port Nicholson</i>	18.1.72	G. Carling	R. E. T. Sneadon, M. P. Parkes, I. Rankin	W. C. Doyle	Blue Star Port Lines Ltd.
<i>Port Pirie</i>	30.11.70	R. H. Finch	R. J. Adamson, P. G. Henley, B. Money	A. M. Worthington	Blue Star Port Lines Ltd.
<i>Port Sydney</i>	11.11.71	J. G. Whyte	C. F. Wood, M. Read, G. Sutherland	P. Tolcher	Blue Star Port Lines Ltd.
<i>Port Townsville</i>	22.12.71	J. M. Read	I. M. Graham, R. Henderson, N. Johnson, P. J. Henley	D. Johnston	Blue Star Port Lines Ltd.
<i>Potosi</i>	23.4.71	J. McManus	C. G. G. Hawken, C. Rowntree, D. Milnes, K. Bryant	J. Burke	Blue Star Port Lines Ltd.
<i>Priam</i>	23.4.71	R. T. Riley	M. Mallin, D. D. McLaren, R. H. Henry, G. M. Cameron	E. E. Milburn	Pacific S.N. Co. Ltd.
<i>Prometheus</i>	18.10.71	J. Bentley	J. P. Murray, J. E. McGregor, J. F. French	E. O. Roberts	Ocean Fleets Ltd.
<i>Protesilaus</i>	25.2.72	F. N. Curphey	I. I. Kazi, J. McGechan, W. Stobie, D. Lim	R. A. Knight	Ocean Fleets Ltd.
	24.1.72	R. G. Rippon			

<i>Pyrrhus</i>	7.2.72	A. G. Surtees	B. McK. Thorne, G. Warren, P. Furneaux	C. Scullion	Ocean Fleets Ltd.
<i>Queen Elizabeth 2</i>	10.11.71	M. Hehir	N. H. Osborne, J. R. D. Hall	D. H. Butterworth	Cunard S.S. Co. Ltd.
<i>Queensrath</i>	13.12.71	J. P. Waldoock	J. Hammond, L. Kruzins, J. Horler	K. J. Sheehy	Cory Maritime Ltd.
<i>Queensland Star</i>	22.6.70	D. S. Gilmoour	I. Mockett, D. McNeil	I. S. Taylor	Blue Star Line Ltd.
<i>Raeburn</i>	*	R. K. Bilton	A. K. Brown, P. Holtby, S. A. Feldman, A. Hurrell	D. O'Halloran	Blue Star Line Ltd.
<i>Rapallo</i>	14.5.71	F. Metham	J. M. Jarratt, D. E. C. Stevenson, B. T. Wood	M. F. Leeney	Ellerman's Wilson Line Ltd.
<i>Raphael</i>	30.12.71	S. M. Williams	G. E. Round, A. Kachno, D. L. Hayes	G. C. Tyrrell	Lampport & Holt Line Ltd.
<i>Regent Falcon</i>	10.11.70	I. Walker	J. W. Archbold, R. C. Cottam, A. J. C. Metcalf	G. C. Rutherford	John I. Jacobs & Co. Ltd.
<i>Registan</i>	14.4.71	R. Hodgson	D. F. Gates, J. W. Wightman, J. A. J. Briggs	L. J. Kidd	Frank C. Strick & Co. Ltd.
<i>Ribblehead</i>	23.3.72	G. C. Murray	R. H. Jenkins, M. Pitck, J. Southworth, S. P. Coate, W. E. Barnes	T. M. Outhwaite	Bolton Steam Shipping Co. Ltd.
<i>Rievaulx</i>	22.3.72	M. W. Siddle	P. C. McGillivray, S. P. Coate, M. A. Gater	J. L. Wiseman	Bolton Steam Shipping Co. Ltd.
<i>Roland</i>	4.11.71	W. A. Sparks	A. Kachno, D. J. Jones, P. Akeroyd	C. S. Currie	Lampport & Holt Line Ltd.
<i>Romney</i>	29.11.71	N. L. Mylchreest	C. Bufton, J. K. Schofield, P. J. C. Boistalle, D.S.C.	R. C. Prole	Lampport & Holt Line Ltd.
<i>Rosnard</i>	15.3.71	J. I. Jones, D.S.O., D.S.C.	J. P. Skinner	R. R. N. Laing	F. T. Everard & Sons Ltd.
<i>Rosemary Everard</i>	11.11.71	W. G. Hunt	R. R. N. Laing	R. C. Perks	British United Trawlers Ltd.
<i>Ross Orion</i>	3.2.72	A. Osler	T. D. Faithfull, P. Howell, J. F. Barkley	J. P. A. Kennedy	Union-Castle Mail S.S. Co. Ltd.
<i>Rothsay Castle</i>	19.4.71	D. A. Rees	C. Hindley, T. Petch	H. C. Jones	Bank Line Ltd.
<i>Rowanbank</i>	*	F. D. Parsons	Smart, —, Greenwood	M. Lindsay	Furness Withy & Co. Ltd.
<i>Ruswain</i>	8.11.71	D. J. Houghton	B. F. Shepherd, J. Cubbon, A. K. Humphrey	P. A. Byrne	Headlam & Son Ltd.
<i>Ruswain</i>	30.12.71	S. Jackson	S. Y. Michael, D. Matheson, S. J. M. Leak, P. H. Warne	M. R. B. Simpson	Houlder Bros. & Co. Ltd.
<i>St. Margaret</i>	10.6.71	J. Woodbridge	J. H. F. Taylor, C. R. Jenkins, E. H. Dillen	P. Curson	Furness Withy & Co. Ltd.
<i>Sagamore</i>	13.11.69	A. W. Cameron	G. Richard, I. F. Fair, L. Miles, C. Flockhart	A. P. G. Gray	Chr. Salvesen & Co. Ltd.
<i>Salmela</i>	9.3.70	C. I. Nicholson	D. N. Bart, M. B. Connor, A. G. Soppitt	J. Steven	G. Heyn & Sons Ltd.
<i>Santon</i>	*	E. L. Seaton	J. G. Brown	J. H. Fitzgerald	Dept. of Agriculture & Fisheries for Scotland
<i>Scolia</i>	4.4.72	G. Caull	A. J. Luckett, B. E. Peck, W. I. Thornton	D. M. Sugden	Shell Tankers (U.K.) Ltd.
<i>Serbistan</i>	20.1.72	P. W. A. Filcek	J. S. Jones, J. Long, C. M. Wilton	J. E. Appleton	Natural Environment Research Council
<i>Serenia</i>	*	P. W. G. Chlman	C. E. J. Simmons, M. C. J. Jewell, J. E. Dulcer	W. E. Myles	Frank C. Strick & Co. Ltd.
<i>Shackleton</i>	2.2.72	G. Selby-Smith	T. I. Drever, R. L. Andrews, R. D. Mountney	J. J. Cooney	W. A. Souter & Co. Ltd.
<i>Shalristan</i>	29.7.70	A. M. J. Jenkins	M. C. Percy, R. Cordon, I. H. Pringle	G. J. Freeman	Bibby Line Ltd.
<i>Sheaf Crest</i>	16.2.72	I. W. Dunn	P. McN. Kenny, K. Inglis, J. Jordan	J. G. Maquess	R. S. Denholm Ltd.
<i>Sheaf Tyne</i>	26.10.71	P. S. Gardner	C. I. Lang, F. Mordey, R. Stephenson	D. A. Drummond	R. S. Dalgleish Ltd.
<i>Shropshire</i>	*	J. D. Routledge	H. Lawson	F. Mangleshot	Silver Line Ltd.
<i>Sig Ragne</i>	1.9.71	J. McNeil	A. Peacock, D. R. Weaver, R. Sidney	E. H. Pringle	Silver Line Ltd.
<i>Silksworth</i>	18.10.71	G. Bowman	C. Thorpe, T. Wright, N. F. Liddell	J. Rush	Silver Line Ltd.
<i>Silverbeach</i>	*	A. N. Hirst	G. S. Rowley, V. Isidoro	J. V. Redding	Silver Line Ltd.
<i>Silverford</i>	11.10.71	A. A. Walker	H. P. Prior, M. McDonald, J. D. Robinson	A. W. Stephen	F. T. Everard & Sons Ltd.
<i>Silvermain</i>	22.3.72	J. G. Tew	A. Smith, W. Ross, I. Roberts	M. J. Ellis	Ministry of Technology
<i>Silversea</i>	21.3.72	J. B. Wyness	K. F. Grimley, T. R. Jeffrey	N. MacLean	P. & O. S.N. Co.
<i>Silverstrand</i>	16.2.72	J. Whitelaw	I. G. Martin, R. Dowse, R. C. Anderson	J. Blackwell	Union-Castle Mail S.S. Co. Ltd.
<i>Silvershore</i>	*	A. N. Hirst	S. E. H. Wrigley, M. Martin, A. MacVicar	R. G. Hunter	Anchor Line Ltd.
<i>Sincerity</i>	1.1.71	W. G. Hunt	B. L. Bass, B. C. Tylet, N. Gemneken	T. H. Trotter	Wm. France Ferwick & Co. Ltd.
<i>Sir William Hardy</i>	16.3.72	J. A. Whittleton	S. N. Marshall, P. F. Curry, J. S. Allan, T. Kent	P. D. Price	R. S. Dalgleish Ltd.
<i>Somersel</i>	*	I. D. Hellings	R. W. Coombs, G. R. W. Grove, P. St. Jarvis	J. Bradley	Bowring S.S. Co. Ltd.
<i>Southampton Castle</i>	20.4.71	I. M. Shearer	R. C. Hart, J. Reeves, D. Christie	R. A. Wignall	P. & O. S.N. Co.
<i>Star Acadia</i>	*	R. W. L. Crawford	R. B. Dunn, P. B. Wright, M. Reed	P. J. Harris	P. & O. S.N. Co.
<i>Star Assyria</i>	12.1.72	M. I. Martin	R. Palmer, W. E. P. Downing, R. C. Lescombe	A. J. Braithwaite	Shaw Savill & Albion Co. Ltd.
<i>Star Pinewood</i>	27.10.71	W. H. Wolfe			
<i>Starworth</i>	20.4.70	G. Bowman			
<i>Stephano</i>	19.1.72	J. Smith			
<i>Strathairle</i>	13.3.72	A. J. Field			
<i>Strathbrora</i>	9.2.72	L. C. Kingswood			
<i>Strathcomon</i>	27.7.71	R. N. Firth			
<i>Suevic</i>		R. D. Jones			

Selected Ships (contd.)

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
Sugar Crystal	16.3.72	J. E. Leaver	I. C. Gravatt, J. E. Sherwood, F. D. E. Kitt	M. A. O'Brien	Sugar Line Ltd.
Sugar Exporter	3.5.71	G. Pirie	P. M. Wilmot, J. T. Buckham, A. Bartlett	B. Milliken	Sugar Line Ltd.
Sugar Importer	4.4.72	P. Sutcliffe	J. C. E. Stuart, J. T. Buckham, R. Newton	R. B. Hardy	Sugar Line Ltd.
Sugar Producer	7.2.72	G. Pirie	O. T. Stephenson, C. N. L. Davies, J. Parkinson	B. Holness	Sugar Line Ltd.
Sugar Refiner	22.3.72	N. S. Lancaster			Sugar Line Ltd.
Sugar Transporter	17.2.72	A. F. Lunn	B. D. Jones, S. Phillips, R. Phillips	B. Milliken	Sugar Line Ltd.
Sussex	16.12.71	S. W. Lambrick	M. B. Turner, J. S. Munns, A. Leachman, C. J. Roberts	R. J. Harris	P. & O. S.N. Co.
Tabaristan	7.1.72	T. D. Dumont	R. Fletcher, R. W. Lorains, G. C. Stonehouse	T. D. Ogbourne	Frank C. Strick & Co. Ltd.
Tactician	22.2.72	H. F. Roberts	M. D. Glee, R. Butler, D. Ellison	F. P. Lawton	T. & J. Harrison Ltd.
Tareea	20.12.71	T. E. Kelso	S. J. Cribb, N. Hayward, L. D. Wood	D. P. Hammond	P. & O. S.N. Co.
Tamworth	28.6.71	K. B. Jewell	T. T. Kent, R. Bryant, A. Grosby	A. Leary	R. S. Dalglish Ltd.
Tasmania Star	5.4.72	L. Allsford	W. Wood, A. Bielawski, T. Green, M. Hardmeat	R. Greaves	Blue Star Line Ltd.
Taupo	3.1.72	E. F. H. Allen	D. B. Truscott, A. J. Ward, M. A. Barnett	M. J. Morrall	P. & O. S.N. Co.
Tekoa	20.12.71	F. S. Angus, R.D.	R. J. Ayers, W. A. F. Killackey, D. C. Winter, P. R. Owen	S. J. N. Griffith	P. & O. S.N. Co.
Temple Arch	29.11.71	A. L. Davie	M. Murray, D. L. Coe, A. MacDonald	J. Thomson	Scottish Ship Management Ltd.
Temple Bar	27.9.71	T. P. Edge	J. C. Gillespie, L. M. Hocking, G. Dobbie, J. Mackie	D. W. Humble	Bank Line Ltd.
Teutothank	11.6.71	C. S. Howe	A. Bourn, J. R. Whitehead, G. A. Davies	J. Noonan	Texaco Overseas Tankship (U.K.) Ltd.
Texaco Brussels	5.4.72	L. Walker	P. Farrand, G. Kavanagh, S. H. Hanson	G. I. Beveridge	Texaco Overseas Tankship (U.K.) Ltd.
Texaco Gloucester	10.5.71	R. C. White	G. J. P. Lang, R. A. Kassie, A. Monteath, P. M. White	D. H. O'Neill	Texaco Overseas Tankship (U.K.) Ltd.
Texaco Saigon	9.7.68	R. G. A. Barnes	R. A. Russell, J. Campbell, R. R. Brooks	G. Cockburn	Texaco Overseas Tankship (U.K.) Ltd.
Timaru Star	*	I. Hutton	D. T. Ali, M. J. Harness	T. Jones	Blue Star Line Ltd.
Titan	21.2.72	R. J. Paterson	A. G. Lacey, J. R. Reeve, P. J. Duff	S. Brown	Ocean Fleets Ltd.
Tongariro	18.2.72	H. J. D. Sladen	R. A. Carver, E. G. Dixon, J. Read	M. D. O'Brien	P. & O. S.N. Co.
Toronto City	9.2.72	P. Saunders	I. R. P. O. Magner, M. R. Robins, R. N. Bell	M. Kirstein	Bibby Line Ltd.
Torr Head	3.9.71	F. R. N. Best	N. S. Stark, T. B. Thompson, N. C. Kerr	M. Scanlan	G. Heyn & Sons Ltd.
Trebartha	3.2.72	R. C. Lister	J. Cracknell, D. W. Carsey, B. Batchelor	D. Hall	P. & O. S.N. Co.
Trecarne	17.1.72	J. O. Spence	M. B. Wdowikowski, J. A. Wingate, G. Cowling	C. T. Robinson	P. & O. S.N. Co.
Trefuis	14.9.71	O. C. Penberthy	D. A. Hunter, J. R. D. Peterkin, R. Whisker, F. Brady	F. McLoghlin	P. & O. S.N. Co.
Treneglow	26.10.70	F. Newell, M.B.E.	T. E. Clark, R. Stephenson, T. Raddings, C. Flanagan	I. P. Doherty	P. & O. S.N. Co.
Trevalgan	28.9.70	A. V. Rowles	K. N. Metcalfe, J. N. Cracknell, C. J. Price	B. Bicknell	P. & O. S.N. Co.
Trevailan	3.2.72	C. B. Thorpe	R. I. Cape, T. E. Clark, R. Stevenson	T. B. McIlroy	P. & O. S.N. Co.
Trevaylor	20.12.71	L. E. Quigley	S. L. E. Pardon, D. Hunter, R. Young, J. J. Sharp	R. Walsh	P. & O. S.N. Co.
Trewadden	13.3.72	D. A. Field	B. Purvis, D. Pratt, R. Williams	I. R. Smith	P. & O. S.N. Co.
Trinculo	13.12.71	J. Hoffman	G. Nish, D. A. Cross	R. W. B. Campbell	Frank C. Strick & Co. Ltd.
Turakina	9.9.71	A. C. R. Rollinson	F. S. Sprought, K. Everitt, S. D. Barton	G. M. Robinson	British India S.N. Co. Ltd.
Turkistan	2.7.71	W. P. Price, M.B.E.	V. L. Cox, W. J. S. Burr, M. K. Theat, J. Stanley	A. G. Turner	J. & J. Denholm Ltd.
Uganda	1.11.71	R. Baker	C. G. Cowell, C. A. H. Blake, M. Smith	C. I. M. Tait	Shell Tankers (U.K.) Ltd.
Vancouver Forest	20.12.71	J. C. Campbell	R. Frater, D. M. Carmichael, J. A. Jackson, S. P. Gorford	P. Boast	Mavroleon Bros. Ltd.
Venassa	26.11.71	C. C. Waugh	C. Batrick, F. Goodwin, R. F. Tupper	W. Hereward	Sir Wm. Reardon Smith & Sons Ltd.
Victore	5.4.72	E. R. Hansen	I. B. Dunsmore, I. Mathias, M. Caffery	A. O'Sullivan	Shell Tankers (U.K.) Ltd.
Victoria City	14.2.72	J. S. Murray	M. A. Hammond, W. Wood, J. Forreous	C. J. O'Connell	Crawford S.S. Co. Ltd.
Volvatella	24.2.72	M. T. Lewis	P. T. I. Pinches, D. W. Tate, T. Kingston	Tang Yuen	China Navigation Co. Ltd.
Vulcan	9.6.71	G. A. Austen	J. F. Flowerdew, W. T. Elliott, J. James		
Wantiu	12.1.67	J. W. G. Wilby	J. N. Bolton, J. Milward, D. R. Parkinson		

<i>Warwickshire</i>	..	..	..	R. B. Hodgson, R. F. Milton, D. J. Creamer	..	..	R. Emmett	..	Bibby Line Ltd.
<i>Welsh City</i>	..	..	..	A. Gosset, R. A. Webster, D. J. Waldron	..	..	R. H. Smith	..	Sir Wm. Reardon Smith & Sons Ltd.
<i>Welsh Herald</i>	..	..	..	A. C. K. Rawson	..	..	C. W. Murray	..	Welsh Ore Carriers Ltd.
<i>Westminster Bridge</i>	..	..	..	P. S. Bytheway, M. M. Reeves, K. Appleton	..	..	J. M. Williamson	..	Britain S.S. Co. Ltd.
<i>Westmorland</i>	..	..	..	L. J. Hesketh, I. J. Sarjeant, A. D. G. Bell	..	..	B. J. F. Adkin	..	P. & O. S.N. Co.
<i>Whitethorn</i>	..	..	..	H. Rose, J. Beatty, A. MacDonald	..	..	I. S. Murray	..	S. William Coe & Co. Ltd.
<i>Willowbank</i>	..	..	..	N. E. Maxwell, K. Waite, J. Matthews	..	..	C. Y. U	..	Bank Line Ltd.
<i>Windsor Castle</i>	..	..	..	J. A. Forbes-Simpson, J. Simpson, I. E. Walker, Spicer	..	..	M. J. O'Brien	..	Union-Castle Mail S.S. Co. Ltd.
<i>Wootung</i>	..	..	..	G. Whitfield, J. J. Milton, L. D. Lawrie, Y. Y. Chan	..	..	K. H. Sellar	..	China Navigation Co. Ltd.
<i>Worcestershire</i>	..	..	..	J. Gooding, A. F. Lightfoot, K. P. J. Bowers	..	..	A. Young	..	Bibby Line Ltd.
<i>Yeabank</i>	..	..	..	R. W. Boatwright, D. C. Boyter, A. D. S. Dodds	..	..	J. Blane	..	Bank Line Ltd.
<i>Zaphon</i>	..	..	..	P. N. Ralph, P. F. Gill, J. A. Legg, C. T. O'Connell	..	..		..	Shell Tankers (U.K.) Ltd.
<i>Zealandic</i>	..	..	..	S. N. McCabe, G. W. Horn, R. Eastwood	..	..		..	Shaw Savill & Albion Co. Ltd.
	1.12.71	M. C. Mills	..		..	
	20.12.71	G. F. Ellerby, M.B.E.	..		..	
	2.11.71	W. Knight	..		..	
	13.3.72	M. G. King	..		..	
	30.12.71	I. Y. Batley	..		..	
	5.1.72	J. McKeown	..		..	
	14.2.72	G. D. Scott	..		..	
	22.11.71	R. M. Wright	..		..	
	14.12.70	M. H. A. Swift	..		..	
	14.3.72	M. J. Horn	..		..	
		B. J. Peterson	..		..	
		P. I. Blackshaw	..		..	
		J. O. Williams	..		..	

Supplementary Ships

NAME OF VESSEL	LAST RETURN RECEIVED	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Apollo</i>	15.3.71	G. V. Barnes	W. R. Kays, I. G. Rock, J. S. Earl, E. Foley	B. Holdsworth	Bristol S.N. Co. Ltd.
<i>Arcadian</i>	26.10.71	A. S. Matheson	B. Hoyle, T. R. Williams, S. A. Sorrel	P. Fensome	Ellerman Lines Ltd.
<i>Baltic Vanguard</i>	21.12.71	J. C. Collins	W. H. J. Chippendale, B. H. Bailey, P. W. Rowe	W. J. M. Campbell	United Baltic Co. Ltd.
<i>Baltic Venture</i>		R. Kreamer	H. J. Speaight, I. Chester	B. Wilkinson	United Baltic Co. Ltd.
<i>Benadoran</i>	6.9.71	R. Griffiths	A. P. Alexander, I. S. Sutherland, J. N. Macnish	I. E. Billany	Ben Line Steamers Ltd.
<i>Benmacdui</i>	11.2.71	D. Wright	B. Lee, J. H. Martin, K. Kennedy	J. E. Billany	Ben Line Steamers Ltd.
<i>Boston York</i>	20.7.71	K. Curtis	I. E. Billany	W. Ryan	Boston Deep Sea Fisheries Ltd.
<i>British Destiny</i>	22.10.71	A. Woodcock	R. Owen, H. Phillips, C. Thomson, A. W. Cooper	K. Hawkins	B.P. Tanker Co. Ltd.
<i>British Energy</i>	19.3.71	J. B. Hunter	W. E. Nergaard, M. A. Brown, W. J. Brennan, H. Skeath, P. C. Townley	D. Clark	B.P. Tanker Co. Ltd.
<i>British Mallard</i>	7.12.71	S. C. Davies	R. A. Forsyth, K. Hindmarsh, J. L. Drewitt, B. Pyburn	J. H. Kell	B.P. Tanker Co. Ltd.
<i>British Patrol</i>	1.5.70	D. O. W. Jones	A. R. Edwards, J. McCloud, R. S. Walker	D. E. Dale	B.P. Tanker Co. Ltd.
<i>British Reliance</i>	2.3.72	W. G. Cornock	M. Wright	J. C. Saphier	B.P. Tanker Co. Ltd.
<i>British Robin</i>	5.1.72	A. M. B. Ferguson	R. Wilson, D. Rundle, R. Bell, T. Blair	E. Conlon	J. Robinson & Sons Ltd.
<i>Camellia</i>	25.9.69	W. R. Hunter	J. C. Gemmeken, G. W. Robinson, I. Blower, S. D. Hyland		
<i>Echo</i>	13.3.72	J. L. Jenkins	E. Evans, J. S. Earl	R. Smith	Bristol S.N. Co. Ltd.
<i>Exo Lancashire</i>	13.1.72	I. I. Baskerville	T. J. Burleton	J. W. Barry	Esso Petroleum Co. Ltd.
<i>Ethel Everard</i>	5.8.70	H. O. Roberts	D. G. Green	A. Ramsay	F. T. Everard & Sons Ltd.
<i>Ilorin Palm</i>		N. C. Swan	A. M. Howard, J. Gill, J. MacArdie	M. Riley	Palm Line Ltd.
<i>Iravincible</i>		R. Waller	A. Ramsay	J. S. Hallam	British United Trawlers Ltd.
<i>Yelunga Conrad</i>	17.2.72	P. G. Farrell	P. W. Bennett, D. Lewis, C. Bridges	J. Brickwood	P. & O. S.N. Co.
<i>Lady Parkes</i>		B. Taylor	J. S. Hallam	G. W. Taylor	Newington Trawlers Ltd.
<i>Lord Nelson</i>	29.12.71	P. E. Craven	J. Brickwood	J. Hind	St. Andrew's Steam Fishing Co. Ltd.
<i>Marbella</i>	2.3.72	K. Barkworth	G. W. Taylor	G. R. Smith	Hellyer Bros. Ltd.
<i>Marella</i>	26.3.71	R. Boughen	G. R. Smith	J. Hind	J. Marr & Sons Ltd.
<i>Methane Princess</i>	1.3.72	S. Christy	J. Hind	R. M. Elliott	J. Marr & Sons Ltd.
<i>Methane Progress</i>	8.3.72	A. M. Andrews	B. Davison, J. Leach, A. Talbot	M. J. Farrelly	Shell Tankers (U.K.) Ltd.
<i>Mobil Acme</i>	9.8.71	R. T. Watson	D. M. Garden	R. C. Earle	Shell Tankers (U.K.) Ltd.
<i>Mobil Endurance</i>	2.2.72	A. R. Goddard	D. P. Bell, R. T. Atkins, T. Pickard	R. S. Sagers	Mobil Shipping Co. Ltd.
<i>Mobil Energy</i>	18.10.71	K. Hardy	I. Davison, F. Hall, P. Chambers	K. T. Peel	Mobil Shipping Co. Ltd.
<i>Mobil Pegasus</i>	26.11.71	V. W. B. Davies	D. N. Pritchard, D. H. Chatterton, G. E. Cram	M. A. Place	Mobil Shipping Co. Ltd.
<i>Northella</i>	29.12.71	L. Fewster	R. Baillie	S. B. Barr	J. Marr & Sons Ltd.
<i>Northern Reward</i>	31.1.72	W. Harris	G. R. Smith	C. R. Smith	Northern Trawler Ltd.
<i>Primella</i>		S. Taylor	Chan Chi Yuen	Chan Chi Yuen	J. Marr & Sons Ltd.
<i>Ross Implacable</i>	31.12.71	G. Whur	I. Brennan, P. Bennisson, C. J. Rolling	A. F. Stoupie	Ross Trawlers Ltd.
<i>Scottish Wasa</i>		R. Wilson	H. G. Pask	H. G. Pask	W. A. Souther & Co. Ltd.
<i>St. Giles</i>		J. W. Humphrey	K. C. Stone	K. C. Stone	T. Hamling & Co. Ltd.
<i>St. Jason</i>	26.3.71	T. Doyle	K. C. Stone	K. C. Stone	T. Hamling & Co. Ltd.
<i>St. Jasper</i>	20.12.71	T. Sawyers	R. T. Murphy	R. T. Murphy	T. Hamling & Co. Ltd.
<i>St. Leger</i>	22.12.71	A. T. Blenkin	R. T. Murphy	R. T. Murphy	T. Hamling & Co. Ltd.
<i>St. Loman</i>		A. T. Blenkin	L. Cooper, R. Watson	R. T. Murphy	Ellerman's Wilson Line Ltd.
<i>Sangro</i>		W. Walker	G. Crowe, A. C. Collop, R. Kinnier, J. Rogers	C. Wortham	Prince Line Ltd.
<i>Tudor Prince</i>	20.12.70	B. Ditchburn			

Trawlers

The following is a list of trawler skippers and radio operators who voluntarily observe and report those elements of the weather which do not entail the use of any meteorological instruments (irrespective of the vessel in which they sail).

SKIPPER	RADIO OPERATOR	OWNER/MANAGER
J. W. E. Boyle	H. C. L. Taylor	Boyd Line Ltd.
W. Gouldson	M. Winter	T. Hamling & Co. Ltd.
F. W. Gray	P. R. Hickson	Northern Trawlers Ltd.
D. Grewar	A. J. Nettleship	Hellyer Bros. Ltd.
C. A. Grimmer	F. R. Hailstones	R. Irvin & Sons Ltd.
H. Hall	M. R. Read	Northern Trawlers Ltd.
E. Johnson	G. A. Osborne	T. Hamling & Co. Ltd.
J. N. Kerr	M. Webb	Ross Trawlers Ltd.
B. McCall	J. L. Thorpe	British United Trawlers Ltd.
S. Morrell	J. E. Billany	Hellyer Bros. Ltd.
R. Pepper	P. R. Hickson	Northern Trawlers Ltd.
T. Thresh	H. C. L. Taylor	Boyd Line Ltd.
J. A. Williams	C. Bird	Boyd Line Ltd.

Light-vessels

NAME OF VESSEL	MASTERS
<i>Bar</i>	A. C. Ryan, A. Nixon
<i>Dowsing</i>	A. S. Richards, R. Halfnight
<i>East Goodwin</i>	B. E. Nobes, F. J. Shilling
<i>Falls</i>	A. H. Robinson
<i>Galloper</i>	E. Marsden, D. E. Jeager
<i>Humber</i>	F. W. Grice, S. F. Goose
<i>Longstone (Lt. Ho.)</i>	D. J. Sythes
<i>Newarp</i>	G. A. Harris, L. R. Long
<i>North Carr</i>	J. Leask, T. H. Henderson
<i>Royal Sovereign (Lt. Tower)</i>	A. T. Whiston
<i>St. Gowan</i>	H. W. Brasted, —, Baldry
<i>Seven Stones</i>	A. W. Allum, W. Johnson
<i>Shipwash</i>	W. G. Burroughs, J. Goldsmith
<i>South Rock</i>	D. Hawkins, S. E. Griffin
<i>Smith's Knoll</i>	F. Harrison
<i>Varne</i>	G. Kozak, F. Betts

'Marid' Ships

The following is a list of ships recruited for the observing and reporting of sea temperatures from coastal waters of Great Britain. Captains are requested to point out any errors or omissions in the list

NAME OF VESSEL	CAPTAIN	OWNER/MANAGER
* <i>Ashington</i>	A. M. Arkley	Stephenson Clarke Ltd.
<i>Avalon</i>	R. Wyld	British Railways Board
<i>Bardic Ferry</i>	C. H. Hughey	Atlantic S.N. Co. Ltd.
* <i>Brenda</i>	J. Henderson	Dept. of Agriculture & Fisheries for Scotland
<i>Brightling</i>	M. Robinson	Stephenson Clarke Ltd.
* <i>Caesarea</i>	B. A. Caws	British Railways Board
<i>Caernarvonbrook</i>	W. Taylor	Comben Longstaff & Co. Ltd.
<i>Cambria</i>	W. J. Roberts	British Railways Board
* <i>Cerdic Ferry</i>	A. D. Young	Atlantic S.N. Co. Ltd.
<i>Claymore</i>	D. Gunn	David MacBrayne Ltd.
<i>Clupea</i>	J. Jappy	Dept. of Agriculture & Fisheries for Scotland
* <i>Corbank</i>	A. H. Lamming	Cory Maritime Ltd.
<i>Doric Ferry</i>	R. Hockings	Atlantic S.N. Co. Ltd.
<i>Dorset Coast</i>	D. Anderson	Coast Lines Ltd.
<i>Dragon</i>	W. H. Conway	Normandy Ferries
<i>Duke of Argyll</i>	L. C. Mills	British Railways Board
<i>Duke of Lancaster</i>	J. D. Nash	British Railways Board
<i>Duke of Rothesay</i>	D. O. Griffiths	British Railways Board
<i>Eileen M</i>	C. Cadogan	Metcalf Motor Coasters Ltd.
<i>Elwick Bay</i>	W. G. Dennison	Elwick Shipping Co.
<i>Fingal</i>	R. McEachern	Northern Lighthouse Board
<i>Framptondyke</i>	E. Maddison	Klondyke Shipping Co. Ltd.
<i>Guernsey Fisher</i>	W. P. Laity	British Railways Board
<i>Hamble</i>	M. H. Bagshaw	Shell-Mex & B.P. Ltd.
* <i>Hebrides</i>	J. Hodgson	David MacBrayne Ltd.
* <i>Helmsdale</i>	A. F. Ross	Northern Trading Co. Ltd.
* <i>Hesperus</i>	F. K. Davidson	Northern Lighthouse Board
<i>Hibernia</i>	R. Roberts	British Railways Board
<i>Ionic Ferry</i>	W. Close	Atlantic S.N. Co. Ltd.
<i>Isle of Ely</i>	I. Pritchard	British Railways Board
<i>Lairds Glen</i>	A. Palmer	Burns & Laird Lines Ltd.
<i>Loch Carron</i>	A. Campbell	David MacBrayne Ltd.
<i>Loch Dunvegan</i>	A. C. Mathieson	David MacBrayne Ltd.
* <i>Loch Seaforth</i>	J. Smith	David MacBrayne Ltd.
<i>Moose</i>	P. Baker	British Railways Board
<i>Navigator</i>	R. D. Yell	Decca Navigator Co. Ltd.
<i>Penelope Everard</i>	A. McKinnon	F. T. Everard & Sons Ltd.
<i>Pentland</i>	J. Williamson	Currie Line Ltd.
* <i>Pharos</i>	M. Fraser	Northern Lighthouse Board
* <i>Plover</i>	J. A. Everett	General S.N. Co. Ltd.
<i>Pointer</i>	— Sanders	Burns & Laird Lines Ltd.
* <i>Pole Star</i>	F. Davidson	Northern Lighthouse Board
* <i>St. Clair</i>	J. Fullerton	North of Scotland Shipping Co. Ltd.
<i>St. David</i>	D. O. Griffiths	British Railways Board
<i>St. George</i>	A. C. P. Beading	British Railways Board
* <i>St. Patrick</i>	N. Deadman	British Railways Board
* <i>Sarnia</i>	H. Walker	British Railways Board
<i>Scarba</i>	P. R. S. Burn	Dept. of Agriculture & Fisheries for Scotland
* <i>Selby</i>	C. H. Barker	British Railways Board
<i>Slieve Bawn</i>	A. Robertson	British Railways Board
<i>Slieve Bearnagh</i>	C. R. Jones	British Railways Board
<i>Slieve Donard</i>	J. Peters	British Railways Board
<i>Spero</i>	J. Etches	Ellerman's Wilson Line Ltd.
* <i>Spray</i>	A. Cockburn	Ellis & McHardy Ltd.
<i>Stormont</i>	E. Knight	Belfast S.S. Co. Ltd.
<i>Torquay</i>	J. Smith	J. D. Davidson Ltd.
<i>Ulster Queen</i>	J. Fullerton	Belfast S.S. Co. Ltd.
* <i>Warwickbrook</i>	R. Bilton	Comben Longstaff & Co. Ltd.
<i>Westminsterbrook</i>	J. H. Shaw	Comben Longstaff & Co. Ltd.
<i>William J. Everard</i>	T. L. Vaughan	F. T. Everard & Sons Ltd.

*These ships report wind and weather.

BRITISH COMMONWEALTH

The following lists give the name of Selected and Supplementary Ships, and the number of Auxiliary Ships where known (i.e., those which only report when in 'sparse areas'), which voluntarily co-operate with meteorological services of the British Commonwealth.

Information for these lists is required by 10th April each year. Information for the January corrective lists is required by 10th October each year.

AUSTRALIA (Information dated 6.3.72)

NAME OF VESSEL	OWNER/MANAGER
Selected Ships:	
<i>Abel Tasman</i>	H. C. Sleight Ltd.
<i>Al Mahrosa</i>	Sheiks of Kuwait
<i>Andros</i>	Containers Pacific Express Line
<i>Arafura</i>	Eastern & Australian S.S. Co. Ltd.
<i>Ariake</i>	Eastern & Australian S.S. Co. Ltd.
<i>Australasia</i>	Austasia Line Ltd.
<i>Australian Endeavour</i>	Australian National Line
<i>Baroona</i>	Western Australian Coastal Shipping Commission
<i>Bogong</i>	Associated S.S. Pty. Ltd.
<i>B.P. Endeavour</i>	B.P. Tankers Co. Ltd.
<i>B.P. Enterprise</i>	B.P. Tankers Co. Ltd.
<i>Cape Don</i>	Dept. of Shipping & Transport, Australia
<i>Cape Pillar</i>	Dept. of Shipping & Transport, Australia
<i>Carpentaria</i>	British India S.N. Co. Ltd.
<i>Cathay</i>	Eastern & Australian S.S. Co. Ltd.
<i>Centaur</i>	Ocean Fleets Ltd.
<i>Chakdina</i>	British India S.N. Co. Ltd.
<i>Chakrata</i>	British India S.N. Co. Ltd.
<i>Chitral</i>	Eastern & Australian S.S. Co. Ltd.
<i>Cleveden</i>	Lynn Elders
<i>Clutha Oceanic</i>	Clutha Development Pty. Ltd.
<i>Coral Chief</i>	China Navigation Co. Ltd.
<i>Dongara</i>	Western Australian Coastal Shipping Commission
<i>Eigamoioya</i>	Nauru Pacific Shipping Line
<i>Empress of Australia</i>	Australian National Line
<i>Enna G</i>	Nauru Pacific Shipping Line
<i>Gauvacore</i>	Maritime Fruit Carriers Pty. Ltd.
<i>Halifax Star</i>	Blue Star Line Ltd.
<i>Hobart Star</i>	Blue Star Line Ltd.
<i>Iron Cavalier</i>	Broken Hill Pty. Co. Ltd.
<i>Iron Dampier</i>	Broken Hill Pty. Co. Ltd.
<i>Iron Derby</i>	Broken Hill Pty. Co. Ltd.
<i>Iron Flinders</i>	Broken Hill Pty. Co. Ltd.
<i>Iron Kimberley</i>	Broken Hill Pty. Co. Ltd.
<i>Iron Yampi</i>	Broken Hill Pty. Co. Ltd.
<i>Island Chief</i>	China Navigation Co. Ltd.
<i>Kangaroo</i>	Western Australian Coastal Shipping Commission
<i>Kamimbla</i>	Associated S.S. Pty. Ltd.
<i>Lemnos</i>	Containers Pacific Express Line
<i>Malaysia</i>	Austasia Line Ltd.
<i>Manoora</i>	Associated S.S. Pty. Ltd.
<i>Manora</i>	British India S.N. Co. Ltd.
<i>Matthew Flinders</i>	Flinders Shipping Co. Pty. Ltd.
<i>Merkara</i>	British India S.N. Co. Ltd.
<i>Milos</i>	Containers Pacific Express Line
<i>Moana Raui</i>	Government of the Gilbert & Ellice Islands Colony
<i>Morvada</i>	British India S.N. Co. Ltd.
<i>Mundoora</i>	Associated S.S. Pty. Ltd.
<i>Nanchang</i>	China Navigation Co. Ltd.
<i>New Guinea Chief</i>	China Navigation Co. Ltd.
<i>Nimos</i>	Containers Pacific Express Line
<i>Ore Regent</i>	Clutha Development Pty. Ltd.
<i>Papuan Chief</i>	China Navigation Co. Ltd.
<i>Port Albany</i>	Port Line Ltd.
<i>Port Huon</i>	Port Line Ltd.
<i>Port Melbourne</i>	Port Line Ltd.
<i>Port Montreal</i>	Port Line Ltd.
<i>Port New Plymouth</i>	Port Line Ltd.
<i>Port St. Lawrence</i>	Port Line Ltd.
<i>Rhexenor</i>	Ocean Fleets Ltd.
<i>Rona</i>	Colonial Sugar Refining Co. Ltd.
<i>Rosie D.</i>	Nauru Pacific Shipping Line
<i>Safia</i>	Karlander New Guinea Line Ltd.
<i>Samos</i>	Containers Pacific Express Line
<i>Sletholm</i>	Karlander New Guinea Line Ltd.
<i>Stentor</i>	Ocean Fleets Ltd.
<i>Taiyuan</i>	China Navigation Co. Ltd.
<i>Tanda</i>	British India S.N. Co. Ltd.
<i>Teesta</i>	British India S.N. Co. Ltd.
<i>Tenos</i>	Containers Pacific Express Line
<i>Thorsorient</i>	Norse Orient Line
<i>Triadio</i>	British Phosphate Commissioners
<i>Tri-Ellis</i>	British Phosphate Commissioners
<i>Troubridge</i>	Adelaide S.S. Co. Ltd.
<i>Tsingtao</i>	China Navigation Co. Ltd.
<i>Wambiri</i>	Western Australian Coastal Shipping Commission
<i>Wongala</i>	Tucker Shipping Pty. Ltd.
Supplementary Ship:	
<i>Bass Trader</i>	Australian National Line

CANADA (Information dated 1.4.72)

NAME OF VESSEL	OWNER/MANAGER
<i>Alert</i>	Government of Canada
<i>Arcadia</i>	P. & O. S.N. Co.
<i>A. T. Cameron</i>	Government of Canada
<i>Baffin</i>	Government of Canada
<i>Baron Forbes</i>	Scottish Ship Management Ltd.
<i>Binsnes</i>	Tenax S.S. Co. Ltd.
<i>Bluenose</i>	Canadian National Railways
<i>Bridgepool</i>	Sir R. Ropner & Co. Ltd.
<i>Camsell</i>	Government of Canada
<i>Canberra</i>	P. & O. S.N. Co.
<i>Chebucto</i>	Government of Canada
<i>Cornish City</i>	Sir Wm. Reardon Smith & Sons Ltd.
<i>Dawson</i>	Government of Canada
<i>Derbyshire</i>	Bibby Line Ltd.
<i>d'Iberville</i>	Government of Canada
<i>Frank H. Brown</i>	White Pass & Yukon Ltd.
<i>G. B. Reed</i>	Government of Canada
<i>Gosforth</i>	Burnett S.S. Ltd.
<i>Gulf Canada</i>	Gulf Oil Ltd.
<i>H 1060</i>	Kent Line Ltd.
<i>H 1070</i>	Kent Line Ltd.
<i>H. R. MacMillan</i>	Canadian Pacific S.S. Ltd.
<i>Hudson</i>	Government of Canada
<i>Iberia</i>	P. & O. S.N. Co.
<i>Imperial Acadia</i>	Imperial Oil Ltd.
<i>Imperial Bedford</i>	Imperial Oil Ltd.
<i>Imperial Quebec</i>	Imperial Oil Ltd.
<i>Imperial St. Lawrence</i>	Imperial Oil Ltd.
<i>Irving Glen</i>	Irving Oil Co.
<i>Irvingstream</i>	Irving Oil Co.
<i>Ixia</i>	Stag Lines Ltd.
<i>Javara</i>	Seaboard Ltd.
<i>John A. Macdonald</i>	Government of Canada
<i>John Cabot</i>	Government of Canada
<i>J. E. Bernier</i>	Government of Canada
<i>J. V. Clyne</i>	Canadian Pacific S.S. Ltd.
<i>Kapuskasing</i>	Government of Canada
<i>Labrador</i>	Government of Canada
<i>Limnos</i>	Government of Canada
<i>Louis S. St. Laurent</i>	Government of Canada
<i>Martin Karlsen</i>	Government of Canada
<i>Montcalm</i>	Government of Canada
<i>N. B. McLean</i>	Government of Canada
<i>Nego Anne</i>	Wallem & Co. A/S
<i>Norman McLeod Rogers</i>	Government of Canada
<i>North Breeze</i>	Manners Navigation Co.
<i>Northern Shell</i>	Shell Canada Ltd.
<i>N. R. Crump</i>	MacMillan & Clyne Ltd.
<i>Oriana</i>	P. & O. S.N. Co.
<i>Pacific Logger</i>	Canadian Pacific S.S. Ltd.
<i>Porte Dauphine</i>	Government of Canada
<i>Princess of Acadia</i>	Canadian Pacific S.S. Ltd.
<i>Quebec</i>	Messabec Ltd.
<i>Queen of Prince Rupert</i>	British Columbia Ferry Authority
<i>Salambria</i>	Chr. Salvesen & Co. Ltd.
<i>Silvercape</i>	Silver Line Ltd.
<i>Silvercooe</i>	Silver Line Ltd.
<i>Sir Humphrey Gilbert</i>	Government of Canada
<i>Texada</i>	Wingate International Shipping Co.
<i>Thomas Carleton</i>	Government of Canada
<i>Thor 1</i>	Thor Dahl A/S
<i>Thorshope</i>	Thor Dahl A/S
<i>Thorsisle</i>	Thor Dahl A/S
<i>Thorsriver</i>	Thor Dahl A/S
<i>Thorstream</i>	Thor Dahl A/S
<i>Thorswave</i>	Thor Dahl A/S
<i>W. C. Van Horne</i>	Canadian Pacific S.S. Ltd.
<i>Wheat King</i>	Upper Lakes Shipping Co. Ltd.
<i>Worcestershire</i>	Bibby Line Ltd.
Supplementary Ships:	
<i>Anna Bakke</i>	Knut Knutsen O.A.S.
<i>Emerillon</i>	Shell Canada Ltd.
<i>Kanangoora</i>	Vanport Shipping Ltd.
<i>Maxwell</i>	Government of Canada

Auxiliary Ships:

Canada has 48 ocean-going Auxiliary Ships and 55 Auxiliary Ships operating on the Great Lakes.

NEW ZEALAND (Information dated 5.4.72)

NAME OF VESSEL	OWNER/MANAGER
Selected Ships:	
<i>Act 3</i>	Blue Star Port Line Ltd.
<i>Act 4</i>	Blue Star Port Line Ltd.
<i>Holmburn</i>	Union S.S. Co. N.Z. Ltd.
<i>Holmlea</i>	Union S.S. Co. N.Z. Ltd.
<i>James Cook</i>	N.Z. Government
<i>Jean Philippe</i>	Trans Pacific Marine
<i>Kaimiro</i>	Union S.S. Co. N.Z. Ltd.
<i>Kaitoa</i>	Union S.S. Co. N.Z. Ltd.
<i>Kaitoke</i>	Union S.S. Co. N.Z. Ltd.
<i>Kaituna</i>	Union S.S. Co. N.Z. Ltd.
<i>Karamu</i>	Union S.S. Co. N.Z. Ltd.
<i>Karepo</i>	Union S.S. Co. N.Z. Ltd.
<i>Karetu</i>	Union S.S. Co. N.Z. Ltd.
<i>Katea</i>	Union S.S. Co. N.Z. Ltd.
<i>Kawaroa</i>	Union S.S. Co. N.Z. Ltd.
<i>Kawerau</i>	Union S.S. Co. N.Z. Ltd.
<i>Koraki</i>	Union S.S. Co. N.Z. Ltd.
<i>Korama</i>	Union S.S. Co. N.Z. Ltd.
<i>Kowhai</i>	Union S.S. Co. N.Z. Ltd.
<i>Kurutai</i>	Union S.S. Co. N.Z. Ltd.
<i>Maheno</i>	Union S.S. Co. N.Z. Ltd.
<i>Marama</i>	Union S.S. Co. N.Z. Ltd.
<i>Moana Roa</i>	N.Z. Government
<i>Ngahere</i>	Union S.S. Co. N.Z. Ltd.
<i>Ngakuta</i>	Union S.S. Co. N.Z. Ltd.
<i>Ngapara</i>	Union S.S. Co. N.Z. Ltd.
<i>Ngatoro</i>	Union S.S. Co. N.Z. Ltd.
<i>Rangatira</i>	Union S.S. Co. N.Z. Ltd.
<i>Tarawera</i>	Union S.S. Co. N.Z. Ltd.
<i>Tavenui</i>	Union S.S. Co. N.Z. Ltd.
<i>Tofua</i>	Union S.S. Co. N.Z. Ltd.
<i>Valetta</i>	British Phosphate Commissioners
<i>Waikare</i>	Union S.S. Co. N.Z. Ltd.
<i>Waimate</i>	Union S.S. Co. N.Z. Ltd.
<i>Waimea</i>	Union S.S. Co. N.Z. Ltd.
Supplementary Ships:	
<i>Aotearoa</i>	N.Z. Sea Transport Ltd.
<i>Aramoana</i>	N.Z. Railways Department
<i>Aranui</i>	N.Z. Railways Department
<i>Haweia</i>	Union S.S. Co. N.Z. Ltd.

Auxiliary Ships:

New Zealand also has a fleet of 16 Auxiliary Ships currently reporting.

HONG KONG (Information dated 13.3.72)

NAME OF VESSEL	CAPTAIN	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Aska</i>	R. S. D. Mortlock ..	G. A. T. Thornton, P. J. Miller, S. N. Monks, P. P. Patel	E. A. Rogers	British India S.N. Co. Ltd.
<i>Cape St. Mary</i> ..	Chan Hok-min	Kwok Yung-sing, Ngau Min-sang	Wong Kam-tim	Agriculture & Fisheries Dept., H.K. Govt.
<i>Cardross</i>	P. D. Nicoll	A. P. Advani, G. Young, Yeung Kin Shing	Chan Kun	Kian Hin Leong Enterprises Ltd.
<i>Carl Offersen</i> ..	R. A. D. Nielsen	A. R. Pedersen, C. A. E. Jensen, E. Thomsen	R. F. McAnaney	Jebsen & Co. Ltd.
<i>Chengtu</i>	R. Kennett	M. Mitchell, A. R. King, Tam Hung Ming	Chan Hak Wai	China Navigation Co. Ltd.
<i>Coral Princess</i> ..	C. R. Humphry	M. Williams, G. B. Smith, P. D. Clarke	Tsui Sung Kwan	China Navigation Co. Ltd.
<i>Cree</i>	N. A. H. Funston	J. Cable, A. M. M. Hill, F. E. Gonsalves	Mak Wai Lam	Indo-China S.N. Co. Ltd.
<i>Eastern Cape</i> ..	C. Preston	N. J. Lane, K. R. Atkinson, I. G. Williams	P. P. Laffan	Indo-China S.N. Co. Ltd.
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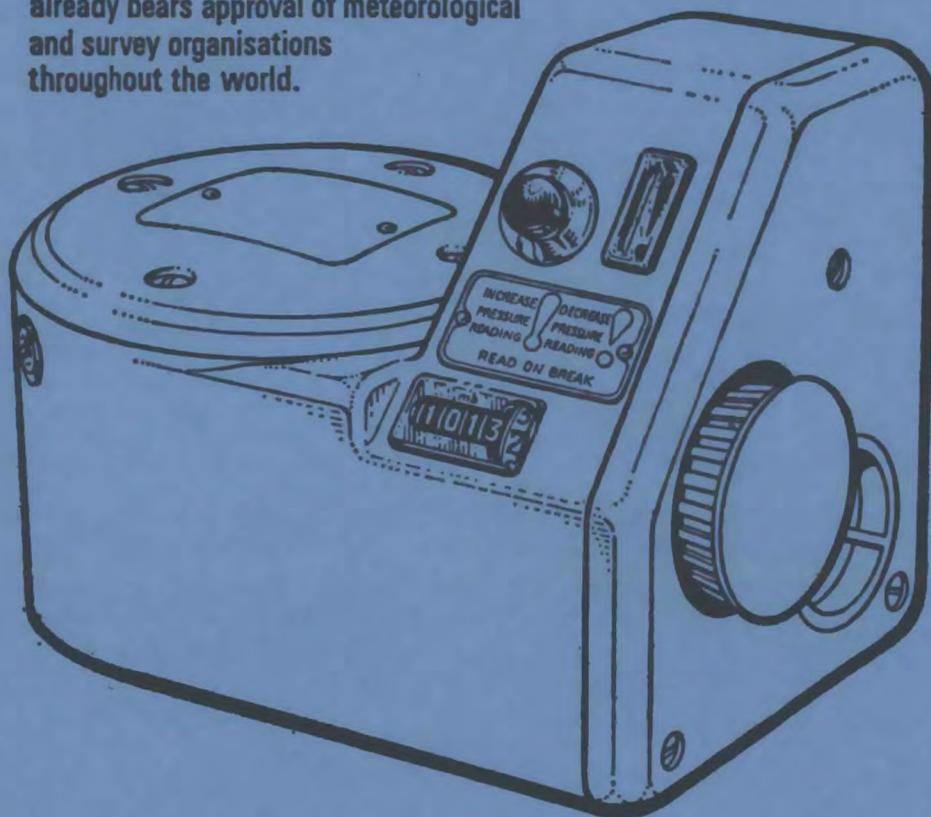


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