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HYDROACOUSTIC HERRING SURVEY RESULTS AND TRAWL CATCHES FROM HECATE STRAIT, OCTOBER 15 TO NOVEMBER 5, 1984. G.B. REED CRUISE GBR84C AND M.V. CANADIAN #1 CRUISE CAN84-1.

by

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ABS.RACT

Kieser, R., D. E. Hay, C. W. Haegele, D. C. Miller, and T. J. Mulligan. 1987. Hydroacoustic herring survey results and trawl catches from Hecate Strait, October 15 to November 5, 1984. G.B. REED cruise GBR84C and M.V. CANADIAN #1 cruise CAN84-1. Can. MS Rep. Fish. Aquat. Sci. 1917 107p.

Hydroacoustic and trawl surveys of herring were made in northern Hecate Strait, Dixon Entrance, Chatham Sound and adjacent inshore waters of northern British Columbia by the G.B. REED and a chartered vessel, the M.V. CANADIAN #1. Hydroacoustic measurements were made to determine the herring distribution. Factors affecting hydroacoustic abundance estimates were examined, including diurnal changes in depth and spatial distribution. Biological samples for size, age and maturity were collected. Incidental species and oceanographic data were also recorded.

Key words: Pacific herring, Hecate Strait, hydroacoustics, echo integration, midwater trawl, survey

RÉSUMÉ

Kieser, R., D. E. Hay, C. W. Haegele, D. C. Miller, and T. J. Mulligan. 1987. Hydroacoustic herring survey results and trawl catches from Hecate Strait, October 15 to November 5, 1984. G.B. REED cruise GBR84C and M.V. CANADIAN #1 cruise CAN84-1. Can. MS Rep. Fish. Aquat. Sci. 1917: 107 p.

Le G.B. REED et le M.V. CANADIAN #1, un navire affrété, ont servi à effectuer des relevés hydroacoustiques et des relevés de chalutage dans la partie nord du détroit d'Hécate, l'entrée Dixon, le passage Chatham et les eaux côtières limitrophes du nord de la Colombie-Britannique. Les quantifications hydroacoustiques ont servi à la détermination de la répartition du hareng. On a aussi étudié les facteurs influant sur les estimations de l'abondance tirées des données hydroacoustiques, y compris les variations diurnes de la répartition selon la profondeur et l'espace. Des échantillons biologiques ont été recueillis pour des études de la taille, de l'âge et de l'état de maturité; de plus, les espèces incidentes et des données océanographiques ont été notées.

Mots-clés: hareng du Pacifique, détroit d'Hécate, hydroacoustique, intégration échographique, chalut méso-pélagique, relevé

INTRODUCTION

A herring survey was carried out in Hecate Strait from October 15 to November 5, 1984. Two vessels were used in joint operations: The CGS G.B. REED made hydroacoustic assessment of herring. The M.V. CANADIAN #1, a chartered commercial trawler, searched for herring concentrations, and made midwater trawl catches. The main objective of this work was to evaluate the feasibility of hydroacoustic techniques as a herring stock assessment method. This required analysis of the diurnal behaviour of winter concentrations of herring. Herring shoals were located and observed acoustically. The extent of their horizontal movement, vertical movement and their proximity to surface or bottom was examined and the effect of diurnal movements on hydroacoustic assessments is described and discussed.

This work also contributes to the multi-disciplinary Hecate Strait project, which examines the ecological relationship among major commercial species. In this context information on the distribution and abundance of herring is important because herring may be a significant prey species for cod (Gadus macrocephalus) and other predators.

This report presents a summary of vessel activities, sounding locations and composition of catches, hydroacoustic survey results, summaries of herring samples and oceanographic data.

METHODS

VESSELS AND EQUIPMENT

The hydroacoustic equipment on the G.B. REED was configured for echo integration. Its major components are a BioSonics echo sounder and integrator and a Simrad chart recorder. The 8 by 13 degree, 38 kHz ceramic transducer was mounted in a torpedo shaped body which was towed behind the vessel to minimize interference. A PDP 11/23 computer was used to analyse the data. The echo integrator was calibrated at the hydroacoustic barge of the University of Washington, Seattle. A fish target strength of -32.0 dB/kg was used to convert the measured backscattering strength into estimates of fish volume density and surface density. The biomass estimates were obtained by expanding the surface density over the area of interest. The vessel was also equipped with a 434-mesh Engel midwater net for species identification.

The M.V. CANADIAN #1 is a 29-m trawler equipped to fish with midwater gear. An Ekolite herring model sounder and an Epsco Chromascope sounder were used to locate and identify herring schools. Two nets were fished: a Canadian Diamond 6 and a Polish Rope trawl. An Atlas headrope

transducer was used on the net. Catches were brought aboard, sorted by species and weighed. Samples of herring were frozen for later processing.

G.B. REED ACTIVITIES

On October 16, the G.B. REED left Nanaimo for Hecate Strait (Table 1). The first echo integration data were collected in Burke Channel, October 17, to investigate echo sounder bottom calibration procedures and to look for bottom calibration sites. The following day herring density measurements were begun. Transects covered the central portion of Browning Entrance (transects 27-21; Fig. 1) and extended from there to Willis Bay (transects A1-A8). On October 19 a search (transects 30-24; Fig. 1) was started to delineate an area that would enclose a herring concentration within its boundaries. Over the next 24 hours transects 27-24 were repeated 5 times to study the diurnal behaviour of the concentration. A set of short nearshore transects (B1-B11) was also executed to look for concentrations that might have migrated from the central area into shallow water. The following day (October 21) adverse weather forced us to work in Kitkatla Inlet where bottom calibration data (transects K1-K4) were taken. That night Browning Entrance and its southern extension were surveyed (transect 23-14; Fig. 1).

On October 22, the ship's sounder was used to survey protected waters in and adjacent to Principe Channel (transects 14A-15E). When the weather improved echo integration was resumed to cover the area from Porcher Island to Rose Spit (transects 32-74; Fig. 2). Further work was impossible in the increasing storm. The survey activity continued in Chatham Sound on October 25 and 26 with transects CS1-CS17.

Following this work the G.B. REED tied up at the M.O.T. dock in Seal Cove to join the F.R.B. open house in Prince Rupert on October 27. On leaving Prince Rupert the Edye Passage area was surveyed (transects EP1-EP7) and extended transects (30L-21L) were executed off Porcher Island to look for changes in the herring distribution that might have occurred since the last survey in this area. This was followed by a second small area survey (transects 27L2-24L2; Fig. 3; October 30). The herring concentrations did spread during the 24-hour survey period and further transects (A-C, 21L2-26L2) were executed in an attempt to delineate the concentration.

A weather day was used for bottom calibration work in Kitkatla Inlet. This was followed by synoptic surveys of Laredo Sound (LS0-LS4G; Fig. 4) and the Goose Island Bank area (transects GI0-GI19, GX1-GX7; Fig. 5, November 3 and 4), before returning to Nanaimo on November 5. The G.B. REED fished on October 29, while the M.V. CANADIAN #1 was enroute to the survey grounds.

A sample of 100 dogfish were provided by the M/V FREE ENTERPRISE, a commercial fishing vessel using bottom trawls in the vicinity of transects 24 to 27. Their stomachs were examined to determine the extent to which dogfish were feeding on herring.

Temperature data was collected by expendable bathythermographs (XBT's) at most major fishing locations and in areas where acoustic bottom calibrations were recorded.

M.V. CANADIAN #1 ACTIVITIES

The movements of the M.V. CANADIAN #1 during the first week of the cruise, October 15 to 21, are shown in Figure 6. The vessel scouted the banks, along a series of tracklines from 54°26'N to 54°14'N. Midwater trawl tows were directed at fish concentrations that were identified on the echosounders. Tows 1 to 9 were made in the first week. On October 15 scouting commenced at 15:30 in Brown Passage and concluded at 20:25 at the anchor position on the bank. The only fish sounded were at the apex of turns 2 and 8, where a "few scratches" and a "light skimmer" were recorded. On October 16 sounding began at 06:15 at the anchor position on the bank and finished at 19:25 at the anchor position in Freeman Passage. Sounding was interrupted at 17:00 for tow 1. No substantial concentrations of fish were sounded along any of the tracklines although small schools occurred, increasing in frequency from one to a few schools along legs of the trackline as the vessel proceeded southward. The schools were considered to be too small and too scattered to be fishable. Sounding was continued at 06:30 on October 17 with the vessel proceeding from Freeman Passage to the tow 1 position, where the transecting was resumed. Browning Entrance was transected on five legs and fish were found along the inner and outer edge of the trench, where bottom depths were between 70 and 110 m. Fish were found near the surface early in the day, midwater by 10:30 and near the bottom by noon. After the completion of the last transect, the vessel returned to the top of the trench where tows 2 and 3 were made. After the last tow the vessel proceeded to the top of Banks Island where it anchored for the night at White Rocks. On October 18 two transects were sounded across the Browning Entrance Gully prior to a rendezvous with the G.B. REED in Willis Bay at 10:00. Light skimmers near the surface were sounded along the dropoffs from 70 to 110 m. At 11:00 the vessel departed Willis Bay to sound for fish along the outer 90-m edge of the gully, completing the most southerly transect at 15:30. Only occcasional small, light density schools near bottom in 100 to 130 m of water were seen. No fish were seen while returning up the middle of the gully to the mouth of Freeman Passage. There, a substantial skimmer on bottom was the target for tow 4. The water was shallow (60 m) and a tear in the net resulted in the loss of most of the catch. The vessel anchored in Willis Bay for the night and for the next two days (October 19 and 20) was engaged mostly in fishing on schools identified by the G.B. REED (tows 5a to 9). The net was switched from the Diamond to the Polish rope trawl between tows 5a and 5b. On October 21 a sounder survey along the edge of the banks off Banks Island was conducted. Only a few small, scattered schools were seen. The only major herring concentrations seen during the first week were those in Browning Entrance near the top of the gully.

During the second week, October 22 to 26, the vessel was engaged in searching for other fishable herring concentrations (Fig. 7). On October 22

the vessel departed from Willis Bay and proceeded down Principe Channel to Otter Passage, and back up Principe and Petrel channels to Ogden Channel. No fish were found. The following day Ogden Channel, Arthur Passage, Malacca Passage and Edye Passage around Porcher Island were searched before noon. A small concentration of fish near bottom was seen at Hanmer Island near the position of tow 11. The reefs off Edye Passage and the 90 m contour were searched next but no fish were seen and the vessel ran through Brown Passage and on to Port Simpson, arriving to anchor at midnight. No fish were seen on the way. On October 24 Port Simpson and the channels at the entrance of Portland Inlet were searched for fish, including Work Channel, Emma Passage, Union Inlet and Steamer Passage. Small schools of fish were seen at the entrance of Work Channel and at the top of Steamer Passage. The schools in Work Channel were fished (tow 10) and appeared to be mostly juvenile herring. Strong tidal currents made fishing difficult. The vessel anchored in Port Simpson on that evening and resumed sounding on the morning of October 25. Cunningham Passage and the coastline from Cunningham Island to Hanmer Island were searched prior to 14:00. Small fish schools were seen on Alexandra Bank, outside Prince Rupert Harbour and at Hanmer Island. The latter were fished (tow 11) and were a mixture of pollock, herring, and rockfish. The waters inside Stephens Island were searched in the afternoon and evening and a near surface tow was made at night on a scattering layer observed by the G.B. REED (tow 12), yielding a trace of fish. The vessel anchored for the night at Qlawdzeet Anchorage. On October 26 the vessel sounded along Stephens Island, where a layer of fish between 50 and 70 m in 90 m of water was seen. However the fish were too close to shore to be fished by trawl. The vessel then sounded from the bottom of Stephens Island to Prince Rupert Harbour, where a light layer of fish near bottom was seen from the B.C. Packers plant to Seal Cove and in Tuck Inlet. These could not be fished because of shallow bottom and marine traffic. The vessel tied up in Prince Rupert for the weekend.

The vessel returned to Browning Entrance for the first three days of the third week, October 29 to 31, to sample fish schools identified by the G.B. REED (Fig. 8). Tows 13 to 19 were made. Strong winds precluded further fishing in outside waters and Kitkatla Inlet was sounded for fish on November 1. None were found. With winds not abating, the decision was made to search the more sheltered inlets of the central coast for fishable herring schools and the vessel proceeded south on November 2 through Principe and Squally channels to anchor for the night in Barnard Harbour. In Barnard Harbour a skimmer of herring 20- to 30-m thick was observed, ending at the sill in the entrance. The fish could not be trawled because of the sill but observations of fish flipping at the surface throughout the night indicated that they were mostly age 1 and 2 herring.

For the remainder of the third week, November 3 to 5, the vessel continued southward (Fig. 9). On the first day Campania Sound, Surf and Pacey inlets, Laredo Channel, Meyers Passage and Kitasu Bay were searched. In Kitasu Bay the only sizable school was seen, but on the morning of the November 4 this school could not be located and the vessel proceeded down Laredo Sound and up Milbanke Sound, up and down Finlayson Channel and through Seaforth Channel to anchor in Norman Morrison Bay. In Finlayson Channel a few small schools were seen in Klemtu Passage in shallow water (20 to 40 m), which was not trawlable. On the November 5 the vessel headed down Raymond Passage,

into Boddy Passage where a skimmer of fish was seen on bottom in 90 m against a 10-m ledge, through Tiderip Passage into Queens Sound, into Cultus and Kildidt sounds, through Nalau Passage into Fitzhugh Sound, through Hakai Passage and Kwakshua Channel back to Fitzhugh Sound and then to the bottom of Calvert Island, where the survey was concluded. No fish except those in Boddy Passage were seen and these were not fishable because of the 10-m ledge and the confined waters.

RESULTS AND DISCUSSION

G.B. REED SURVEYS

Four projects were carried out during the G.B. REED cruise: (1) bottom calibrations; (2) towed body stability tests; (3) large area surveys; and (4) small area surveys.

(1) Bottom calibration:

Echo sounders traditionally are calibrated by placing a standard target or a calibration hydrophone in the acoustic beam. The calibration device must be placed on axis, this is difficult when the transducer is mounted on the hull of the vessel. In some cases a 'bottom calibration' can provide an useful alternative.

Given a suitable sea bottom the performance and stability of a standard echo sounder can be checked to approximately ±3 dB without auxiliary equipment. Our echo integration system allows us to test the acoustic uniformity of the bottom itself and thus determine its suitability as an acoustic calibration target. As a pilot project we tested transects in Burke Channel (October 17) and Kitkatla Inlet (October 21, November 1).

An example of the data that were measured is shown Figure 10. Mean bottom echo intensities are plotted versus distance (3.9 km) for transect C1 in Burke Channel. Standard echo sounder and integrator settings were used except for lower transmit power and receiver gain. The bottom depth was approximately 60 m. Each of the seven values is the average over 100 echoes. The standard deviation is 1.0 dB. The results look promising and further work should determine the short- and long-term stability of the measured echo intensity and locate convenient calibration sites. Echo sounders on fisheries patrol vessels can then easily be field tested.

(2) Towed body stability tests:

The transducer of the echo integration system is mounted in a

torpedo shaped body which is towed behind the survey vessel. This isolates the acoustic system from vessel noise, vessel motion and the air bubbles that pass below the vessel in even moderate seas. The towed body is equipped with a roll and pitch sensor that records the body's attitude on a strip chart recorder. Table 2 gives stability measurements that were made during the cruise.

The 'bias' gives an average roll or pitch while the amplitude indicates the range about the bias value. The maximum observed bias and amplitude are -13 and 19°, respectively. The maximum angular rate is 2.6°/s. These values are compared with the 8 x 13° FWHM of the transducer beam. For an 8° FWHM beam, a 3°/s angular rate gives a <10% signal reduction for depth of <500 m. Thus, roll and pitch should not seriously bias our measurements, however better towed body stability is desirable.

(3) Large area surveys:

The following areas were covered to estimate the extent of major herring winter distributions: Browning Entrance to Dundas Island and Rose Spit (October 18-24, 28, 30 and 31), Figures 1 and 2; Chatham Sound and Edye Passage (October 25-28), Laredo Sound (November 3), Figure 4; and Goose Island Bank (November 3 and 4), Figure 5.

Biomass densities were calculated for all transects, those for the Browning Entrance to Rose Spit area were plotted as surface density maps (Fig. 11). The transects are given as dashed lines, verticals to the transects indicate density on a logarithmic scale. Density less or equal to a minimum value will give a vertical height of zero. Maximum height is indicated by a dot. Figures 11a and 11b display a density range from 0.01 to 1.0 kg/m^2 while Figure 11c uses 0.001 to 0.1 kg/m^2 to illustrate low density distributions. Figures 11a and 11b cover the entire area, high herring densities only occur in the southern part, primarily on transects 24 through 29. Figure 12 uses a more sensitive scale, it indicates low density, widespread distributions of herring, pollock and other species. The area north of Browning Entrance (Fig. 11c) shows widespread low density distributions of herring, pollock and other species.

The data for the surface density maps (Fig. 11) are given in Appendix tables 1 and 2. These estimates include all species and are based on an acoustic fish target strength of -32.0 dB/kg. These tables also give local and total biomass estimates which are obtained by extrapolating the surface densities over an appropriate area. In some cases this area expansion is difficult to determine and may cause additional uncertainty. The data in these tables are preliminary since final checks for bottom integration and noise have not been carried out. This could result in excessive surface density estimates.

(4) Small area surveys:

Two small area surveys were conducted to observe the horizontal and

vertical distribution and abundance of herring over a 24-hour period. The first 24-hour survey was conducted from October 19 to 20 in a 3 x 6 NM area in Browning Entrance (Fig. 3). A substantial herring concentration was contained in the area with relatively little outside. Transects 27-24 were executed 6 times to obtain several day and night time measurements. Biomass estimates in metric tonnes (t) were made for each transect and the total area (Table 3).

The biomass estimates range from 2103 to 13903 t, the greatest estimate being 6.6 times the smallest. Average day observations range from 9712 to 13637 t and on average are 5.2 times higher than night time estimates. Figures 12a-f show the corresponding density distribution maps. The four daytime maps Figures 14 a, b, e and f show high herring densities that are in the center of the survey area. During the night the density dropped substantially and fish were located mainly at the east and west boundary. This change in density might be caused by herring moving into shallow water at night; alternately it might reflect vertical migrations. Herring that are very close to the surface (within ~5 m) or close to the bottom (within 1 m) cannot be detected with the acoustic system used in this work.

A second 24-hour survey was conducted October 30 and 31 in a slightly larger area. The original area was extended into shallow water and transects 27L2-24L2 (Fig. 3) were executed 4 times to obtain 2 day and 2 night time measurements. Table 4 shows biomass estimates (t) for each transect and the total area.

This second 24-hour survey found higher night time densities (3.3 times). The total biomass estimates were generally higher during the second survey (Table 3 versus Table 4). Only a relatively small fraction of the biomass was located in the shallow extensions of the original transects. Therefore the earlier speculation that some herring move into shallow water at night is not supported by these results.

CATCH DATA

The M.V. CANADIAN #1 made 20 tows of which 17 were made in Browning Entrance (Fig. 13). The other 3 tows were: (i) tow 10 in Work Channel; (ii) tow 11 at Hanmer Island; and (iii) tow 12 in Chatham Sound (Fig. 7). Tows 1 to 5a were made with the Diamond net, the remainder with the Polish rope trawl. Date, time and position of tow, net depth, and catch are given in Table 5a-b. Catches were generally small, less than 100 kg, except when tows were made on concentrations of herring in Browning Entrance. The total catch of 11,829 kg was 91% herring, 5% dogfish and 3% rockfish (Table 6). The three G.B. REED tows in Browning Entrance were made with an Engel trawl.

HERRING SAMPLES

Herring from 15 of the catches, including one catch made by the G.B. REED, were sampled. A total of 1466 herring were processed and for 1158 of these the ages were determined (Table 7). The percent at age for tows in Browning Entrance is shown in Figure 14. For tows where catches were less than 100 kg the sample may not reflect the age composition of the stocks in the area since schools or significant portions of schools were not captured by the net.

Samples from small catches show age compositions different to those from large catches (Fig. 14). Of the tows with catches of less than 100 kg, tows 2 and 4 appear to have more young (age 2 and 3) fish and tows 5, 8 and 13 appear to have more older (age 6 to 11) fish than large catches. Tow 9, which had a catch of 107 kg, also has a large proportion of older fish. Tows 3, 6 and 7 in the first week and tows 15 to 18 in the third week probably provide the best estimate of age composition for herring in Browning Entrance.

The age composition from the combined samples was: age 2 (1.2%); 3 (7.9%); 4 (40.1%); 5 (16.1%); 6 (13.8%); 7 (9.8%); 8 (4.6%); 9 (3.2%); 10 (2.8%); and 11+ (0.5%). Tows 3, 6 and 7 in week 1 had fewer young fish (age 4 and 5) and more old fish (age 6 to 8) than tows 15 to 18 in week 3 (Fig. 15). The mean age was 5.4 for week 1 and 5.0 for week 3. Hydroacoustic estimates by the G.B. REED showed more herring in week 3 than in week 1 in Browning Entrance. The stocks that moved into the area in week 3 may have had a larger proportion of young fish.

STOMACH CONTENT

Most herring collected by the G.B. REED had empty or near-empty guts. The dogfish, collected in the same general geographical vicinity as the largest herring concentrations observed on the cruise, had empty stomachs or were feeding on euphausiids and fish, including herring (Table 8).

TEMPERATURE

The temperature by depth data, from the expendable bathythermographs, is presented in Table 9.

CONCLUSIONS

The general vicinity of Browning Entrance is a major northern herring holding area during winter months. There appear to be separate winter holding areas for Queen Charlotte Island herring (McCarter and Hay 1985) and perhaps for central coast herring although the precise winter area is uncertain.

Within the Browning Entrance holding area the movements of herring are pronounced. There are distinct vertical migrations with herring generally dispersing and rising in the water column during dark hours. It appears also that some herring may swim into shallower water during dark hours by moving to locations nearer shore. This presents a problem for any kind of hydroacoustic assessment and, in particular, for a towed-body which must be operated in deeper water.

There were no large quantities of northern herring detected outside of the Browning Entrance area. A substantial effort was made to find herring in near-shore or inland passages.

Estimates of northern herring biomass, based on 1985 spawn deposition and analysis of population age structure, indicates that northern mainland stocks were relatively strong with the highest pre-fishery biomass, estimated at approximately 30000 t, since the 1960s (Haist et al. 1986). In comparison, the hydroacoustic biomass estimates varied widely but it is interesting to note that the maximal estimate of 31500 t (Table 4) is remarkably close to that obtained by the other methods. This similarity may be coincidental. There are a variety of reasons that hydroacoustic surveys may yield inappropriate biomass estimates. These reasons include: (1) unverified assumptions about target strengths of Pacific herring - our present estimates are based mainly on Atlantic herring; (2) hydroacoustic surveys cannot cover the entire geographic range available to herring and therefore probably will underestimate total biomass; (3) hydroacoustic surveys cannot cover the water column near the surface or the bottom; (4) hydroacoustic estimates may be inflated if species mixtures are encountered (i.e. herring and rockfish) and not identified.

Conventional hydroacoustic surveys generally cover a large area at a single time. Due to the dynamic behaviour and the variable hydroacoustic availability this strategy appears unsuitable for herring. The present data indicate that it is more appropriate to locate a holding area which then is surveyed several times to obtain a maximum estimate. Care must, of course, be taken to provide species information and avoid multiple enumeration of moving schools.

Herring densities may vary by several orders of magnitude from light skimmer to dense schools that can mask the bottom trace on the echogram. Our hydroacoustic gear provides estimates over the entire density range. A comparison of catch rates with our acoustic data indicates that the midwater trawl catches provide representative samples from dense schools. However,

midwater trawl catches from low density aggregations may be disproportionately small and as a consequence we often were unable to confirm species identification for low density aggregations. Herring surveys based on catch size will tend to underestimate low herring densities and thus a major fraction may be excluded as low densities are often wide spread.

The veracity of hydoacoustic biomass estimates cannot be confirmed or negated from the present work. The close similarity in the different biomass estimates is an encouraging result. We must point out, however, that captain George Radil and his experienced crew of the M.V. CANADIAN #1 were of the opinion that the total biomass of herring that could be captured in the Browning Entance area was much lower, perhaps at most a few thousand tonnes. We respect their views. Their experience in previous herring fisheries and surveys lends credibility to their observations and opinions. Nevertheless, the 1985 spawning escapement in northern British Columbia was nearly an historical high, indicating that a substantial biomass of herring spawned there. Presumably these were the same herring that we observed in the Browning Entrance area. Also, in spite of extensive searches on this and previous cruises, no other locations with winter herring concentrations have been detected. The explanation for discrepancy of opinion regarding herring biomass is conjectural but it may be related to interpretation of echograms. Much of the herring in the Browning Entrance area was present in light but widespread densities that were too low for commercial fishing. Only a relatively small proportion of the stock was sufficiently dense to be vulnerable to commercial fishing gear.

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Table 1. Cruise schedule and activities of the G.B. REED

Date	Time	Activity
16 Oct	11:30	REED leaves Nanaimo for Hecate Strait
17 Oct	11:00	Burke Channel, bottom calibration
18 Oct	8:30	Willis Bay, rendevous with CANADIAN #1, begin survey transect 27-21, A1-A8, Fig. 1A
	22:35	Anchor in Willis Bay
19 Oct	11:31	Transect 30-24, search for suitable herring concentration.
	13:59	Transect 27-24, start 1st 24-hour survey
	22:09	Repeat 27-24
20 Oct	01:54	"
	05:40	"
	10:04	"
	13:00	Picked up dogfish stomach samples from the FREE ENTERPRISE
	19:12	Transect B1-B11, survey nearshore shallow waters
	22:19	Anchor in Willis Bay
21 Oct	10:53	Kitkatla Inlet, transect K1-K4, bottom calibration
	21:01	Transect 23-21, Browning Entrance, Fig. 1.
22 Oct	00:37	Transect 20-14
	09:06	Transect 14A-14M, Principe Channel, rough weather
	17:42	Transect 14N-14U, ships sounder only
23 Oct	00:40	Transect 14V-14Z "
	04:07	Transect 15A-15E "
	13:47	Transect 32-49, Porcher to Stephens Island, Fig. 2
24 Oct	00:02	Transect 50-74, Melville Island to Rose Spit, rough weather
	15:44	Survey Work Channel
	17:50	Anchor off Port Simpson, meet CANADIAN #1
25 Oct	10:03	Transect CS1-CS5, Chatham Sound
	15:45	Transect CS6-CS11, Chatham Sound
	21:45	Anchor at Qlawdzeet Anchorage
26 Oct	09:34	Transect CS12-CS17, Chatham Sound
	14:00	Prince Rupert, M.O.T. dock, Seal Cove
27 Oct		F.R.B. holds open house, Prince Rupert
28 Oct	10:21	Transect EP1-EP7, Edye Pass
	12:24	Transect 30L-21L, Porcher Island, Fig. 1
	22:30	Anchor in Willis Bay
29 Oct	09:43	Transect S1-S4, datalogging and set 1-3, Browning Entrance area
	10:23	G.B. REED fishing in the vicinty of transects 24-27.
	17:55	Anchor in Willis Bay
30 Oct	08:30	Transect 27L2-24L2, start 2st 24 hour suvey, Fig. 3.
	14:21	Repeat 27L2-24L2
	22:02	"
31 Oct	03:15	"
	12:43	Transect A-C, 21L2, 24L2, 27L2, 26L2, try to delineate extent of herring concentrations
	22:05	Anchor in Willis Bay
1 Nov	12:45	Kitkatla Inlet, stormy weather
		Bottom calibration, transect K5, test bomb stability
	17:35	Anchor at north end of Kitkatla Inlet
2 Nov	11:15	Weather bound, scout Principe Channel to Laredo Sound
	21:35	Anchor in Kitasu Bay, Marvin Island

Table 1 (cont'd)

Date	Time	Activity
3 Nov	10:10	Transect LS0-LS4F, Laredo Sound, Fig. 4.
	16:57	Transect GI0-GI10, Goose Island Bank, Fig. 5.
4 Nov	00:35	Transect GI11-GI19
	09:12	Transect GX1-GX7
	11:30	Depart for Nanaimo
5 Nov	16:10	PBS, Nanaimo

Table 2. Stability measurements of the towed body. The towing cable between the vessel and the towed body was 36 m. The bias, amplitude, period and rate were measured on five different occasions. See Figures 1, 3, and 5 for transects 16, 27, and GI8 respectively.

Date	Time	Tra	Speed (knots)	Sea *	Roll				Pitch			
					Bias (deg)	Amp (deg)	Per (S)	Rate (deg/S)	Bias (deg)	Amp (deg)	Per (S)	Rate (deg/S)
18 Nov.	1240	27	10.7		-13	3-13	6	2.2	2	3-10	4	2.5
21 Nov.	1247	K3	4.5	VC	-2	2	20	.1	5	2	20	.1
22 Nov.	0629	16	9.8	R	0	6-13	6	2.2	0	3-10	5	2.0
28 Nov.	1440	27L1	8.0	VC	-4	3-6	6	1.0	2	2-5	4	1.3
03 Dec.	2105	GI8	9.0	HS	+6	13-19	15	1.3	2	5-13	5	2.6

*VC= Very calm R= Rough HS = High long swell

Table 3. Biomass estimates for a 24-hour period on transects 24-27. Six replicate surveys were made: 4 during 'light' or day hours; 2 during night or dark hours. Esimates are in metric tonnes.

	------Oct.19-------			------Oct.20-------		
Transect	13:59	18:23	22:09	01:54	05:40	15:34
27	941	1040	1240	468	461	753
26	3300	7460	161	617	3340	6750
25	2940	942	535	224	7610	4490
24	1230	1570	167	1050	1960	1910
Total	8411	11012	2103	2359	13371	13903
Average	Day 9712		Night 2231		Day 13637	

Table 4. Biomass estimates made during 2 'day' and 2 'night' periods. This replicated survey was a repeat of an earlier one (Table 3) except that the transects were extended into shallow water.

Transect	---Oct.30--- 08:30	14:21	---Oct.31--- 23:02	03:15
27L2	1190	370	5010	2580
26L2	1320	3240	9450	6570
25L2	3520	1790	8310	10800
24L2	794	5380	8750	6350
Total	6820	10800	31500	26300
Average	Day 8810		Night 28900	

Table 5a. Tow information for M/V CANADIAN #1, Oct. 15-Nov. 6, 1984.

Haul no.	1	2	3	4*	5a
Location	Browning E.	Browning E.	Browning E.	Browning E.	Browning E.
Date	16.10.84	17.10.84	18.10.84	18.10.84	19.10.84
Time:Start	17:20	15:08	19:26	20:56	11:10
Stop	17:55	15:45	20:12	21:25	11:50
Position:					
Start Lat.	53°49.6'	53°50.4'	53°50.6'	53°49.5'	53°43.7'
Long.	130°55.6'	130°54.1'	130°48.5'	130°41.8'	130°45.9'
Stop Lat.	53°50.6'	53°49.8'	53°51.9'	53°49.6'	53°44.8'
Long.	130°54.3'	130°52.7'	130°50.5'	130°53.8'	130°45.9'
Bottom(m):Start	80	97	86	59	124
Stop	88	91	91	73	139
Net depth (m off btm)	5	9	11	6	20
Net opening (m)	17	18	14	21	7
Catch (kg):					
Widow rockfish					
Yellowtail rockfish			1	tr	171
Quillback rockfish				1	
Yelloweye rockfish			8		
Rock sole				tr	
Dogfish		2	24		272
Blackcod	1	tr	1		
Lingcod					
Pacific pollock					6
Eulachon					11
Herring-adult	2	4	282	21	18
Herring-juv.					
Chinook					
Salmon-juv.					
Squid				tr	
Jellyfish				present	
Total wt.	3	6	316	22	478

*Torn net.

Table 5a (cont'd)

Haul no.	5b	6	7	8	9*
Location	Browning E.	Browning E.	Browning E.	Browning E.	Browning E.
Date	19.10.84	19.10.84	19.10.84	20.10.84	20.10.84
Time:Start	15:20	15:35	23:45	08:25	20:45
Stop	15:50	17:30	00:50	09:48	21:25
Position:					
Start Lat.	53°49.6'	53°48.2'	53°51.0'	53°50.7'	53°51.1'
Long.	130°51.0	130°54.1'	130°48.7'	130°50.2'	130°47.0'
Stop Lat.	53°48.9'	53°47.2'	53°50.2'	53°49.3'	53°50.5'
Long.	130°52.3'	130°50.8'	130°44.2'	130°46.9'	130°44.6'
Bottom(m):Start	88	95	82	99	62
Stop	99	110	64	101	55
Net depth (m off btm)	23	5	6	4	7
Net opening (m)	7	22	17	18	18
Catch (kg):					
Widow rockfish					
Yellowtail rockfish					tr
Quillback rockfish					
Yelloweye rockfish		7			
Rock sole					
Dogfish	10	195		24	
Blackcod					
Lingcod					
Pacific pollock					
Eulachon				tr	tr
Herring-adult	1	1378	4637	43	107
Herring-juv.					
Chinook		5			
Salmon-juv.					
Squid					
Jellyfish					
Total wt.	11	1585	4637	67	107

*Torn net.

Table 5a (cont'd)

Haul no.	10	11	12	13	14
Location	Work Ch.	Hanmer Is.	Chatham Sd.	Browning E.	Browning E.
Date	24.10.84	25.10.84	25.10.84	30.10.84	30.10.84
Time:Start	12:05	14:52	19:15	09:25	11:50
Stop	12:18	15:18	20:15	09:40	12:12
Position:					
Start Lat.	50°37.6;	54°2.7'	54°10.4'	53°52.2'	53°51.0'
Long.	130°23.8'	130.14.7'	130°37.4'	130°49.0'	130°47.4'
Stop Lat.	54°38.0'	54°3.6'	54°11.7'	53°51.4'	53°50.4'
Long.	130°24.7'	130°15.9'	130°39.7'	130°48.0'	130°45.9'
Bottom(m):Start	73	69	106	75	73
Stop	62	91	130	75	73
Net depth (m off btm)	10	6	90	16	10
Net opening (m)	10	18	8	11	16
Catch (kg):					
Widow rockfish				19	
Yellowtail rockfish		12		tr	
Quillback rockfish		tr			
Yelloweye rockfish					
Rock sole					
Dogfish					
Blackcod					
Lingcod					
Pacific pollock	tr	87	tr		
Eulachon			tr		
Herring-adult		34	tr	74	2
Herring-juv.	1		tr		
Chinook					
Salmon-juv.					
Squid					
Jellyfish					
Total wt.	1	133	1	93	2

Table 5a (cont'd)

Haul no.	15	16	17[a]	18	19[b]
Location	Browning E.	Browning E.	Browning E.	Browning E.	Browning E.
Date	30.10.84	30.10.84	31.10.84	31.10.84	31.10.84
Time:Start	13:35	16:20	08:10	13:48	16:40
Stop	14:15	17:30	09:15	14:58	17:20
Position:					
Start Lat.	53°48.3'	53°52.9'	53°44.6'	53°46.5'	53°43.2'
Long.	130°49.0'	130°52.0'	130°53.0'	130°51.7'	130°47.5'
Stop Lat.	53°49.2'	53°51.5'	53°46.9'	53°44.8'	53°44.6'
Long.	130°50.7'	130°48.4'	130°55.4'	130°49.7'	130°49.0'
Bottom(m):Start	115	82	57	106	93
Stop	99	79	73	102	113
Net depth (m off btm)	7	10	5	6	5
Net opening (m)	18	16	19	18	18
Catch (kg):					
Widow rockfish					
Yellowtail rockfish				tr	39
Quillback rockfish					
Yelloweye rockfish					
Rock sole					
Dogfish	74			35	
Blackcod					tr
Lingcod	14				
Pacific pollock					
Eulachon					
Herring-adult	1142	180	138	2737	5
Herring-juv.					
Chinook	2				
Salmon-juv.					tr
Squid					
Jellyfish					
Total wt.	1234	180	138	2772	44

[a]Schools under net.
[b]Not representative - missed schools.

Table 5b. Tow information for G.B. REED, Oct. 29, 1984.

Haul no.	1	2	3
Location	Browning E.	Browning E.	Browning E.
Date	29.10.84	29.10.84	29.10.84
Time:Start	10:23	12:51	15:24
Stop	11:01	13:46	15:54
Position:			
Start-Lat.	53°51.9'	53°50.9'	53°48.2'
Long.	130°51.9'	130°51.5'	130°48.2'
Stop Lat.	53°33.8'	53°53.8'	53°49.3'
Long.	130°53.9'	130°53.9'	130°50.0'
Bottom(m):Start	92	97	142
Stop	80	84	110
Net depth (m off btm)	10	10	varied
Net opening (m)			
Catch (kg):			
Widow rockfish			
Yellowtail rockfish			
Quillback rockfish			
Yelloweye rockfish			
Rock sole			
Dogfish		16	119
Blackcod		tr	
Lingcod			
Pacific pollock			
Eulachon			
Herring-adult		2	17
Herring-juv.			
Chinook			
Salmon-juv.			
Squid			
Jellyfish			
Total wt.			

Table 6. Total catch by principal species for CAN84-1 cruise, Oct. 15- Nov. 6, 1984.

Species	Weight (kg)	% of total
Herring - adult	10805	91.34
Dogfish	636	5.38
Yellowtail rockfish	223	1.89
Pacific pollock	93	0.79
Widow rockfish	19	0.16
Yelloweye rockfish	15	0.13
Lingcod	14	0.12
Eulachon	11	0.09
Chinook	7	0.06
Blackcod	4	0.03
Quillback rockfish	1	0.01
Herring - juvenile	1	0.01
Total	11829	100.01

Table 7. Numbers, percent and mean length (mm) by age for herring sampled from the CANADIAN #1 and G.B. REED tows. Note that the ages shown here are applied differently than for previous publications.

		Age											
		2	3	4	5	6	7	8	9	10	11+	Unaged	Aged
G.B.R.3	No.	1	2	40	17	9	5	0	0	0	0	26	74
	%	1.35	2.70	54.05	22.97	12.16	6.76	0.00	0.00	0.00	0.00		
	m.l.	141	164	181	186	192	189	0	0	0	0		
CAN.2	No.	9	12	25	4	3	2	2	0	0	1	8	58
	%	15.52	20.69	43.10	6.90	5.17	3.45	0.00	0.00	1.72			
	m.l.	144	171	179	186	191	224	228	0	0	242		
CAN.3	No.	0	8	30	9	16	10	5	4	2	1	15	85
	%	0.00	9.41	35.29	10.59	18.82	11.76	5.88	4.71	2.35	1.18		
	m.l.	0	171	181	193	204	218	220	238	236	252		
CAN.4	No.	8	10	38	19	5	6	2	0	0	1	11	89
	%	8.99	11.24	42.70	21.35	5.62	6.74	2.25	0.00	0.00	1.12		
	m.l.	147	173	183	194	200	209	244	0	0	248		
CAN.5	No.	0	1	13	8	5	10	2	1	0	1	59	41
	%	0.00	2.44	31.71	19.51	12.20	24.39	4.88	2.44	0.00	2.44		
	m.l.	0	188	185	202	206	230	253	0	274			
CAN.6	No.	0	4	33	14	11	9	5	0	0	1	23	77
	%	0.00	5.19	42.86	18.18	14.29	11.69	6.49	0.00	0.00	1.30		
	m.l.	0	179	180	191	195	215	223	0	0	260		
CAN.7	No.	1	8	28	11	11	10	6	4	6	1	14	86
	%	1.16	9.30	32.56	12.79	12.79	11.63	6.98	4.65	6.98	1.16		
	m.l.	150	171	184	202	210	211	225	249	239	231		
CAN.8	No.	3	9	14	13	13	10	10	7	4	1	16	84
	%	3.57	10.71	16.67	15.48	15.48	11.90	11.90	8.33	4.76	1.19		
	m.l.	135	172	179	192	192	203	216	236	221	235		
CAN.9	No.	0	3	13	19	9	20	9	1	3	3	20	80
	%	0.00	3.75	16.25	23.75	11.25	25.00	11.25	1.25	3.75	3.75		
	m.l.	0	175	188	201	209	218	231	246	250	263		
CAN.11	No.	0	2	12	20	24	15	6	2	1	1	17	83
	%	0.00	2.41	14.46	24.10	28.92	18.07	7.23	2.41	1.20	1.20		
	m.l.	0	163	176	187	205	212	226	230	269	236		
CAN.13	No.	1	2	3	15	8	13	10	11	11	4	22	78
	%	1.28	2.56	3.85	19.23	10.26	16.67	12.82	14.10	14.10	5.13		
	m.l.	166	178	185	200	217	226	232	233	245	246		
CAN.15	No.	1	5	34	15	5	3	1	2	0	0	34	66
	%	1.52	7.58	51.52	22.73	7.58	4.55	1.52	3.03	0.00	0.00		
	m.l.	168	176	181	184	177	217	217	247	0	0		
CAN.16	No.	1	9	31	16	12	5	2	3	6	0	15	85
	%	1.18	10.59	36.47	18.82	14.12	5.88	2.35	3.53	7.06	0.00		
	m.l.	160	178	185	198	213	204	238	240	242	0		

Table 7 (cont'd)

		Age											
		2	3	4	5	6	7	8	9	10	11+	Unaged	Aged
	No.	2	7	35	15	12	7	1	3	2	0	16	84
CAN.17	%	2.38	8.33	41.67	17.86	14.29	8.33	1.19	3.57	2.38	0.00		
	m.l.	161	178	187	205	208	215	229	225	239	0		
	No.	2	4	38	12	12	12	6	2	0	0	12	88
CAN.18	%	2.27	4.55	43.18	13.64	13.64	13.64	6.82	2.27	0.00	0.00		
	m.l.	160	180	186	188	188	196	217	238	0	0		
All	No.	29	86	387	207	155	137	67	40	35	15	308	1158
tows	%	2.50	7.43	33.42	17.88	13.39	11.83	5.79	3.45	3.02	1.30		
	m.l.	148	174	183	194	202	211	225	237	241	250		

Table 8. Stomach contents of 100 dogfish, collected by bottom trawls made by the FREE ENTERPRISE in the vicinity of transect 27, Oct. 20, 1984. Unidentified digested material is shown as DM. In some cases, the length and weight of prey species are included.

Fish number	Length (cm)	Volume (cc)	Stomach contents
1	56	0	
2	79	0	
3	74	0	
4	82	60	Euphausiids
5	78	10	Euphausiids
6	74	20	DM (fish)
7	68	50	Euphausiids
8	76	20	Euphausiids
9	80	t	Herring vertebrae
10	65	0	
11	70	0	
12	82	30	Euphausiids
13	81	10	DM (fish)
14	81	70	Digested herring
15	69	20	DM (fish)
16	65	0	
17	77	10	DM (fish)
18	69	10	Euphausiids
19	59	10	DM (fish)
20	88	40	DM (fish)
21	74	30	Euphausiids
22	72	20	DM (fish)
23	45	0	
24	74	63	Euphausiids, one herring (162 mm/63 g)
25	90	130	Euphausiids and herring
26	80	30	DM (fish)
27	84	30	Euphausiids and DM (fish)
28	68	0	
29	70	20	DM (fish)
30	78	10	Euphausiids and DM (fish)
31	71	0	
32	76	50	Euphausiids and DM
33	76	0	
34	80	20	Euphausiids and DM
35	78	0	
36	82	0	
37	77	0	
38	70	20	Euphausiids
39	72	30	Euphausiids
40	68	30	DM
41	68	0	
42	73	0	
43	77	20	Euphausiids and one pollock (116 mm/18 g)
44	81	0	
45	78	20	DM (fish)

Table 8 (cont'd)

Fish number	Length (cm)	Volume (cc)	Stomach contents
46	76	30	Euphausiids
47	84	50	Euphausiids
48	76	60	Euphausiids
49	80	70	DM (fish)
50	60	10	DM (fish)
51	76	10	DM (fish)
52	72	50	Euphausiids
53	73	100	Euphausiids
54	79	30	Euphausiids and DM
55	85	20	DM (fish)
56	76	40	Euphausiids
57	78	50	Euphausiids
58	79	0	
59	78	0	
61	80	0	
62	77	0	
63	81	0	
64	72	20	Euphausiids
65	76	110	Euphausiids
66	77	20	Euphausiids and DM
67	72	0	
68	80	0	
69	78	10	DM (fish)
70	68	0	
71	65	10	DM
72	85	0	
73	78	0	
74	75	90	Euphausiids and DM (fish)
75	73	0	
76	66	0	
77	78	150	Euphausiids
78	75	0	MT
79	75	50	Euphausiids
80	76	10	Euphausiids
81	77	0	
82	83	70	Euphausiids and DM (fish)
83	77	0	
84	66	10	Euphausiids
85	76	40	Euphausiids
86	80	0	
87	79	50	DM (fish)
88	84	20	DM
89	60	10	DM (fish)
90	73	10	Euphausiids

Table 8 (cont'd)

Fish number	Length (cm)	Volume (cc)	Stomach contents
91	69	40	Euphausiids
92	74	0	
93	78	0	
94	74	0	
95	78	30	Euphausiids
96	63	0	
97	78	0	
98	81	30	DM (fish)
99	70	0	
100	74	0	

Table 9. Seawater temperatures (°C) at 10 m depth intervals, taken at various locations in the survey by expendable bathythermograph (XBT) during G.B. REED cruise October 15-November 5, 1984.

Transect Name	Day/ month	Time (PST)	Location		Standard depths (m)												Bottom	
			N. Lat.	W. Long.	0	10	20	30	50	75	100	125	150	200	250	300	°C	Depth (m)
Burke Channel	17/10	1052	(Edmond Point)		8.8	8.8	10.0	10.1	10.3	10.3	8.0	7.7	-	-	-	-	7.2	137
24	20/10	0927	53°48.3	130°46.5	10.0	11.0	11.0	11 1	11.1	10.1	9.4	-	-	-	-	-	9.1	106
25	20/10	0934	53°48.8	130°47.9	10.0	10.8	11.0	11.0	11.0	10.0	9.6	-	-	-	-	-	9.0	110
26	20/10	0940	53°49.4	130°49.2	10.0	10.8	10.9	10.9	11.1	10.0	9.4	-	-	-	-	-	9.4	100
27	20/10	0948	53°50.0	130°50.5	10.2	11.0	11.2	11.2	11.2	10.0	-	-	-	-	-	-	9.3	90
21L	28/10	1912	53°35.2	131°04.4	10.0	10.0	10.0	10.4	-	-	-	-	-	-	-	-	9.1	31
6X7	04/11	1132	51°57.4	128°53.9	9.6	9.6	9.6	10.3	10.3	10.0	-	-	-	-	-	-	10.0	86
QCS	04/11	1500	51°24.0	128°42.6	10.1	10.1	10.1	10.1	10.1	10.1	10.1	-	-	-	-	-	10.1	120

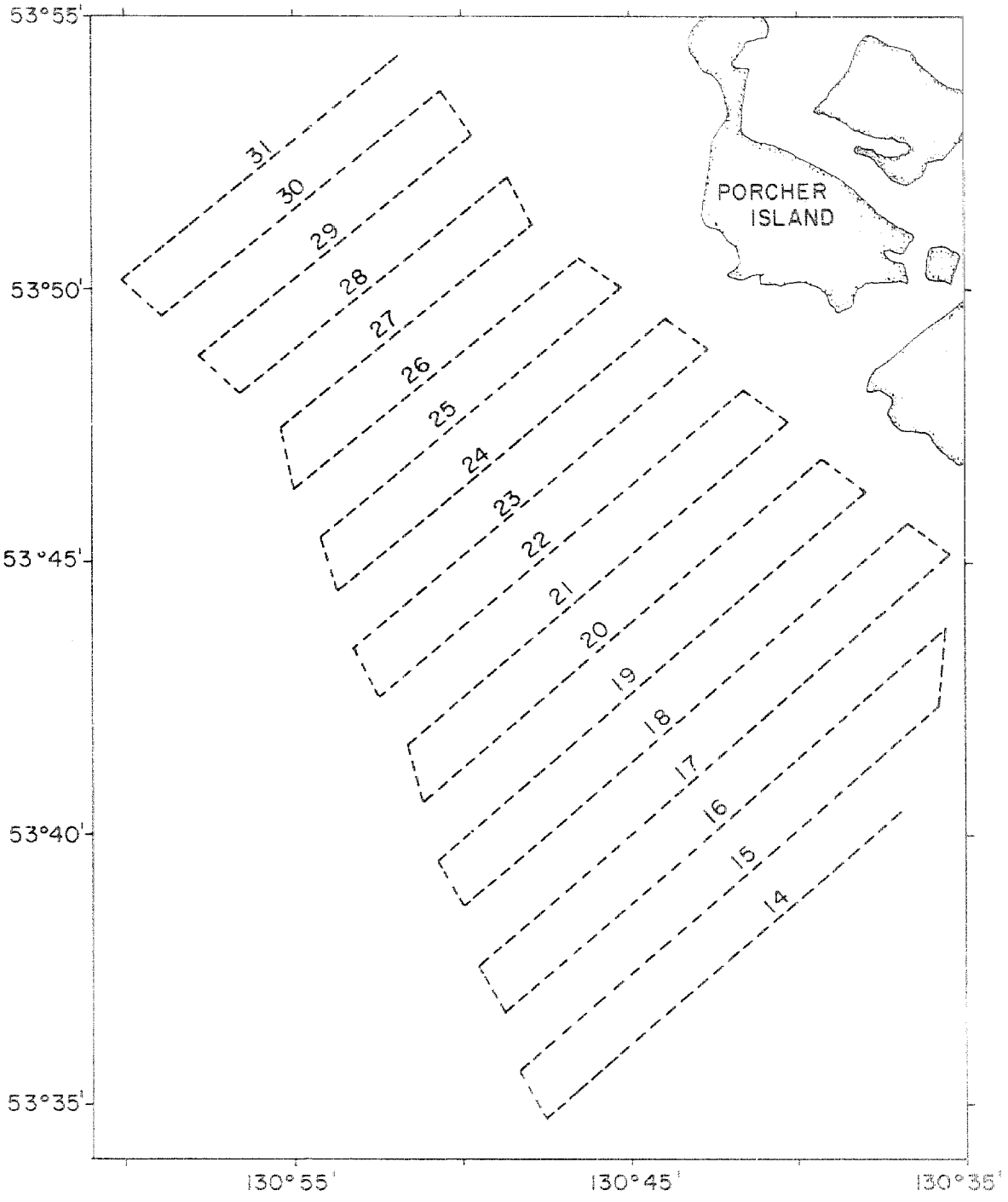

Fig. 1. G.B. REED transects 14-31 in the Browning Entrance area.

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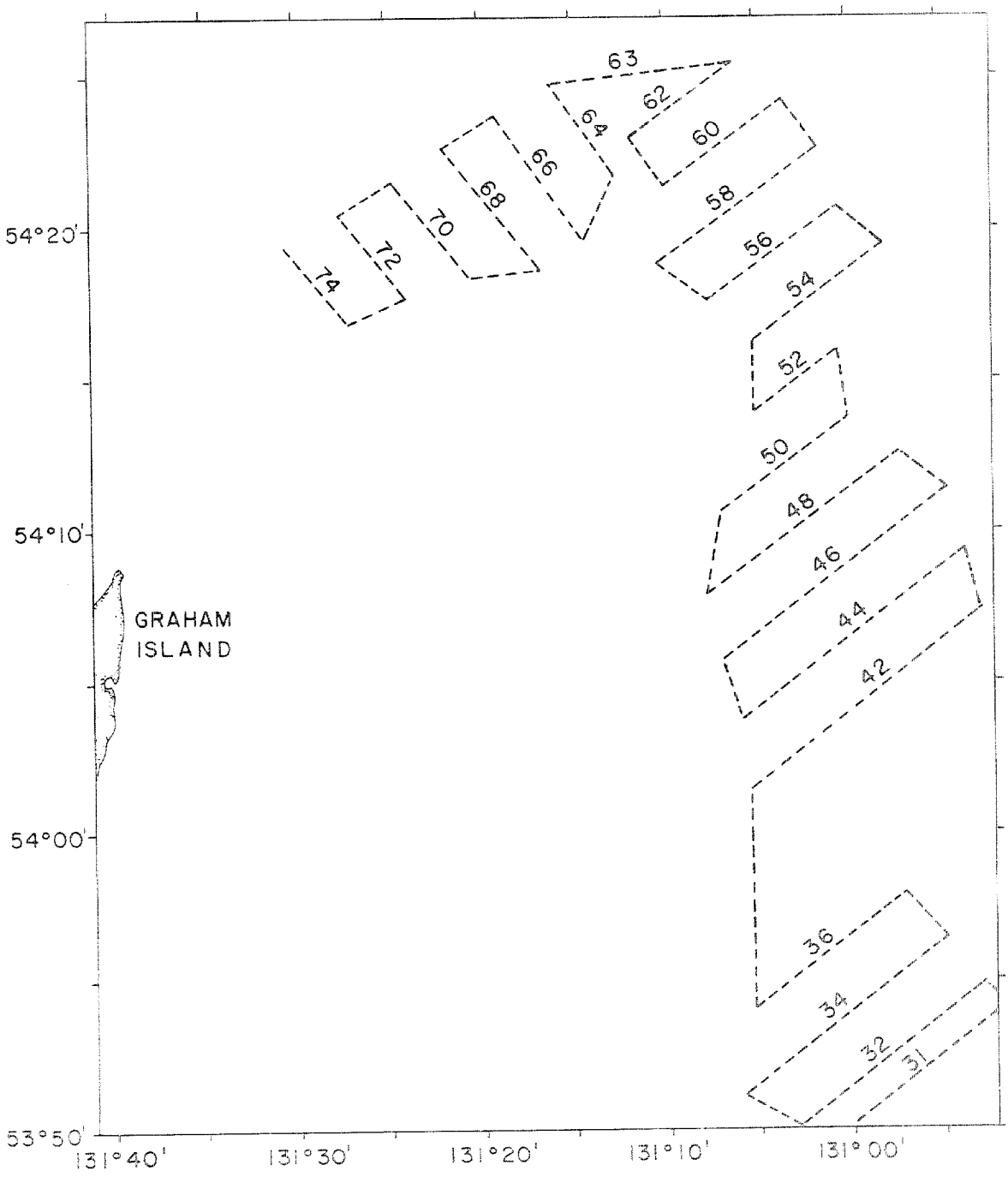

Fig. 2. G.B. REED transects 31-74 in the vicinity of Dundas Island and Rose Spit.

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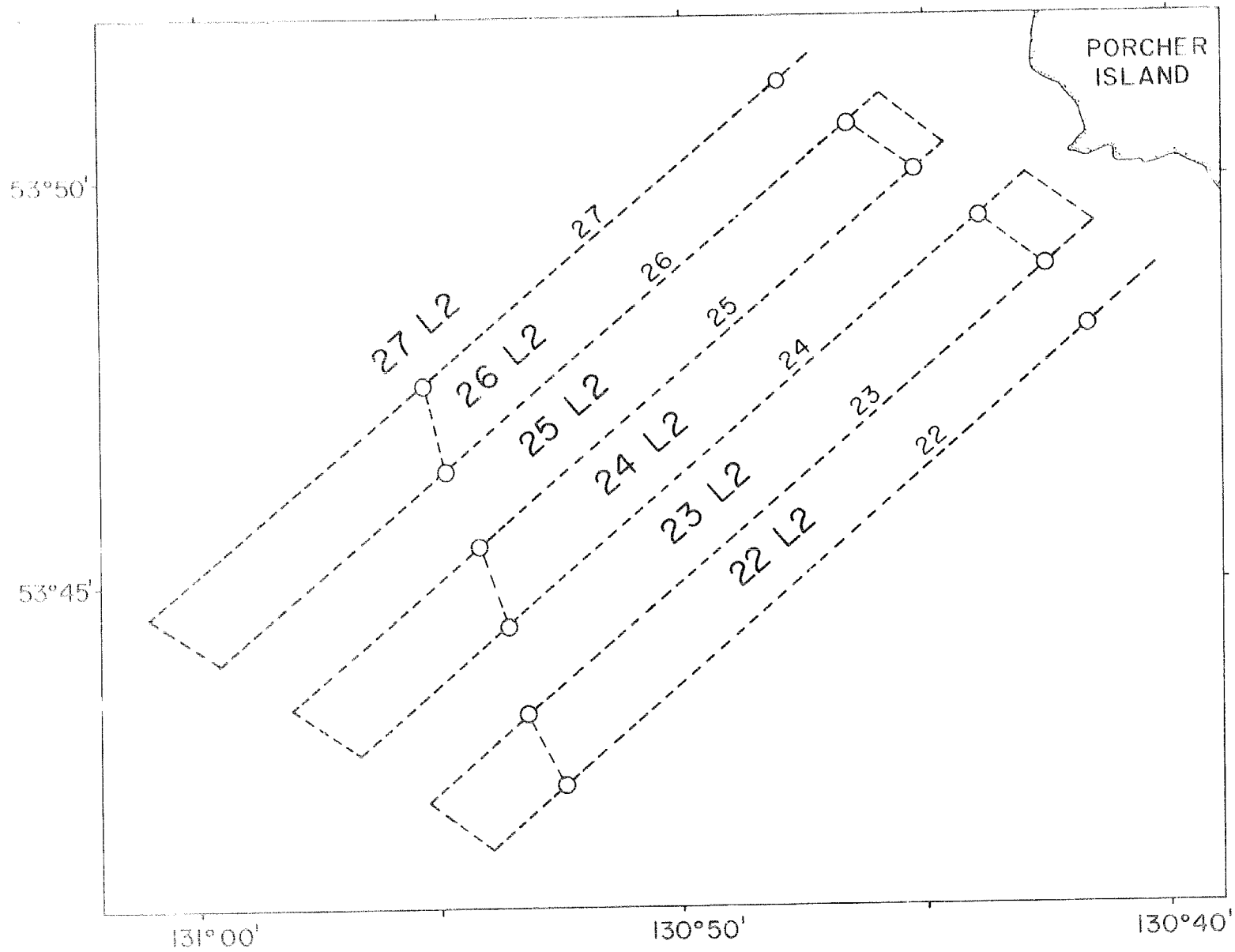

Fig. 3. G.B. REED transects 22-27 and 22L2-27L2 in the Browning Entrance area.

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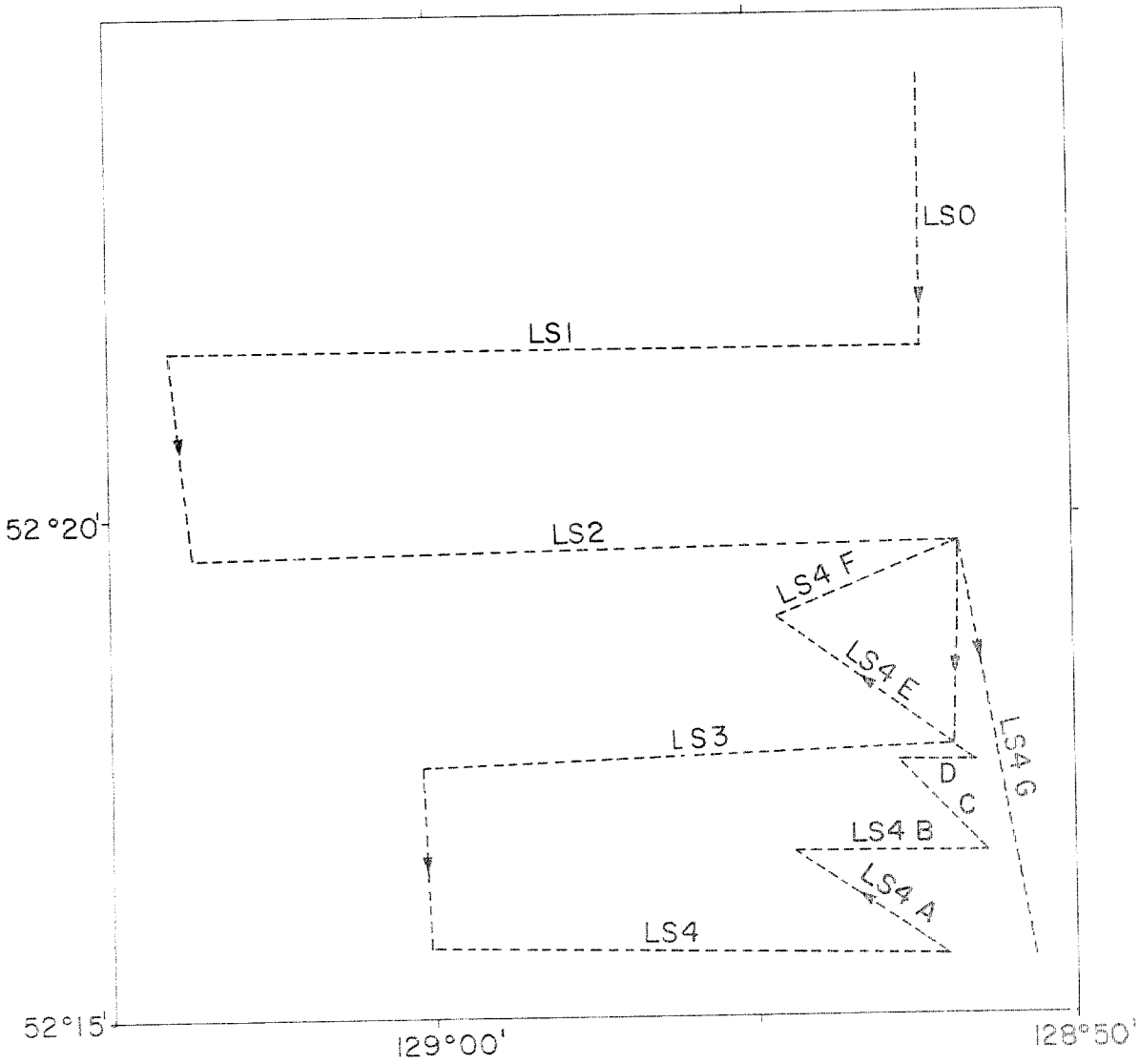

Fig. 4. G.B. REED transects LS0-LS4 and LS4A-LS4G in the Laredo Sound area.

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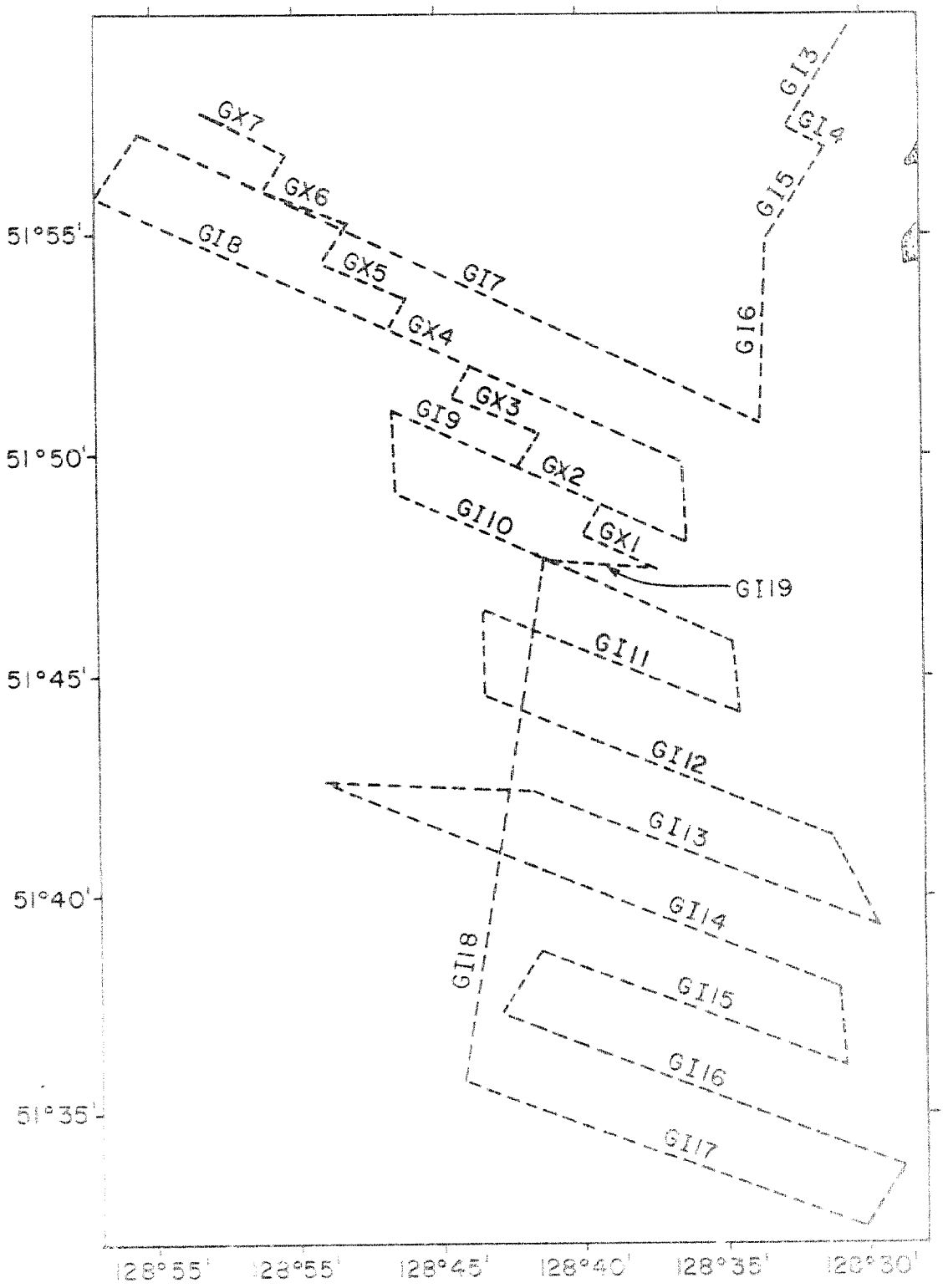

Fig. 5. G.B. REED transects GI3-GI19 and GX1-GX7 in the Goose Island Bank area.

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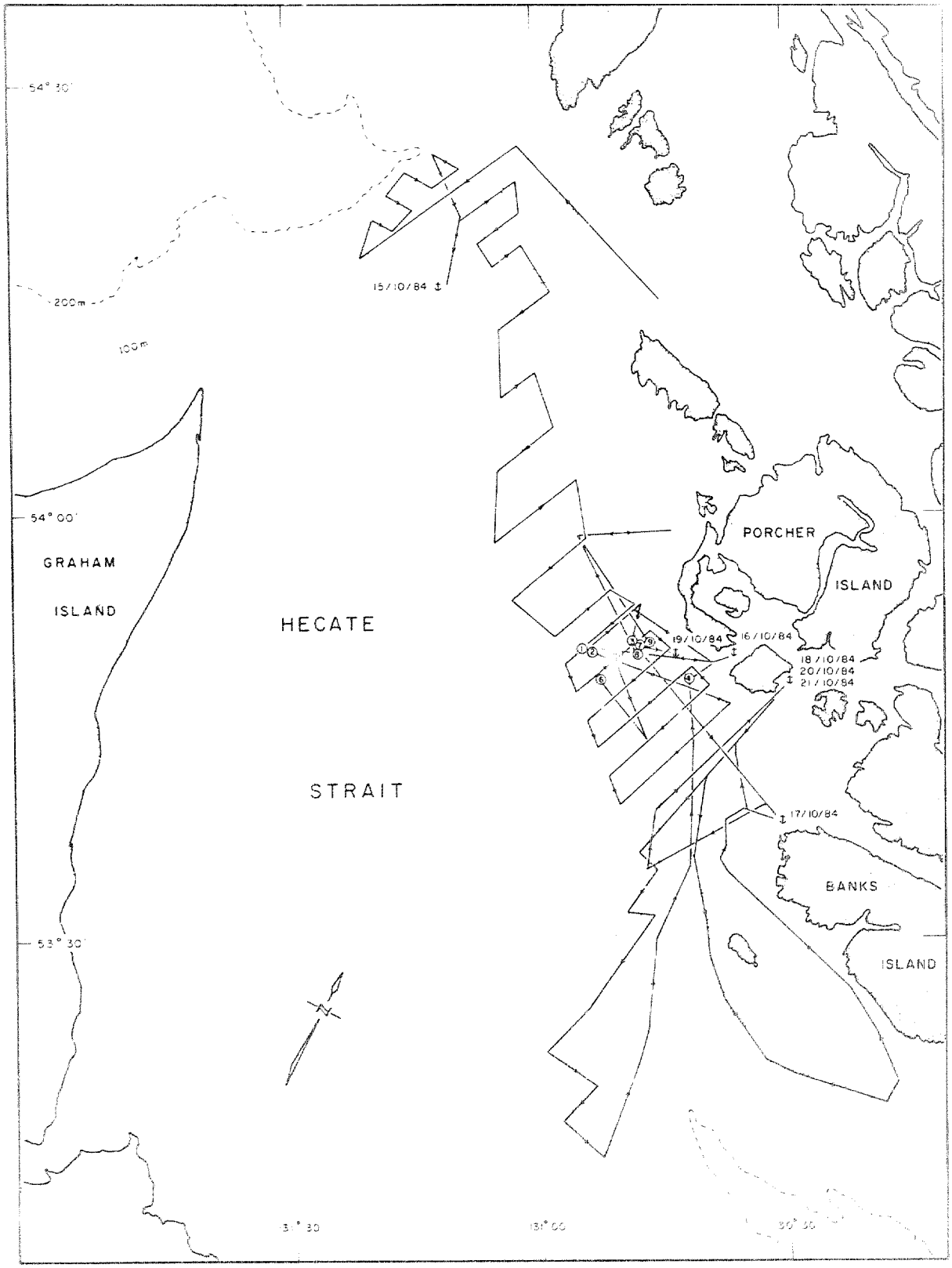

Fig. 6. CANADIAN #1 movements and tow positions (circled) for week 1 (October 15 to 21, 1984).

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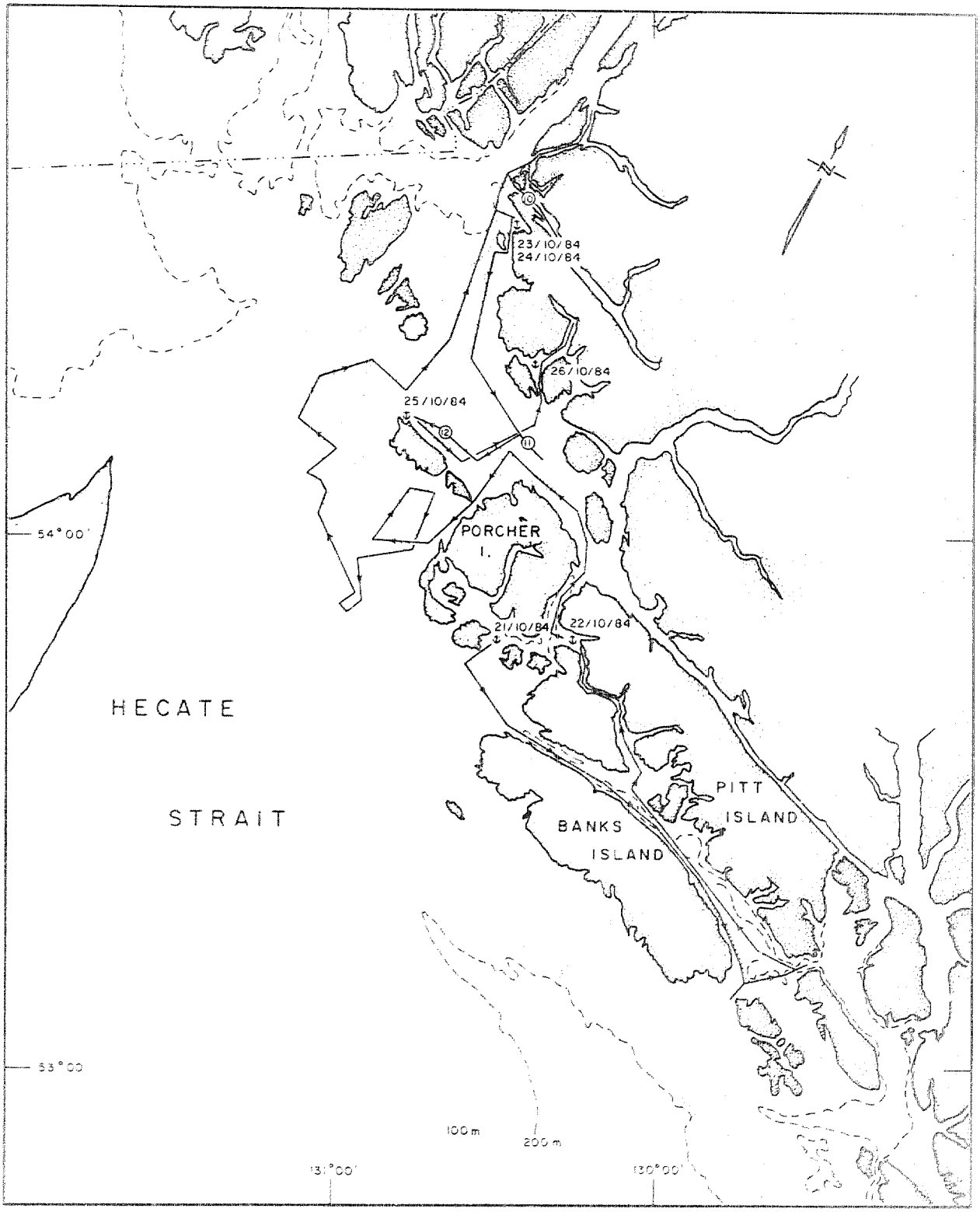

Fig. 7. CANADIAN #1 movements and tow positions (circled) for week 2 (October 22 to 26, 1984).

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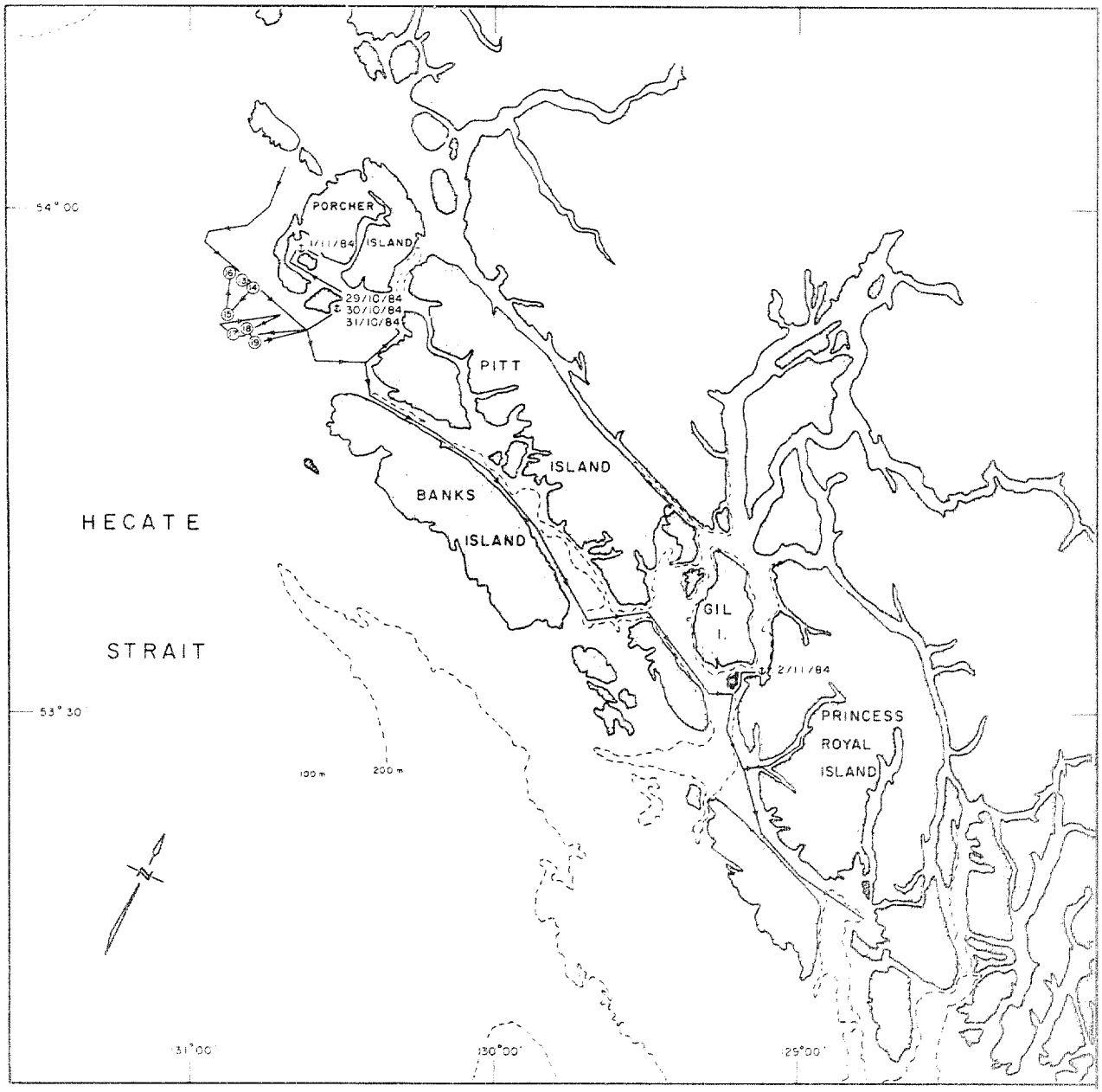

Fig. 8. CANADIAN #1 movements and tow positions (circled) for the first part of week 3 (October 29 to November 2, 1984).

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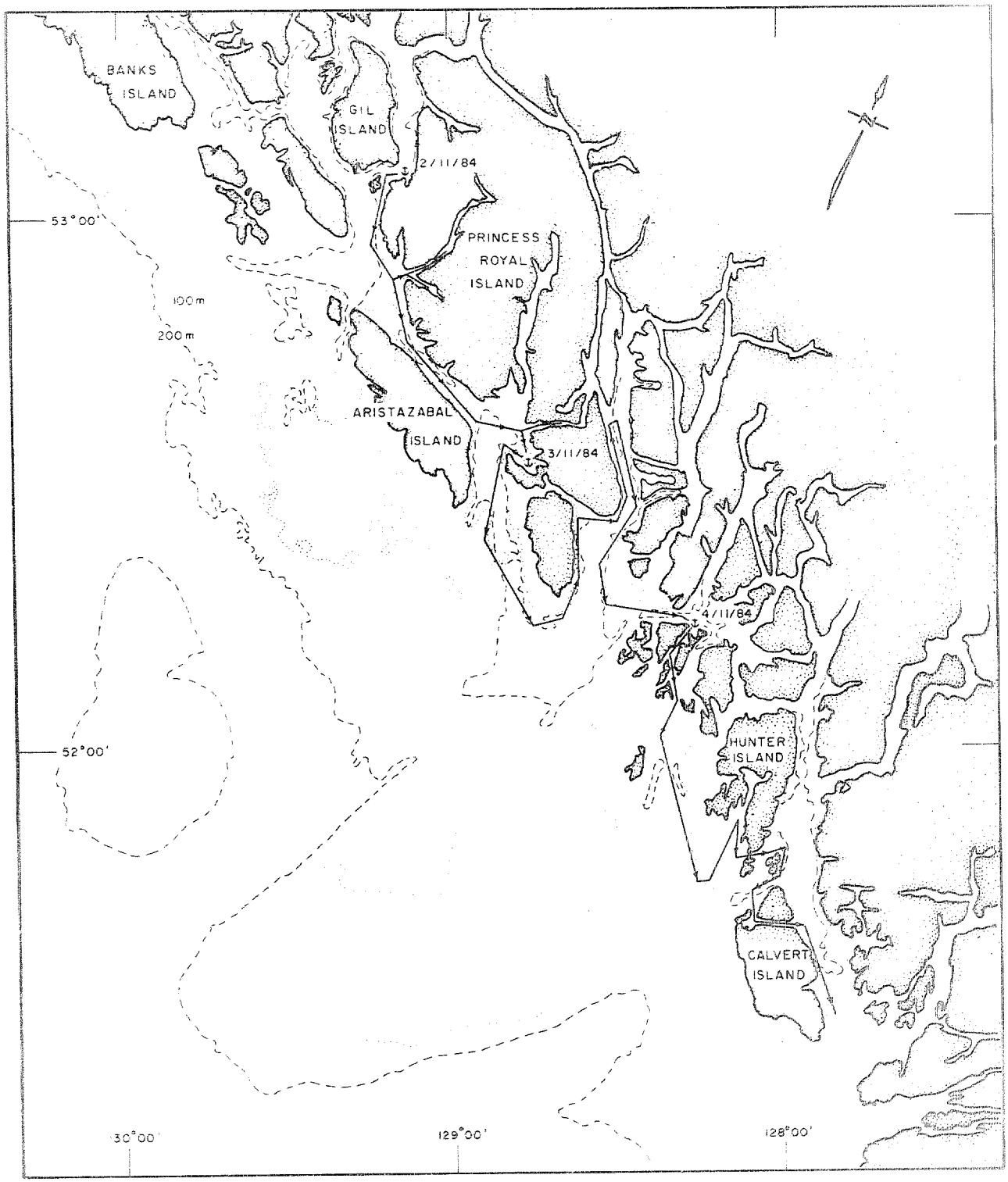

Fig. 9. CANADIAN #1 movements for the last part of week 3 (November 3 to November 5, 1984).

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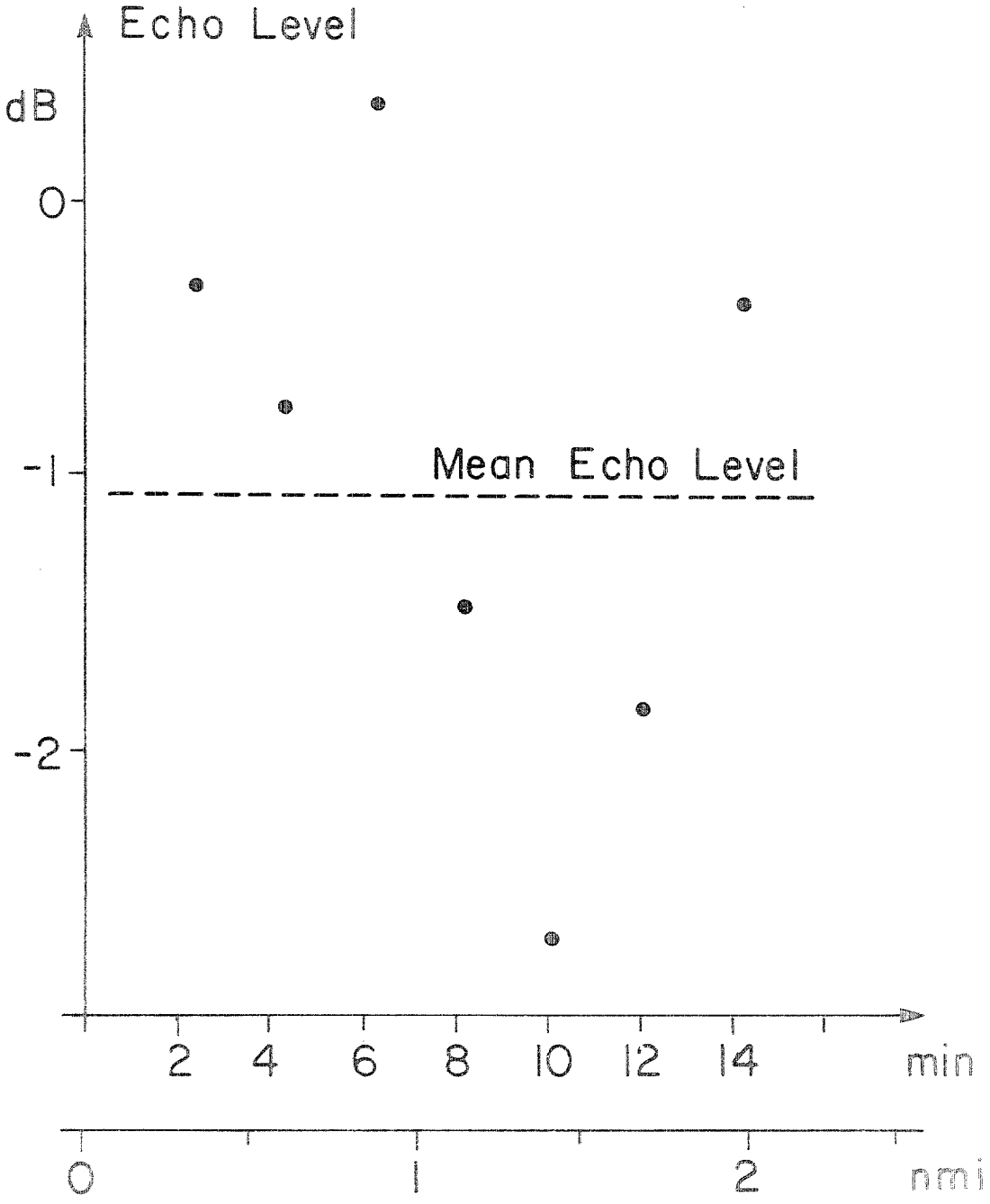

Fig. 10. The relative bottom echo intensity (dB) is plotted versus distance (Burke Channel, bottom calibration transect 01, October 17, 11:47). The standard deviation is 1.0 dB over a distance of 2.1 nmi (3.9 km).

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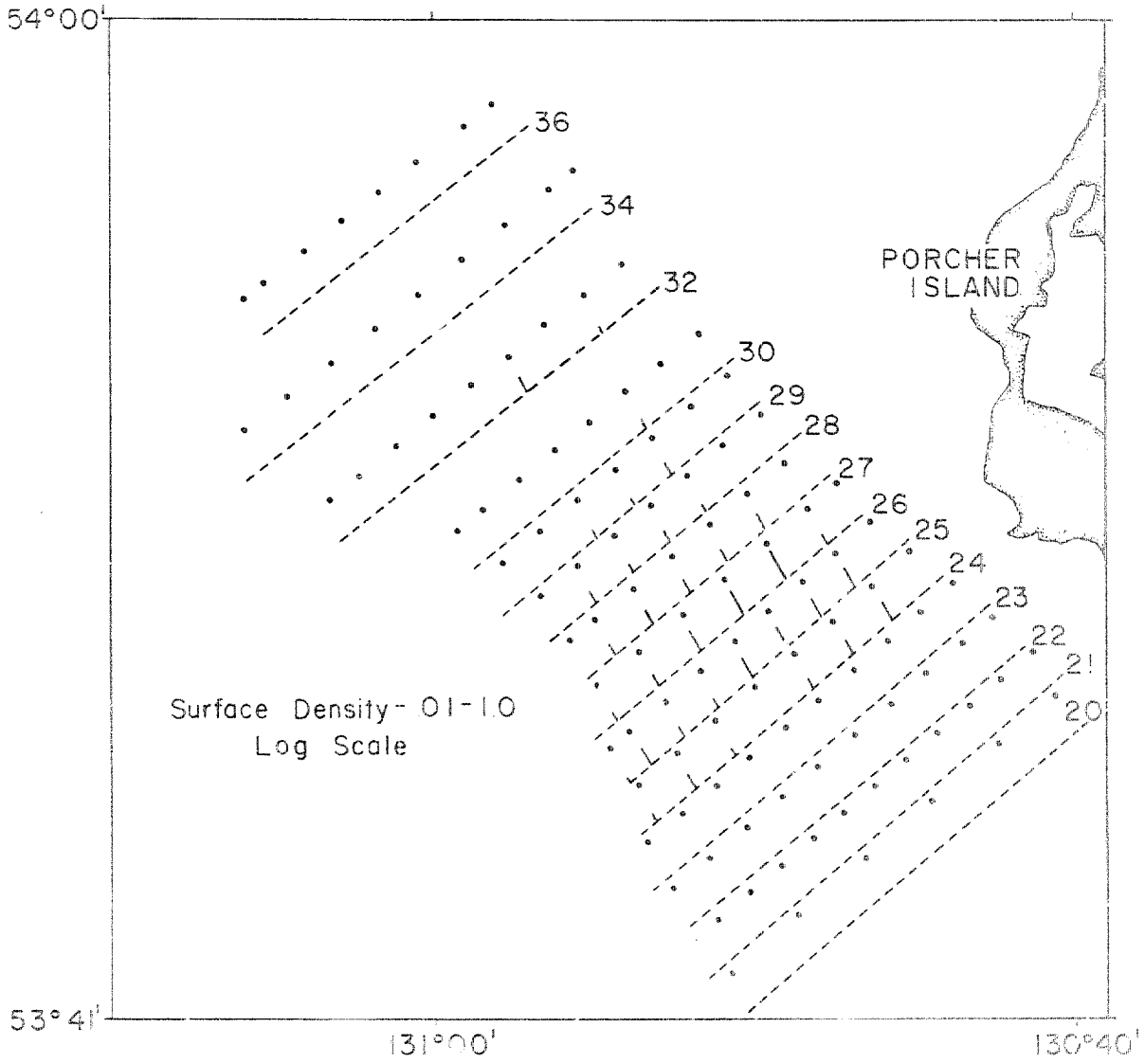

Fig. 11 a-c. Biomass density maps, density bars use a logarithmic scale (a) Density 0.01-1.0 kg/m^2, Browning Entrance Area

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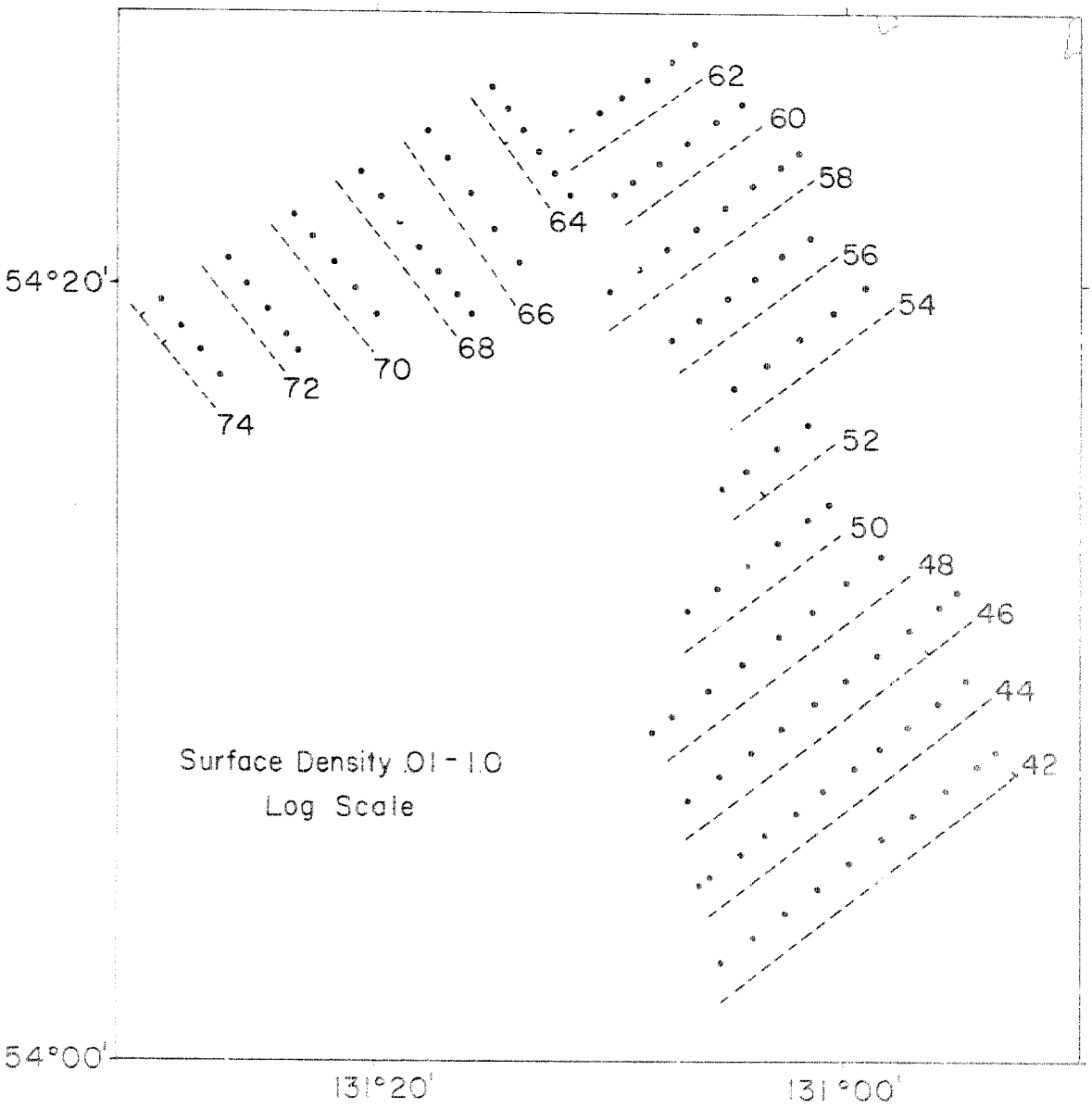

Fig. 11b. Density 0.01- 1.0 kg/m^2, Rose Spit Area.

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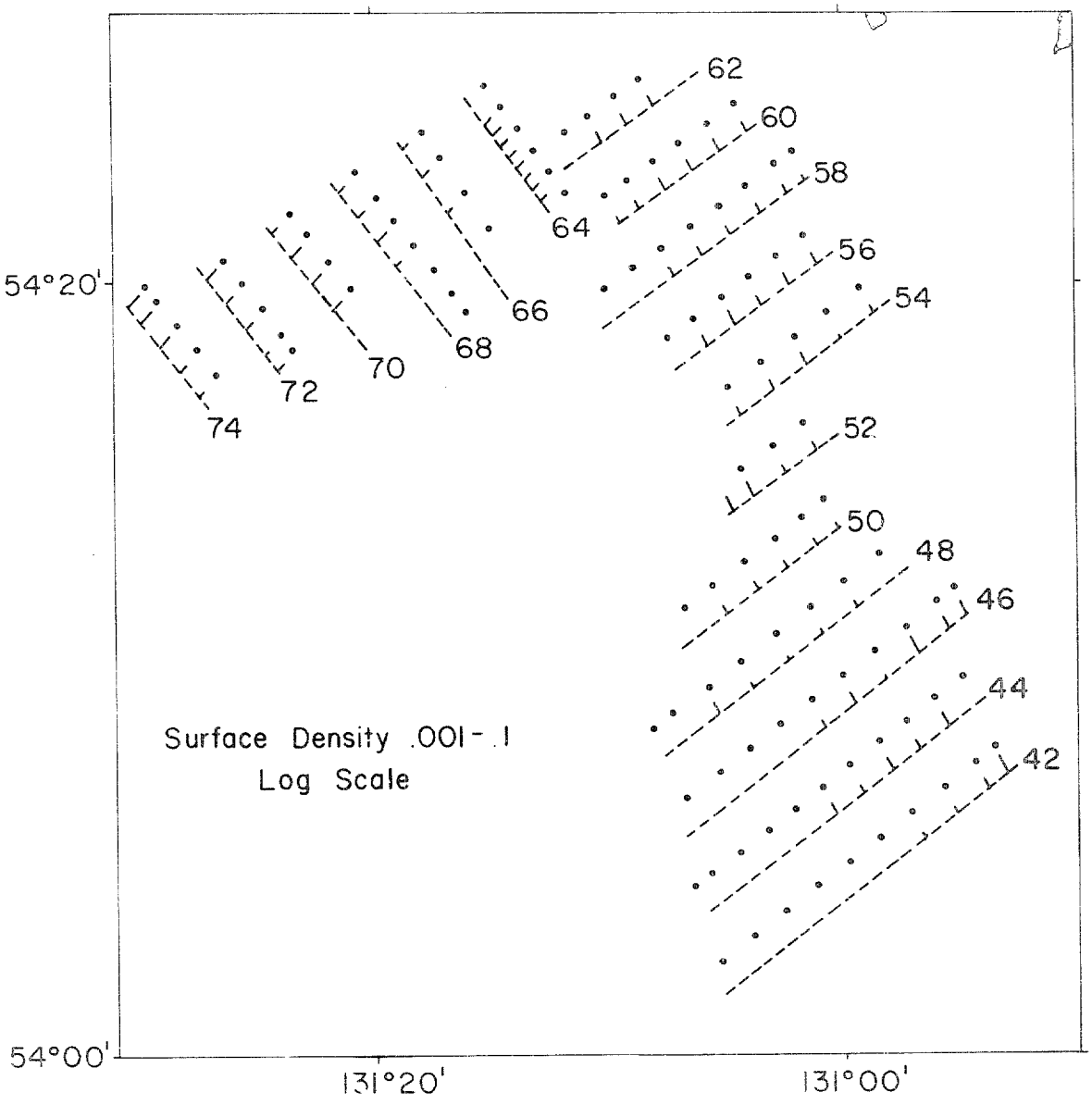

Fig. 11c. Density 0.001-0.1 kg/m^2, Rose Spit Area.

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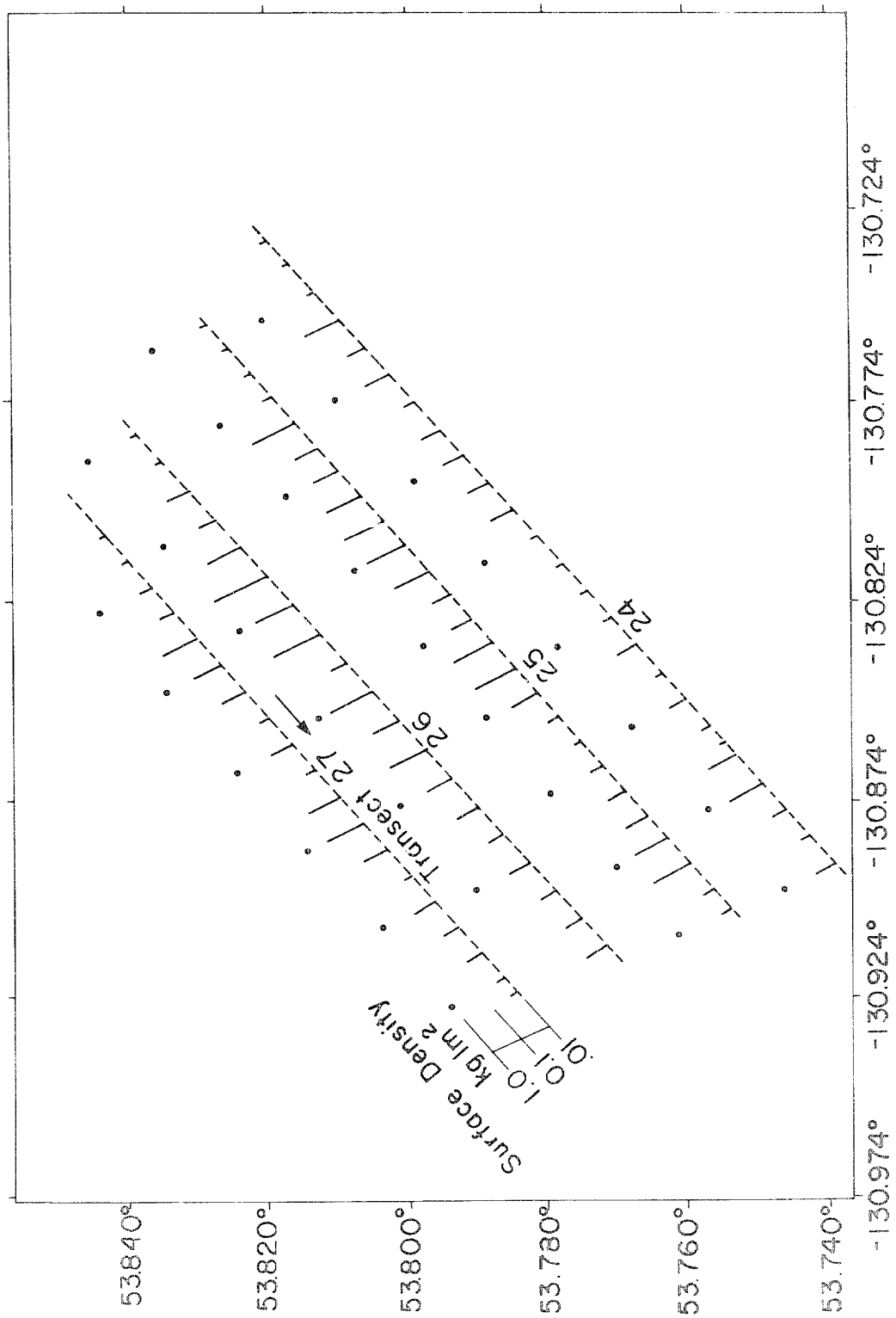

Fig. 12a-f. Six consecutive herring density maps from the first 24 hour survey, October 19-20, Transects 27-24. A logarithmic density scale of 0.01-1.0 kg/m^2 is used.

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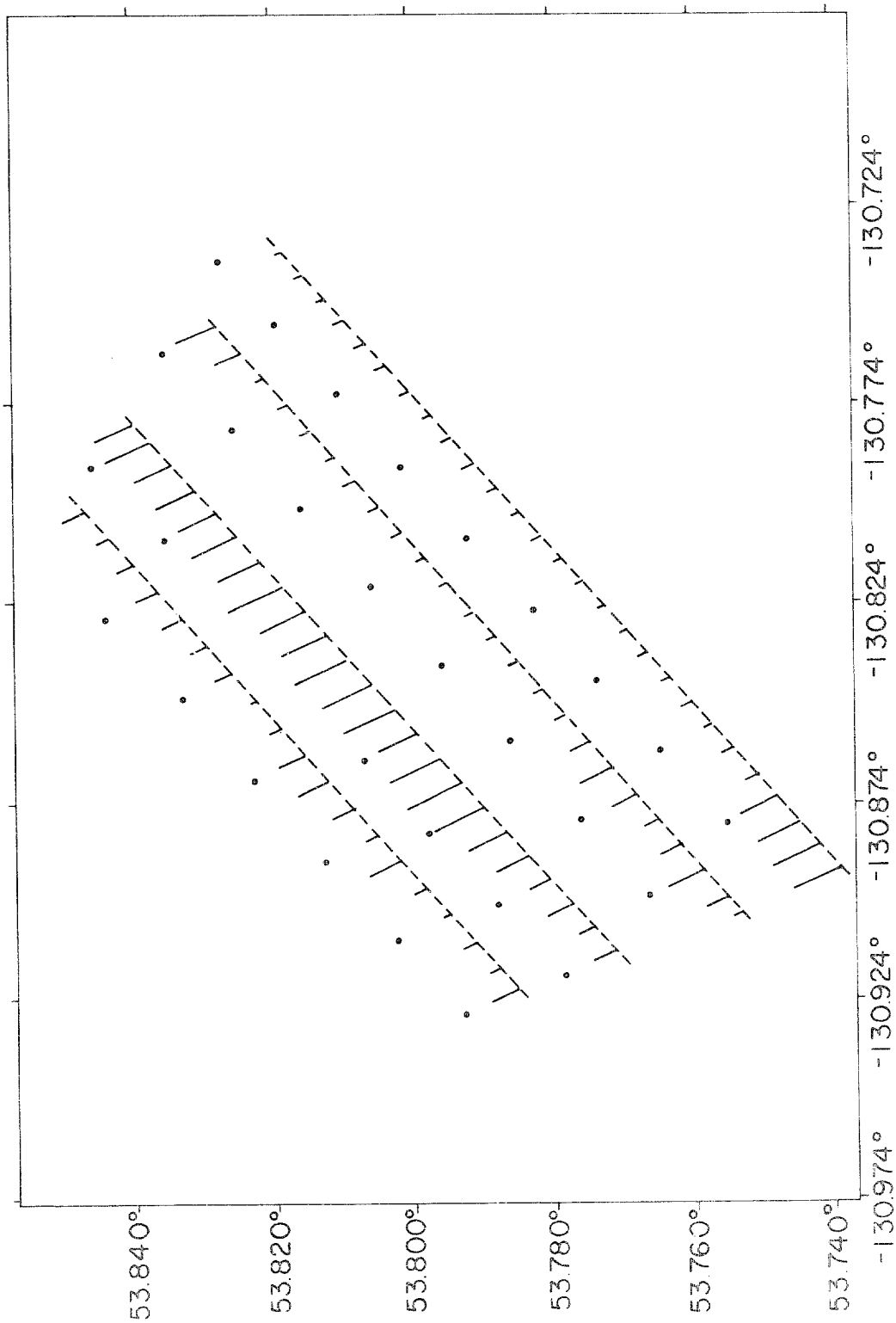
53.840°
53.820°
53.800°
53.780°
53.760°
53.740°
-130.974°
-130.924°
-130.874°
-130.824°
-130.774°
-130.724°

Fig. 12b.

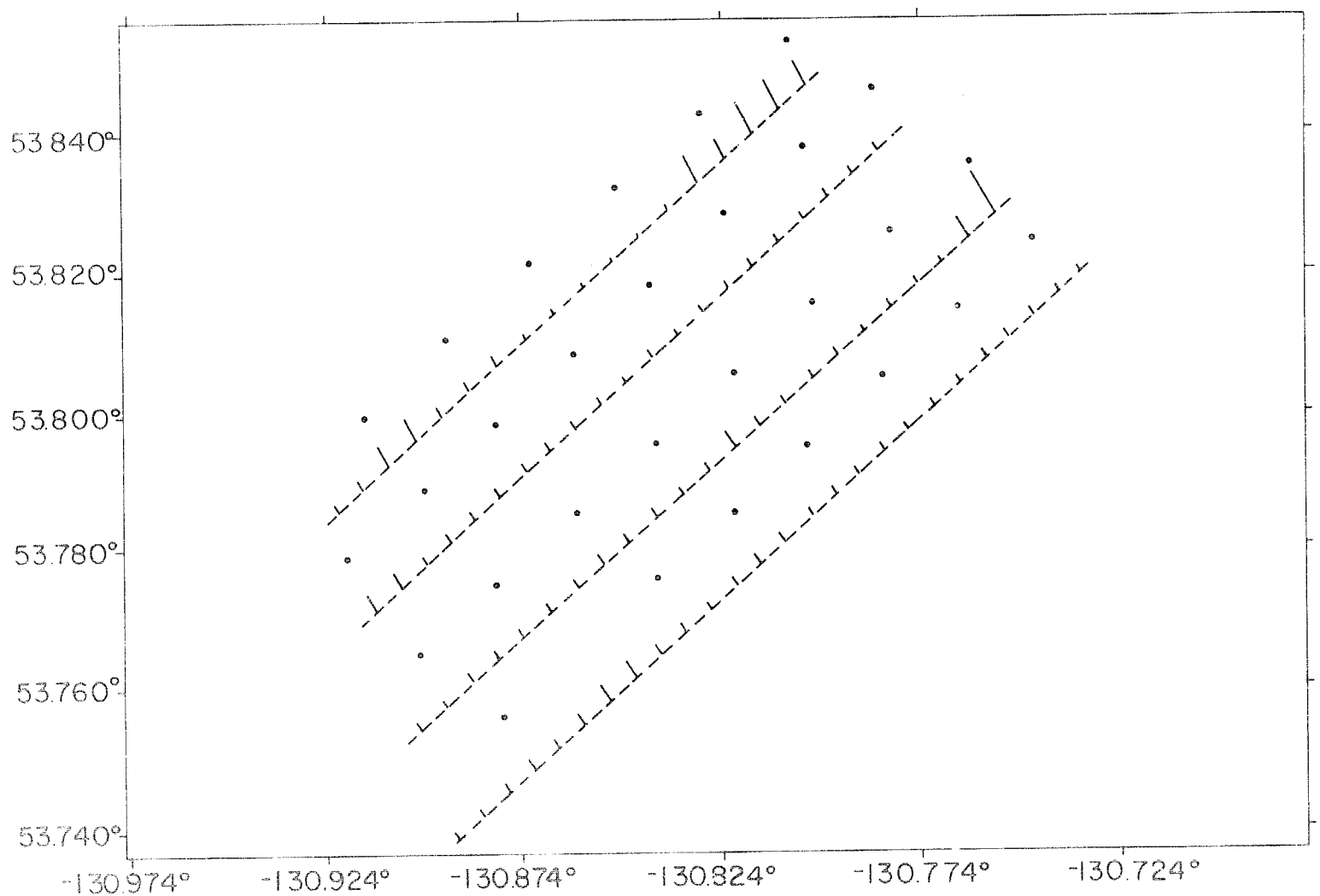
53.840°
53.820°
53.800°
53.780°
53.760°
53.740°
-130.974°
-130.924°
-130.874°
-130.824°
-130.774°
-130.724°

Fig. 12c.

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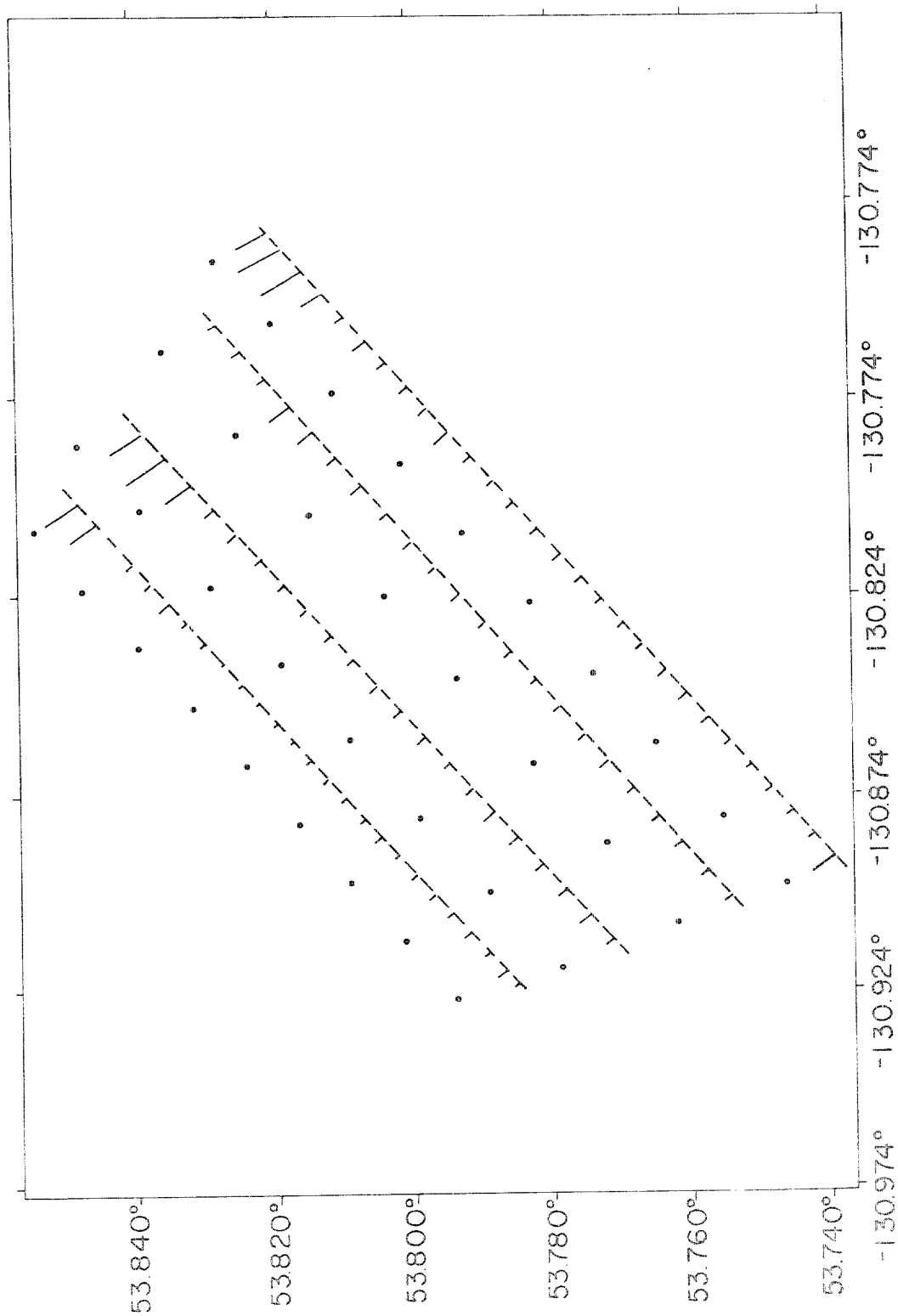
53.840°
53.820°
53.800°
53.780°
53.760°
53.740°
-130.974°
-130.924°
-130.874°
-130.824°
-130.774°
-130.774°

Fig. 12d.

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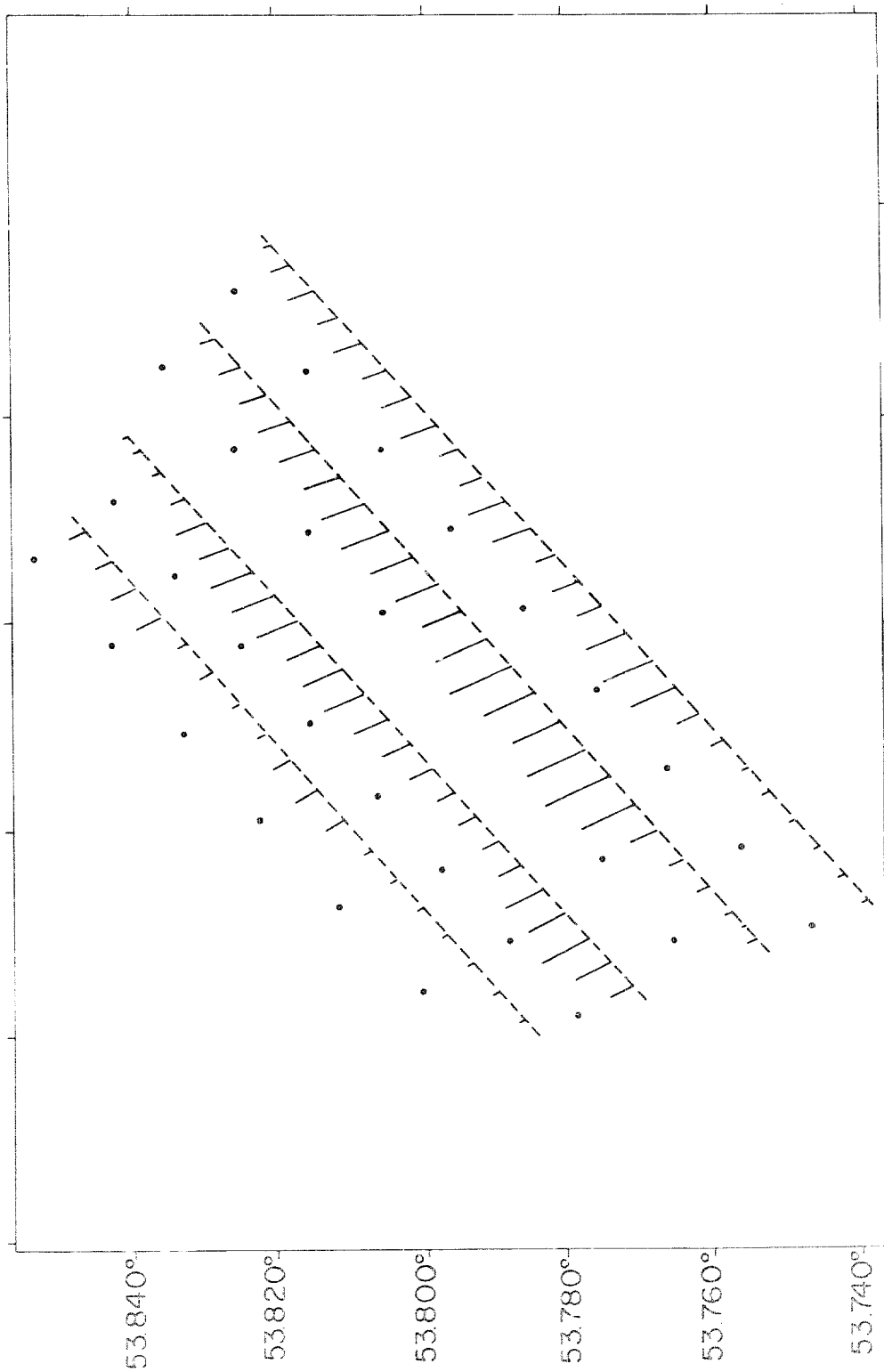
53.840°
53.820°
53.800°
53.780°
53.760°
53.740°
-130.974°
-130.924°
-130.874°
-130.824°
-130.774°
130.724°

Fig. 12e.

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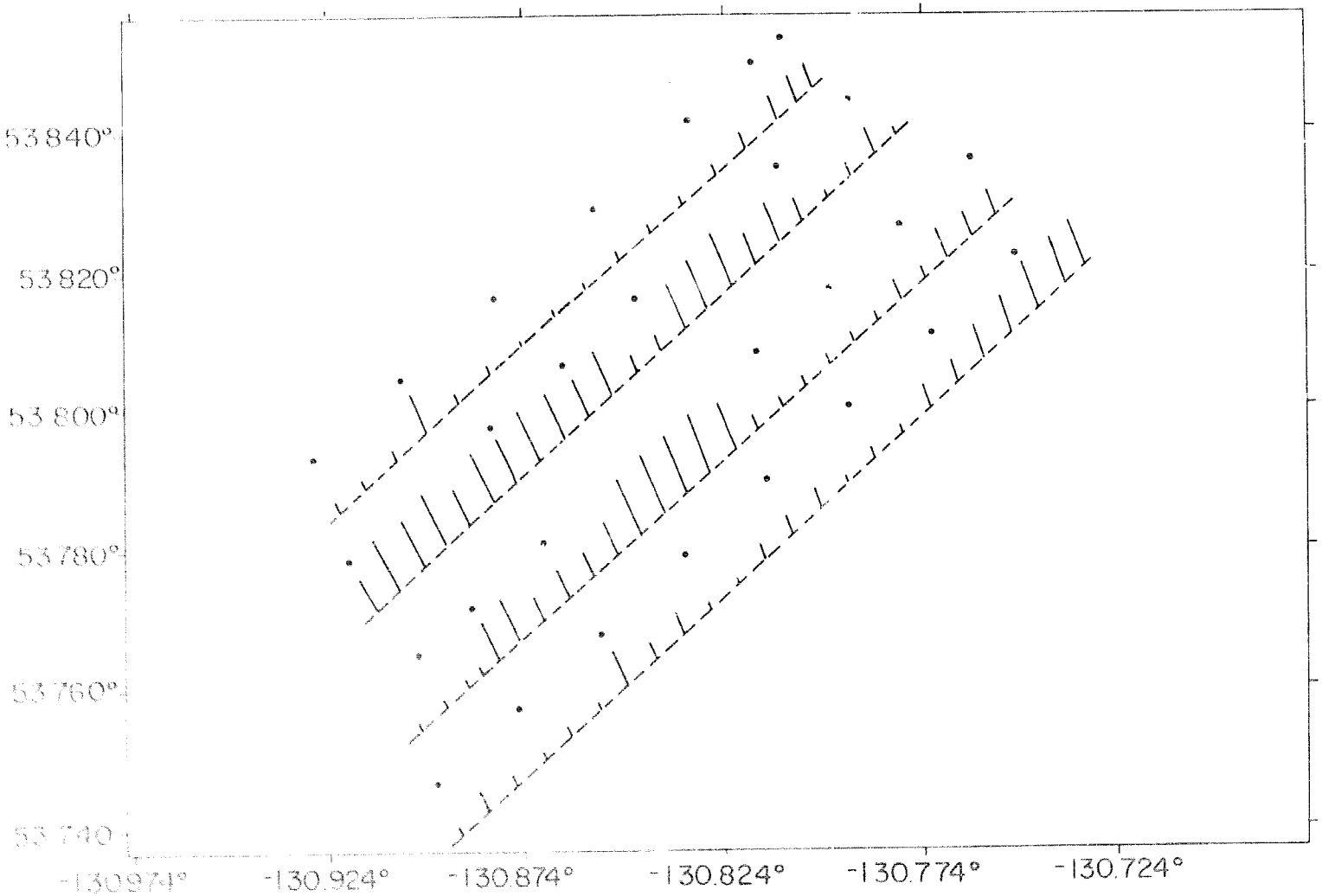
53.840°
53.820°
53.800°
53.780°
53.760°
53.740°
-130.974°
-130.924°
-130.874°
-130.824°
-130.774°
-130.724°

Fig. 12f.

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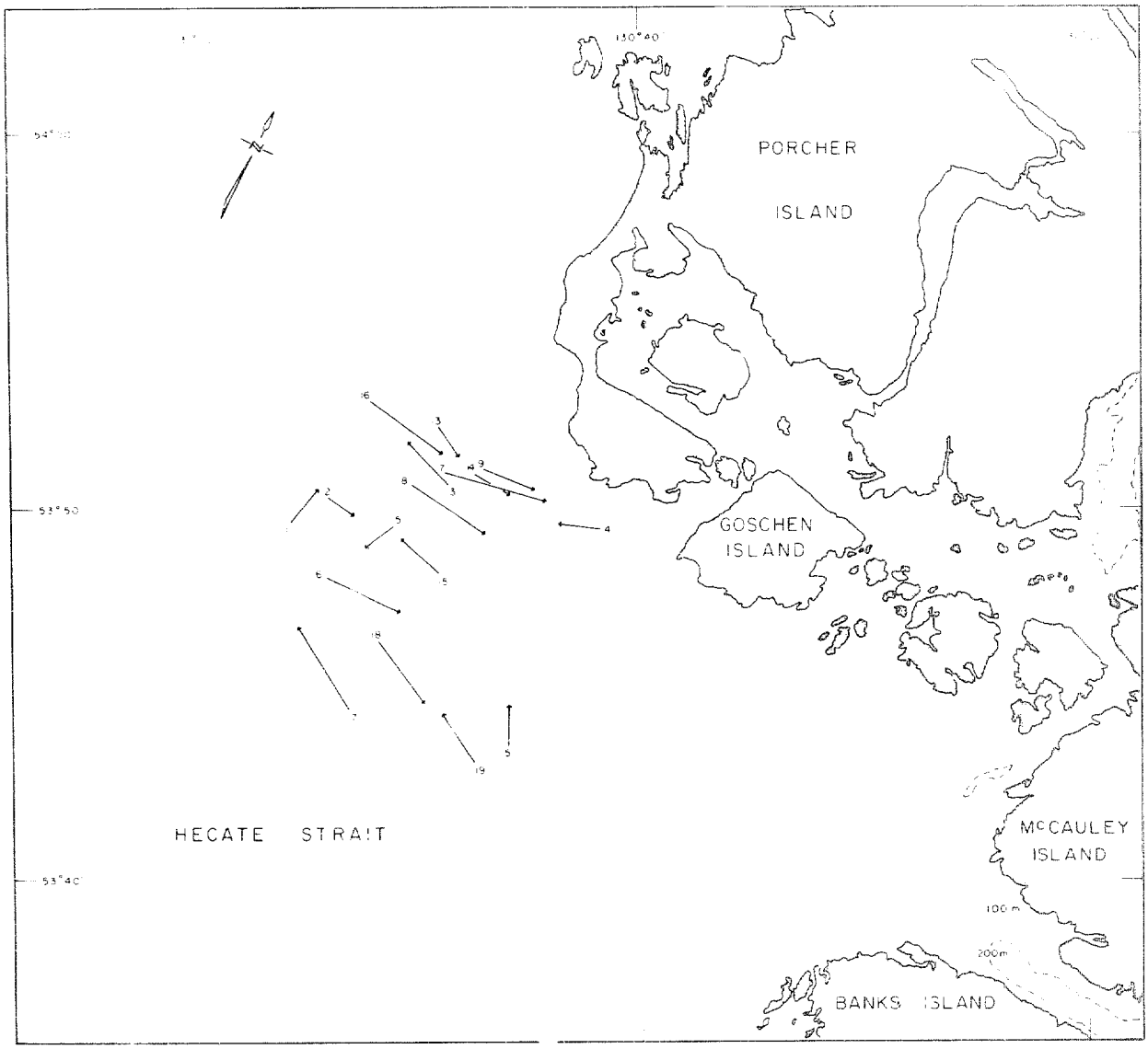

Fig. 13. Tow positions of the CANADIAN #1 in Browning Entrance.

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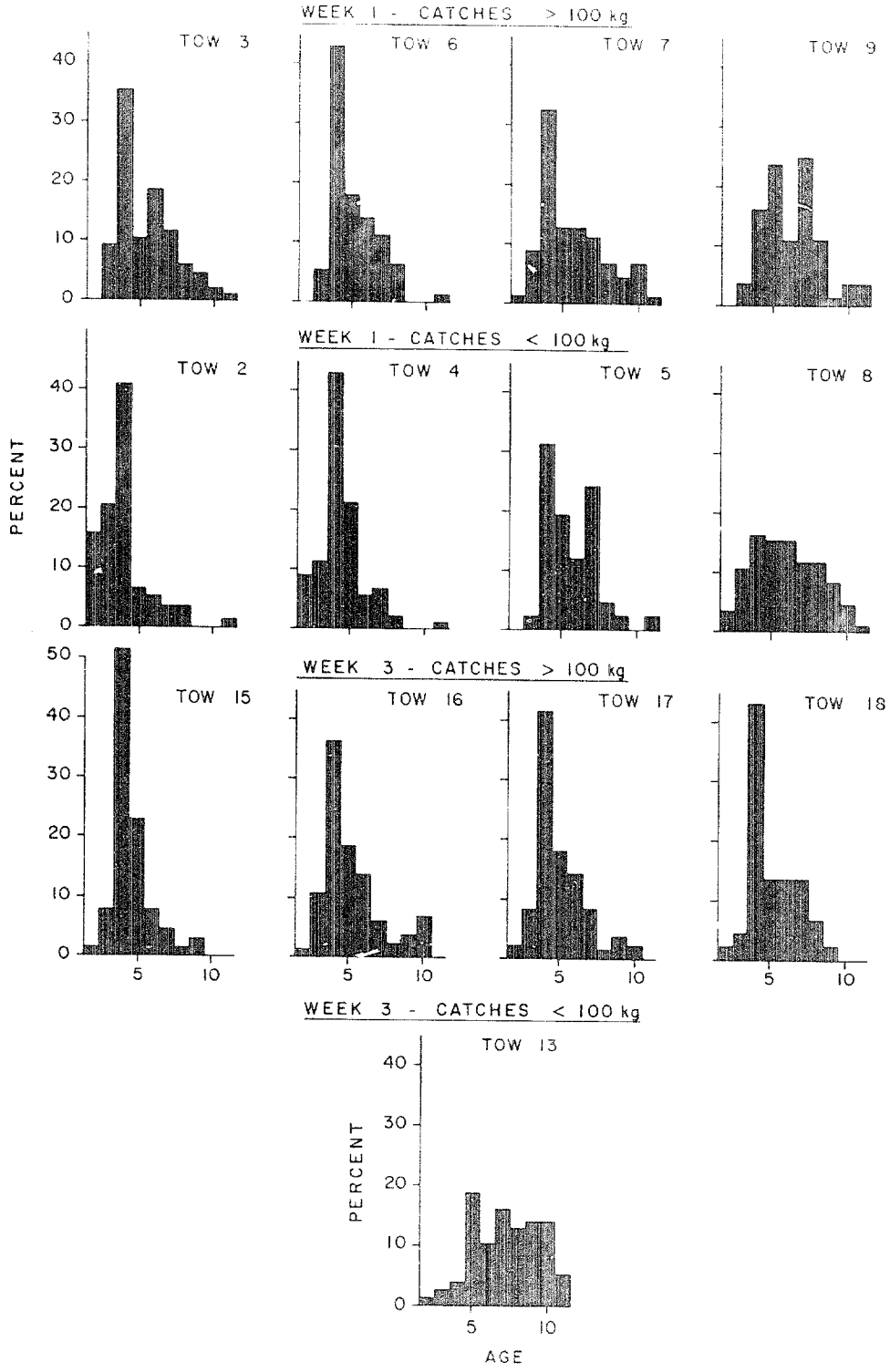

Fig. 14. Percent at age (year of life) of herring in tows made by the CANADIAN #1 in Browning Entrance in week 1 and week 3.

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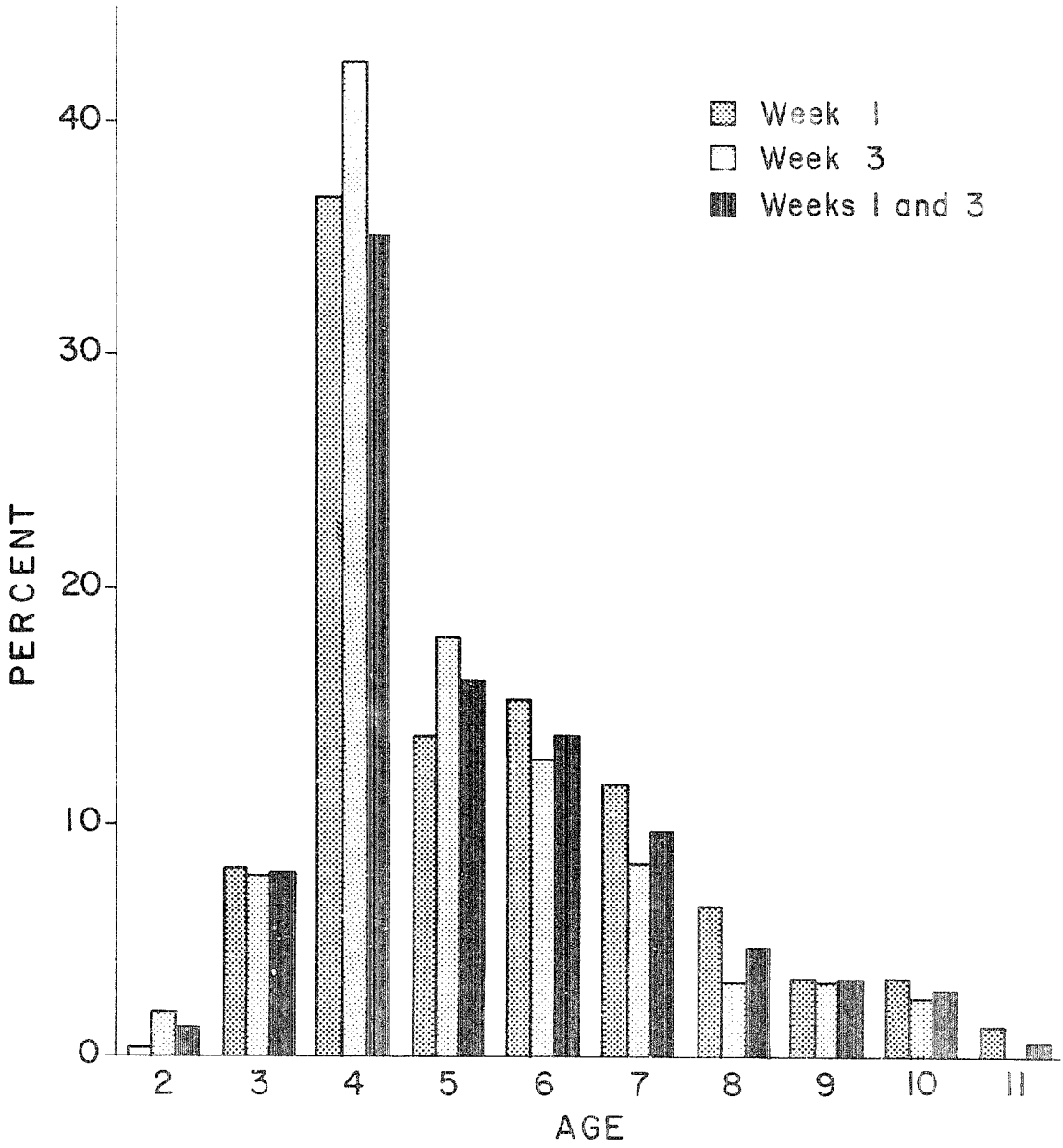

Fig. 15. Percent at age (year of life) of herring in tows with catches greater than 100 kg made by the CANADIAN #1 in Browning Entrance. Tows 3, 6, 7, and 15 to 18 are included.

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Appendix table 1. Surface densities Browning Entrance to Rose Spit. The data are based on the echointegrator output and auxiliary information such as distance steamed and fish target strength. A command driven program is used for the calculations. It uses the following commands:

Command	Comment
*OIE ...	Echointegration input file
*TRA ...	Transect name, date, etc.
*DPP ...	Distance per ping, required for area calculation
*WID ...	Width for area calculation
*FIR ...	First printout number (PO#) for this transect
*LOU ...	Last printout number for this transect
*ZER ...	Zero cummulative estimates

For each transect the surface densities are given by printout in a column that is headed by SURF/D KG/M^2. This is followed by the average surface densities for the transect and a cumulative surface density estimate. A new cummulative surface density estimate is started after each *ZER command. A further column gives local and total biomass estimates which are obtained by extrapolating the surface densities to appropriate areas.

*! Date	Time	Transect	File	Area
*! Oct 19	11:31	30 24	8	Browning Entrance
*! 21	21:01	23 21	13	"
*! 22	00:37	20		"
*!	02:17	19 14	15	"
*!	08:43	14	16	"
*! 23	13:47	32 44	19	North of Browning Entrance
*!	19:52	46 54	20	Rose Spit
*! 24	00:15	56 74		"

*OIE 84C008.DAT
*TRA 30 19-Oct-84 11:31 p.17 E->W
*DPP .531124E-02
*WID 2.778
*FIR 1
*LOU 8

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
1	3	300	1	2.78	4.43	42.9	27.4	4.96E-04	2.20E+03
2	3	300	0	2.78	4.43	58.6	45.5	6.49E-03	2.87E+04
3	3	300	0	2.78	4.43	67.9	39.7	3.51E-02	1.55E+05
4	3	300	0	2.78	4.43	63.9	43.5	1.37E-02	6.05E+04
5	3	300	0	2.78	4.43	74.0	36.3	6.26E-03	2.77E+04
6	3	300	0	2.78	4.43	66.9	62.0	1.34E-03	5.94E+03
7	3	300	0	2.78	4.43	43.3	37.6	4.69E-05	2.07E+02
8	2	133	0	2.78	1.96	38.2	38.5	3.37E-05	6.62E+01

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
8	2233	11.9	2.78	32.9	58.4	41.2	4.6	1.46E-04	8.52E-03	2.81E+05
8	2233	11.9	2.78	32.9	58.4	41.2	4.6	1.46E-04	8.52E-03	2.81E+05

*TRA 29 19-Oct-84 12:23 p.18 W->E
*DPP .558095E-02
*WID 1.852
*FIR 11
*LOU 17

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
11	3	300	0	1.85	3.10	42.8	14.0	1.19E-02	3.68E+04
12	3	300	0	1.85	3.10	60.4	43.5	1.81E-03	5.61E+03
13	3	300	0	1.85	3.10	67.8	38.4	2.58E-02	8.00E+04
14	3	300	0	1.85	3.10	66.0	39.0	2.01E-02	6.22E+04
15	3	300	0	1.85	3.10	66.8	49.4	3.08E-02	9.55E+04
16	3	300	0	1.85	3.10	62.0	44.8	1.15E-02	3.57E+04
17	3	300	0	1.85	3.10	59.3	43.3	4.22E-04	1.31E+03

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
7	2100	11.7	1.85	21.7	60.7	39.8	5.7	2.41E-04	1.46E-02	3.17E+05
15	4333	23.6	2.32	54.7	59.3	40.4	5.2	1.84E-04	1.09E-02	5.98E+05

*TRA 28 19-Oct-84 13:11 p.19 E->W
*DPP .546988E-02
*FIR 19 2
*LOU 25

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
19	3	300	0	1.85	3.04	46.2	26.3	3.50E-03	1.06E+04
20	3	300	0	1.85	3.04	70.5	63.3	5.29E-03	1.61E+04
21	3	300	0	1.85	3.04	72.5	52.9	2.81E-02	8.54E+04
22	3	300	0	1.85	3.04	62.5	51.8	3.16E-02	9.62E+04
23	3	300	0	1.85	3.04	70.2	39.0	2.86E-02	8.69E+04
24	3	300	0	1.85	3.04	70.1	36.4	5.05E-02	1.53E+05
25	3	275	0	1.85	2.79	60.4	47.4	3.22E-03	8.96E+03

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
7	2075	11.4	1.85	21.0	64.7	44.1	6.7	3.37E-04	2.18E-02	4.58E+05
22	6408	34.9	2.17	75.7	60.8	42.0	5.8	2.29E-04	1.39E-02	1.06E+06

*TRA 27 19-Oct-84 13:59 p.20 E->W
*DPP .564854E-02
*FIR 28
*LOU 34

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
28	3	300	0	1.85	3.14	65.2	28.1	7.03E-03	2.21E+04
29	3	300	0	1.85	3.14	73.7	47.6	6.11E-02	1.92E+05
30	3	300	0	1.85	3.14	73.9	46.0	4.39E-02	1.38E+05
31	3	300	0	1.85	3.14	68.1	43.5	5.59E-02	1.75E+05

32	3	300	0	1.85	3.14	68.0	51.3	7.76E-02	2.43E+05
33	3	300	0	1.85	3.14	71.4	63.7	4.11E-02	1.29E+05
34	2	112	0	1.85	1.17	66.0	59.6	2.71E-03	3.18E+03

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
7	1912	10.8	1.85	20.0	69.8	49.4	5.8	6.47E-04	4.51E-02	9.03E+05
29	8320	45.7	2.09	95.7	62.7	45.4	5.8	3.27E-04	2.05E-02	1.96E+06

*TkA 26 19-Oct-84 14:45 p.21 W->E
*DPP .536839E-02
*FIR 37
*LOU 43

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
37	3	300	0	1.85	3.54	63.7	53.9	3.56E-02	1.26E+05
38	3	300	5	1.85	3.54	73.1	68.2	4.59E-02	1.62E+05
39	3	300	0	1.85	3.54	73.9	54.0	1.17E-01	4.15E+05
40	3	300	0	1.85	3.54	76.0	52.8	2.33E-01	8.24E+05
41	3	300	3	1.85	3.54	76.9	54.9	3.56E-01	1.26E+06
42	3	300	29	1.85	3.54	70.1	33.4	3.09E-02	1.09E+05
43	2	111	0	1.85	1.31	62.3	49.9	4.34E-04	5.68E+02

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
7	1911	12.2	1.85	22.5	71.7	54.0	6.9	1.79E-03	1.29E-01	2.90E+06
36	10231	57.9	2.04	118.2	64.4	50.6	6.5	6.38E-04	4.11E-02	4.86E+06

*TRA 25 19-Oct-84 15:31 p.22 E->W
*DPP .530248E-02
*FIR 46
*LOU 54

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
46	3	300	0	1.85	2.95	47.1	24.9	4.25E-03	1.25E+04
47	3	300	12	1.85	2.95	70.4	47.0	1.13E-01	3.33E+05
48	3	300	0	1.85	2.95	79.8	71.3	2.20E-01	6.47E+05
49	3	300	21	1.85	2.95	88.5	68.6	1.75E-01	5.15E+05
50	3	300	25	1.85	2.95	102.1	102.3	1.96E-01	5.76E+05
51	3	300	25	1.85	2.95	92.1	95.7	3.18E-02	9.36E+04
52	3	300	9	1.85	2.95	85.6	84.1	3.65E-02	1.07E+05
53	3	300	0	1.85	2.95	72.0	64.1	1.16E-01	3.43E+05
54	1	63	0	1.85	0.62	58.8	57.9	2.34E-02	1.45E+04

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
9	2463	13.1	1.85	24.2	79.2	74.6	6.3	1.38E-03	1.09E-01	2.64E+06
45	12694	71.0	2.01	142.4	66.9	59.0	6.4	7.87E-04	5.27E-02	7.50E+06

*TRA 24 19-Oct-84 16:27 p.23 W->E
*DPP .595298E-02
*FIR 57
*LOU 64

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
57	3	300	0	1.85	3.31	59.7	54.0	3.76E-02	1.24E+05
58	3	300	0	1.85	3.31	79.4	74.8	5.92E-02	1.96E+05
59	3	300	0	1.85	3.31	85.0	82.5	2.59E-02	8.57E+04
60	3	300	0	1.85	3.31	110.1	91.8	2.68E-03	8.86E+03
61	3	300	0	1.85	3.31	94.7	88.0	3.62E-02	1.20E+05
62	3	300	0	1.85	3.31	84.8	64.3	4.68E-02	1.55E+05
63	3	300	45	1.85	3.31	66.4	53.0	1.30E-01	4.31E+05
64	3	282	9	1.85	3.11	42.9	25.1	3.21E-03	9.99E+03

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
8	2382	14.2	1.85	26.3	78.1	64.4	7.7	5.51E-04	4.30E-02	1.13E+06
53	15076	85.1	1.98	168.7	68.7	59.8	6.6	7.45E-04	5.12E-02	8.63E+06

*OIE 84C013.DAT
*TRA 23 21 Oct 84 21:01 p.56 E->W
*DPP .00511
*FIR 1
*LOU 10
RESTORE 84C013.DAT

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
1	3	300	1	1.85	2.84	70.6	44.2	7.41E-03	2.10E+04
2	3	300	0	1.85	2.84	84.1	76.3	5.48E-03	1.56E+04
3	3	300	0	1.85	2.84	89.7	81.2	1.42E-03	4.04E+03
4	3	300	0	1.85	2.84	101.0	85.3	1.48E-03	4.20E+03
5	3	300	0	1.85	2.84	93.6	63.2	2.93E-03	8.32E+03
6	3	300	0	1.85	2.84	96.6	54.9	1.58E-03	4.49E+03
7	3	300	0	1.85	2.84	88.3	67.2	1.82E-03	5.16E+03
8	3	300	0	1.85	2.84	69.2	53.4	1.94E-03	5.50E+03
9	3	300	0	1.85	2.84	44.0	38.2	2.92E-03	8.28E+03
10	3	300	0	1.85	2.84	37.9	39.9	9.38E-03	2.66E+04

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
10	3000	15.3	1.85	28.4	77.5	54.2	7.7	4.69E-05	3.64E-03	1.03E+05
63	18076	100.5	1.96	197.1	69.9	59.7	6.6	6.34E-04	4.43E-02	8.73E+06

*TRA 22 21 Oct 84 22:10 p.57 W->E
*DPP .552285E-02
*FIR 13
*LOU 22

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
13	3	300	11	1.85	3.07	33.5	50.2	4.81E-03	1.48E+04
14	3	300	0	1.85	3.07	46.9	50.9	4.27E-03	1.31E+04
15	3	300	9	1.85	3.07	51.6	48.4	6.43E-03	1.97E+04
16	3	300	0	1.85	3.07	86.0	45.8	9.14E-04	2.80E+03
17	3	300	0	1.85	3.07	101.4	54.3	9.84E-04	3.02E+03
18	3	300	0	1.85	3.07	106.6	70.5	8.39E-04	2.57E+03
19	3	300	0	1.85	3.07	107.7	58.8	6.80E-04	2.09E+03
20	3	300	0	1.85	3.07	103.2	91.5	5.37E-03	1.65E+04

21	3	300	0	1.85	3.07	94.6	84.3	3.04E-03	9.32E+03
22	2	188	0	1.85	1.92	82.3	68.7	1.09E-03	2.10E+03

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
10	2888	15.9	1.85	29.5	81.3	62.8	6.7	3.58E-05	2.91E-03	8.60E+04
73	20964	116.4	1.95	226.6	71.4	59.7	6.6	5.45E-04	3.89E-02	8.82E+06

*TRA 21 21 Oct 84 23:16 p.58 E->W
*DPP .477104E-02
*FIR 25
*LOU 36

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
25	3	300	0	1.85	2.65	70.9	56.9	1.16E-02	3.08E+04
26	3	300	0	1.85	2.65	97.0	67.8	2.76E-03	7.30E+03
27	3	300	0	1.85	2.65	100.3	80.5	4.14E-03	1.10E+04
28	3	300	0	1.85	2.65	113.5	80.5	1.56E-03	4.13E+03
29	3	300	0	1.85	2.65	114.8	76.5	1.19E-03	3.14E+03
30	3	300	0	1.85	2.65	113.4	89.8	1.72E-03	4.57E+03
31	3	300	0	1.85	2.65	104.1	72.6	2.62E-03	6.96E+03
32	3	300	0	1.85	2.65	92.3	61.5	6.18E-04	1.64E+03
33	3	300	0	1.85	2.65	60.6	35.1	3.12E-04	8.26E+02
34	3	300	0	1.85	2.65	39.5	45.8	2.70E-03	7.16E+03
35	3	300	0	1.85	2.65	28.5	28.6	4.49E-04	1.19E+03
36	2	194	0	1.85	1.71	30.0	34.1	5.40E-04	9.26E+02

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
12	3494	16.7	1.85	30.9	81.9	64.6	4.7	3.15E-05	2.58E-03	7.96E+04
85	24458	133.1	1.93	257.5	72.7	59.8	6.6	4.76E-04	3.46E-02	8.90E+06

*TRA 20 22 Oct 84 00:37 p.60 W->E Incomplete data file
*! Use as is, negligible contribution to biomass
*DPP .102706E-01
*FIR 39
*LOU 44,2

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
39	3	300	1	1.85	5.71	26.5	30.4	1.16E-03	6.59E+03
40	3	300	136	1.85	5.71	24.6	25.8	1.15E-03	6.58E+03
41	3	300	109	1.85	5.71	52.2	20.0	3.86E-04	2.20E+03
42	3	300	0	1.85	5.71	89.3	70.8	1.10E-03	6.27E+03
43	3	300	0	1.85	5.71	107.5	103.4	2.73E-03	1.56E+04
44	2	200	0	1.85	3.80	98.0	101.5	2.24E-03	8.50E+03

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
6	1700	17.5	1.85	32.3	64.5	72.9	10.5	2.19E-05	1.41E-03	4.57E+04
91	26158	150.6	1.92	289.8	71.8	59.8	6.6	4.30E-04	3.09E-02	8.94E+06

*! DPP 9.6 NM ??
*! LOU 48
*! OIE 84C015.DAT

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*! TRA 19 22 Oct 84 02:17 p.61 E->W  Incomplete 01:43 - 02:17 - 02:47
*! DPP 18.78
*! FIR 1
*! LOU 6
*! TRA 18 22 Oct 84 03:01 p.62 W->E
*! DPP 19.63
*! FIR 9
*! LOU 20
*! TRA 17 22 Oct 84 04:17 p.64 E->W
*! DPP 20.94
*! FIR 23
*! LOU 35
*! TRA 16 22 Oct 84 05:39 p.65 W->E
*! DPP 19.55
*! FIR 38
*! LOU 49
*! TRA 15 22 Oct 84 06:57 p.66 E->W
*! DPP 18.54
*! FIR 52
*! LOU 62
*! TRA 14 22 Oct 84 08:14 p.68 W->E
*!       Incomplete 08:14 - 8:32? - 08:43 - 09:06
*! DPP 15.91
*! FIR 66
*! ! LAS 69
*! IDA 84C016.DAT
*! FIR 1
*! LOU 4
*OIE 84C019.DAT
*TRA 32 23 Oct 84 13:47 p.78 E->W
*DPP .557791E-02
*WID 2.78
*ZER
*FIR 1
*LOU 9
  RESTORE 84C019.DAT
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PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
1	3	300	1	2.78	4.65	35.4	47.2	4.24E-03	1.97E+04
2	3	300	0	2.78	4.65	59.2	58.0	1.50E-02	6.95E+04
3	3	300	0	2.78	4.65	65.7	67.6	5.87E-03	2.73E+04
4	3	300	0	2.78	4.65	71.0	73.7	4.59E-02	2.14E+05
5	3	300	0	2.78	4.65	72.9	73.6	4.12E-03	1.92E+04
6	3	300	0	2.78	4.65	43.7	51.8	5.86E-04	2.73E+03
7	3	300	0	2.78	4.65	40.9	29.8	6.23E-05	2.90E+02
8	3	300	0	2.78	4.65	52.1	28.2	2.01E-04	9.36E+02
9	2	135	0	2.78	2.09	47.5	28.7	4.88E-05	1.02E+02

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
9	2535	14.1	2.78	39.3	54.7	68.3	4.9	1.64E-04	8.99E-03	3.53E+05
9	2535	14.1	2.78	39.3	54.7	68.3	4.9	1.64E-04	8.99E-03	3.53E+05

*TRA 34 23 Oct 84 14:51 p.79 W->E
*DPP .635579E-02
*WID 3.70
*FIR 13
*LOU 21

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
13	3	300	0	3.70	7.05	26.3	18.4	2.46E-05	1.74E+02
14	3	300	0	3.70	7.05	31.0	27.2	2.18E-05	1.54E+02
15	3	300	0	3.70	7.05	43.5	50.6	2.28E-04	1.61E+03
16	3	300	0	3.70	7.05	54.1	48.9	1.33E-03	9.42E+03
17	3	300	0	3.70	7.05	62.1	44.5	4.41E-04	3.11E+03
18	3	300	0	3.70	7.05	61.8	60.8	4.48E-03	3.16E+04
19	3	300	0	3.70	7.05	54.2	37.5	4.53E-03	3.20E+04
20	3	300	0	3.70	7.05	35.1	24.3	2.86E-03	2.02E+04
21	1	34	0	3.70	0.80	22.5	17.5	1.13E-06	9.02E-01

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
9	2434	15.5	3.70	57.2	45.7	43.7	11.3	3.75E-05	1.72E-03	9.82E+04
18	4969	29.6	3.26	96.5	49.4	63.0	6.3	9.47E-05	4.68E-03	4.52E+05

*TRA 36 23 Oct 84 15:52 p.80 E->W
*DPP .547552E-02
*WID 3.704
*FIR 24
*LOU 31

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
24	3	300	0	3.70	6.08	43.7	36.6	2.72E-03	1.65E+04
25	3	300	0	3.70	6.08	45.4	34.5	1.89E-04	1.15E+03
26	3	300	0	3.70	6.08	51.7	50.1	2.90E-04	1.77E+03
27	3	300	0	3.70	6.08	62.3	62.5	4.30E-04	2.62E+03
28	3	300	0	3.70	6.08	57.2	27.4	8.52E-06	5.19E+01
29	3	300	4	3.70	6.08	49.9	36.0	1.04E-05	6.33E+01
30	3	300	0	3.70	6.08	31.0	18.0	4.49E-06	2.73E+01
31	1	24	0	3.70	0.49	27.1	25.0	3.38E-06	1.65E+00

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
8	2124	11.6	3.70	43.1	48.5	40.5	1.8	1.06E-05	5.16E-04	2.22E+04
26	7093	41.2	3.39	139.6	49.1	61.9	6.1	6.91E-05	3.39E-03	4.74E+05

*TRA 42 23 Oct 84 17:22 p.82 W->E
*DPP .636101E-02
*ZER
*FIR 41
*LOU 50

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
41	3	300	0	3.70	7.07	57.2	26.5	3.01E-04	2.12E+03
42	3	300	0	3.70	7.07	70.9	68.5	1.50E-04	1.06E+03
43	3	300	0	3.70	7.07	69.0	55.6	7.33E-05	5.18E+02
44	3	300	0	3.70	7.07	63.3	50.1	5.81E-05	4.11E+02

45	3	300	0	3.70	7.07	57.1	54.6	2.09E-04	1.48E+03
46	3	300	0	3.70	7.07	64.3	32.1	2.25E-05	1.59E+02
47	3	300	0	3.70	7.07	70.9	74.3	2.38E-03	1.68E+04
48	3	300	1	3.70	7.07	63.8	58.6	2.76E-03	1.95E+04
49	3	300	0	3.70	7.07	103.3	95.7	5.23E-03	3.70E+04
50	1	70	0	3.70	1.65	98.3	93.5	2.15E-02	3.54E+04

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
10	2770	17.6	3.70	65.3	69.6	83.0	15.1	2.52E-05	1.75E-03	1.14E+05
10	2770	17.6	3.70	65.3	69.6	83.0	15.1	2.52E-05	1.75E-03	1.14E+05

*TRA 44 23 Oct 84 18:34 p.83 E->W
*DPP .561299E-02
*FIR 54
*LOU 64

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
54	3	300	0	3.70	6.24	70.8	56.3	1.51E-03	9.39E+03
55	3	300	41	3.70	6.24	58.0	63.1	8.43E-03	5.26E+04
56	3	300	8	3.70	6.24	58.9	67.2	4.59E-03	2.86E+04
57	3	300	0	3.70	6.24	58.9	57.8	8.17E-03	5.10E+04
58	3	300	0	3.70	6.24	51.6	51.3	3.91E-03	2.44E+04
59	3	300	0	3.70	6.24	58.6	55.1	5.85E-03	3.65E+04
60	3	300	0	3.70	6.24	76.8	63.2	1.25E-03	7.81E+03
61	3	300	0	3.70	6.24	73.9	42.1	1.93E-03	1.21E+04
62	3	300	0	3.70	6.24	61.5	40.4	1.54E-03	9.58E+03
63	3	300	0	3.70	6.24	25.2	41.5	2.26E-03	1.41E+04
64	1	18	0	3.70	0.37	0.0	0.0	0.00E+00	0.00E+00

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
11	3018	16.9	3.70	62.7	59.1	56.7	6.9	6.64E-05	3.92E-03	2.46E+05
21	5788	34.6	3.70	128.0	64.4	65.1	9.5	4.37E-05	2.82E-03	3.60E+05

*OIE 84C020.DAT
*TRA 46 23 Oct 84 19:52 p.86 W->E
*DPP .620803E-02
*FIR 3
*LOU 12
RESTORE 84C020.DAT

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
3	3	300	0	3.70	6.90	2.2	10.9	1.29E-05	8.88E+01
4	3	300	0	3.70	6.90	26.0	27.4	9.61E-04	6.63E+03
5	3	300	0	3.70	6.90	84.5	53.0	8.92E-04	6.15E+03
6	3	300	0	3.70	6.90	78.4	39.9	8.11E-04	5.60E+03
7	3	300	0	3.70	6.90	37.7	40.1	2.49E-03	1.72E+04
8	3	300	0	3.70	6.90	47.6	51.5	5.37E-03	3.70E+04
9	3	300	0	3.70	6.90	49.0	53.1	1.52E-03	1.05E+04
10	3	300	0	3.70	6.90	31.3	30.2	1.86E-02	1.28E+05
11	3	300	0	3.70	6.90	78.0	35.5	9.69E-03	6.69E+04
12	1	40	0	3.70	0.92	84.8	34.8	1.27E-02	1.17E+04

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
10	2740	17.0	3.70	63.0	48.8	36.3	13.0	9.43E-05	4.60E-03	2.90E+05
31	8528	51.6	3.70	191.0	59.3	52.3	11.1	5.74E-05	3.41E-03	6.50E+05

*TRA 48 23 Oct 84 21:03 p.87 E->W
*DPP .682008E-02
*FIR 16
*LOU 23

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
16	3	300	0	3.70	7.58	32.0	38.6	1.15E-03	8.73E+03
17	3	300	0	3.70	7.58	36.7	40.5	3.27E-03	2.48E+04
18	3	300	0	3.70	7.58	63.6	51.4	1.90E-03	1.44E+04
19	3	300	0	3.70	7.58	76.9	38.7	1.54E-03	1.16E+04
20	3	300	0	3.70	7.58	83.5	38.5	1.89E-03	1.43E+04
21	3	300	0	3.70	7.58	26.1	19.7	7.60E-03	5.76E+04
22	3	300	0	3.70	7.58	7.2	13.4	1.63E-05	1.24E+02
23	1	51	0	3.70	1.29	10.6	13.8	2.40E-05	3.09E+01

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
8	2151	14.7	3.70	54.3	45.7	32.1	7.8	5.30E-05	2.42E-03	1.32E+05
39	10679	66.2	3.70	245.4	56.3	48.9	10.5	5.66E-05	3.19E-03	7.82E+05

*TRA 50 23 Oct 84 22:06 p.88 W->E
*DPP .593672E-02
*FIR 28
*LOU 33

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
28	3	300	0	3.70	6.60	7.4	13.3	1.07E-04	7.09E+02
29	3	300	0	3.70	6.60	24.9	30.1	3.85E-03	2.54E+04
30	3	300	0	3.70	6.60	72.3	38.9	4.08E-03	2.69E+04
31	3	300	0	3.70	6.60	87.2	43.5	2.15E-03	1.42E+04
32	3	300	0	3.70	6.60	78.9	62.4	2.91E-03	1.92E+04
33	2	112	0	3.70	2.46	68.4	54.3	1.92E-03	4.72E+03

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
6	1612	9.6	3.70	35.4	55.1	42.7	5.2	4.67E-05	2.57E-03	9.12E+04
45	12291	75.8	3.70	280.8	56.1	48.2	10.0	5.54E-05	3.11E-03	8.73E+05

*TRA 52 23 Oct 84 22:53 p.89 E->W
*DPP .60936E-02
*FIR 37
*LOU 40

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
37	3	300	0	3.70	6.77	74.3	39.1	2.97E-03	2.01E+04
38	3	300	0	3.70	6.77	93.1	47.3	3.18E-03	2.15E+04
39	3	300	0	3.70	6.77	65.0	41.1	1.62E-02	1.10E+05
40	2	147	0	3.70	3.32	38.8	28.5	9.72E-03	3.23E+04

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
4	1047	6.4	3.70	23.6	72.0	39.4	4.2	1.08E-04	7.77E-03	1.84E+05
49	13338	82.2	3.70	304.4	57.4	46.7	9.0	6.05E-05	3.47E-03	1.06E+06

*TRA 54 23 Oct 84 23:32 p.90 W->E
*DPP .00652
*FIR 44
*LOU 48

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
44	3	300	0	3.70	7.25	58.5	51.1	1.99E-03	1.44E+04
45	3	300	0	3.70	7.25	94.1	50.0	4.26E-03	3.09E+04
46	3	300	0	3.70	7.25	67.9	42.7	5.64E-03	4.09E+04
47	3	300	0	3.70	7.25	44.6	32.3	1.50E-03	1.08E+04
48	3	300	0	3.70	7.25	93.8	50.4	2.84E-03	2.06E+04

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
5	1500	9.8	3.70	36.2	71.8	46.1	4.8	4.52E-05	3.25E-03	1.18E+05
54	14838	92.0	3.70	340.7	58.9	46.6	8.5	5.85E-05	3.45E-03	1.17E+06

*TRA 56 24 Oct 84 00:15 p.91 E->W
*DPP .535337E-02
*FIR 53
*LOU 58

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
53	3	300	0	3.70	5.95	33.7	18.1	5.79E-03	3.44E+04
54	3	300	12	3.70	5.95	49.5	41.8	5.76E-03	3.43E+04
55	3	300	0	3.70	5.95	73.2	44.7	4.14E-03	2.47E+04
56	3	300	0	3.70	5.95	89.8	34.4	1.13E-02	6.70E+04
57	3	300	0	3.70	5.95	68.2	43.6	5.31E-03	3.16E+04
58	3	297	0	3.70	5.89	37.4	24.6	8.26E-04	4.87E+03

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
6	1797	9.6	3.70	35.6	58.7	35.4	4.4	9.41E-05	5.52E-03	1.97E+05
60	16635	101.6	3.70	376.3	58.9	45.0	7.9	6.19E-05	3.64E-03	1.37E+06

*TRA 58 24 Oct 84 01:07 p.92 W->E
*DPP .551341E-02
*FIR 62
*LOU 69

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
62	3	300	0	3.70	6.13	42.1	46.4	1.16E-03	7.10E+03
63	3	300	0	3.70	6.13	48.1	27.5	1.00E-03	6.14E+03
64	3	300	0	3.70	6.13	64.9	37.3	4.56E-03	2.80E+04
65	3	300	0	3.70	6.13	77.5	45.1	4.62E-03	2.83E+04
66	3	300	0	3.70	6.13	76.7	42.1	3.09E-03	1.89E+04
67	3	300	0	3.70	6.13	67.5	34.8	3.46E-03	2.12E+04
68	3	300	0	3.70	6.13	54.4	32.0	3.75E-03	2.30E+04
69	1	62	0	3.70	1.27	44.0	31.1	2.51E-03	3.18E+03

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
8	2162	11.9	3.70	44.2	61.1	38.2	6.8	5.03E-05	3.08E-03	1.36E+05
68	18797	113.5	3.70	420.4	59.1	44.4	7.8	6.06E-05	3.58E-03	1.51E+06

*TRA 60 24 Oct 84 02:02 p.93 E->W
*DPP .524752E-02
*FIR 72
*LOU 77

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
72	3	300	0	3.70	5.83	78.4	22.9	3.63E-03	2.12E+04
73	3	300	0	3.70	5.83	92.6	52.0	2.56E-03	1.49E+04
74	3	300	0	3.70	5.83	71.7	48.4	4.43E-03	2.58E+04
75	3	300	0	3.70	5.83	67.5	44.7	5.72E-03	3.34E+04
76	3	300	0	3.70	5.83	56.3	44.5	2.96E-03	1.73E+04
77	2	116	0	3.70	2.25	49.8	30.6	2.18E-03	4.92E+03

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
6	1616	8.5	3.70	31.4	71.6	41.9	4.3	5.22E-05	3.74E-03	1.17E+05
74	20413	122.0	3.70	451.9	60.0	44.2	7.6	5.99E-05	3.60E-03	1.62E+06

*TRA 62 24 Oct 84 02:47 p.94 W->E
*DPP .480858E-02
*FIR 81
*LOU 86

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
81	3	300	0	3.70	5.34	54.8	39.8	8.63E-04	4.61E+03
82	3	300	0	3.70	5.34	64.1	58.8	3.90E-03	2.08E+04
83	3	300	0	3.70	5.34	65.5	53.1	5.67E-03	3.03E+04
84	3	300	0	3.70	5.34	76.4	53.5	3.77E-03	2.01E+04
85	3	300	0	3.70	5.34	103.9	51.2	1.17E-03	6.28E+03
86	3	224	0	3.70	3.99	110.6	32.8	2.79E-03	1.11E+04

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
6	1724	8.3	3.70	30.7	77.8	51.3	4.1	3.90E-05	3.04E-03	9.33E+04
80	22137	130.3	3.70	482.6	61.1	44.6	7.4	5.82E-05	3.56E-03	1.72E+06

*TRA 64 24 Oct 84 04:00 p.95 E->W Speed changes, 2.909-2.896-0.904 km
*DPP .215133E-02
*! DPP too small, accept as densities are small
*ZER
*FIR 94
*LOU 104

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
94	3	300	0	3.70	2.39	137.1	79.0	2.18E-03	5.20E+03
95	3	300	0	3.70	2.39	101.6	68.1	2.64E-03	6.31E+03
96	3	300	0	3.70	2.39	73.5	25.3	1.20E-02	2.87E+04
97	3	300	0	3.70	2.39	64.7	20.8	1.62E-02	3.88E+04
98	3	300	0	3.70	2.39	52.5	25.8	9.69E-03	2.32E+04

99	3	300	0	3.70	2.39	48.8	26.4	8.12E-03	1.94E+04
100	3	300	0	3.70	2.39	46.5	28.4	8.52E-03	2.04E+04
101	3	300	0	3.70	2.39	44.8	26.7	5.68E-03	1.36E+04
102	3	300	0	3.70	2.39	43.0	27.4	8.28E-03	1.98E+04
103	3	300	0	3.70	2.39	48.8	22.1	5.79E-03	1.38E+04
104	2	119	0	3.70	0.95	50.9	35.4	1.25E-03	1.18E+03

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
11	3119	6.7	3.70	24.9	65.5	27.9	3.3	1.17E-04	7.66E-03	1.90E+05
11	3119	6.7	3.70	24.9	65.5	27.9	3.3	1.17E-04	7.66E-03	1.90E+05

*TRA 66 24 Oct 84 05:18 p.97 W->E
*DPP .67462E-02
*FIR 108
*LOU 112

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
108	3	300	0	3.70	7.50	65.4	43.1	1.96E-03	1.47E+04
109	3	300	0	3.70	7.50	81.4	58.6	1.76E-03	1.32E+04
110	3	300	0	3.70	7.50	100.6	57.2	1.69E-03	1.27E+04
111	3	300	0	3.70	7.50	127.5	85.1	4.56E-03	3.42E+04
112	2	183	0	3.70	4.57	164.8	95.4	3.57E-03	1.63E+04

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
5	1383	9.3	3.70	34.6	103.1	72.4	5.5	2.56E-05	2.64E-03	9.12E+04
16	4502	16.0	3.70	59.4	87.4	42.3	4.0	5.42E-05	4.74E-03	2.82E+05

*TRA 68 24 Oct 84 06:01 p.97 E->W
*DPP .486957E-02
*FIR 116
*LOU 122

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
116	3	300	0	3.70	5.41	170.1	102.0	4.43E-03	2.40E+04
117	3	300	0	3.70	5.41	155.2	111.3	5.02E-03	2.71E+04
118	3	300	0	3.70	5.41	142.3	118.8	1.02E-02	5.50E+04
119	3	300	0	3.70	5.41	127.5	103.3	3.61E-03	1.95E+04
120	3	300	0	3.70	5.41	108.5	88.2	1.91E-03	1.03E+04
121	3	300	0	3.70	5.41	87.6	53.2	9.36E-04	5.06E+03
122	2	155	0	3.70	2.80	72.2	42.2	1.64E-03	4.58E+03

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
7	1955	9.5	3.70	35.3	127.2	105.7	3.6	3.25E-05	4.13E-03	1.46E+05
23	6457	25.6	3.70	94.7	102.2	63.9	3.9	4.41E-05	4.51E-03	4.27E+05

*TRA 70 24 Oct 84 06:56 p.98 W->E
*DPP .533755E-02
*FIR 126
*LOU 130

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG

126	3	300	0	3.70	5.93	87.8	69.2	2.46E-03	1.46E+04
127	3	300	0	3.70	5.93	118.9	82.4	6.78E-03	4.02E+04
128	3	300	0	3.70	5.93	135.1	87.5	8.65E-03	5.13E+04
129	3	300	0	3.70	5.93	149.5	109.9	9.39E-03	5.57E+04
130	3	222	0	3.70	4.39	163.1	88.3	3.90E-03	1.71E+04

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
5	1422	7.6	3.70	28.1	129.1	91.9	4.2	4.93E-05	6.36E-03	1.79E+05
28	7879	33.2	3.70	122.8	108.4	72.2	4.0	4.55E-05	4.94E-03	6.06E+05

*TRA 72 24 Oct 84 07:41 p.99 E->W
*DPP .501167E-02
*FIR 134
*LOU 138

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
134	3	300	0	3.70	5.57	156.1	75.1	1.12E-02	6.24E+04
135	3	300	0	3.70	5.57	141.3	88.6	5.48E-03	3.05E+04
136	3	300	0	3.70	5.57	119.4	88.2	4.43E-03	2.47E+04
137	3	300	0	3.70	5.57	79.5	70.9	2.19E-03	1.22E+04
138	1	85	0	3.70	1.58	43.8	33.9	3.24E-03	5.11E+03

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
5	1285	6.4	3.70	23.9	118.7	78.6	2.3	4.76E-05	5.66E-03	1.35E+05
33	9164	39.6	3.70	146.6	110.1	73.4	3.7	4.59E-05	5.05E-03	7.41E+05

*TRA 74 24 Oct 84 08:21 p.100 W->E
*DPP .490333E-02
*FIR 142
*LOU 146

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
142	3	300	1	3.70	5.45	47.8	38.8	2.43E-03	1.32E+04
143	3	300	0	3.70	5.45	87.6	68.5	4.24E-03	2.31E+04
144	3	300	0	3.70	5.45	120.8	76.0	9.33E-03	5.09E+04
145	3	300	0	3.70	5.45	137.2	67.0	1.38E-02	7.54E+04
146	1	93	0	3.70	1.69	146.6	71.6	1.55E-02	2.62E+04

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
5	1293	6.3	3.70	23.5	101.8	68.3	4.2	7.90E-05	8.04E-03	1.89E+05
38	10457	45.9	3.70	170.1	108.9	72.3	3.8	5.02E-05	5.47E-03	9.30E+05

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Appendix table 2. Surface densities for Chatham Sound, Edye Passage, Laredo Sound and Goose Island Bank. See Appendix table 1 caption for details.

*! File	Date	Time	Transect	Area
*!	25	10:03	CS1-CS5	Chatham Sound
*!		15:45	CS6-CS11	"
*!	26	09:34	CS12-CS17	"
*!	28	10:21	EP1-EP7	Edye Pass
*!	Nov 3	10:10	LS1-LS4F	Laredo Sound
*!		16:57	GI0-GI10	Goose Island Bank
*!	4	00:35	GI11-GI19	"
*!		09:12	GX1-GX7	"

*!

*OIE 84C022.DAT
*TRA CS1 25 Oct 84 10:03 p102 E->W
*DPP .287563E-02
*FIR 1
*LOU 5

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
1	3	287	1	1.85	2.83	156.5	118.9	1.16E-03	3.28E+03
2	3	300	0	1.85	2.96	170.5	48.6	3.49E-03	1.03E+04
3	3	300	0	1.85	2.96	103.3	36.9	3.78E-03	1.12E+04
4	3	300	0	1.85	2.96	164.4	82.0	7.66E-03	2.27E+04
5	3	204	0	1.85	2.01	100.4	30.2	6.09E-03	1.22E+04

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
5	1391	7.4	1.85	13.7	141.5	59.2	4.7	3.08E-05	4.35E-03	5.97E+04
5	1391	7.4	1.85	13.7	141.5	59.2	4.7	3.08E-05	4.35E-03	5.97E+04

*TRA CS2 25 Oct 84 10:30 p102 E->W
*DPP .255556E-02
*FIR 6
*LOU 8

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
6	3	300	11	1.85	2.63	74.2	38.0	6.28E-03	1.65E+04
7	3	300	0	1.85	2.63	100.4	71.6	9.64E-03	2.53E+04
8	3	300	0	1.85	2.63	99.2	66.4	2.45E-03	6.44E+03

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
3	900	4.3	1.85	7.9	91.3	59.4	1.8	6.71E-05	6.12E-03	4.83E+04
8	2291	11.7	1.85	21.6	123.2	59.3	3.4	4.06E-05	5.00E-03	1.08E+05

*TRA CS3 25 Oct 84 10:48 p102 E->W
*DPP .303688E-02
*FIR 9
*LOU 13

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
9	3	300	23	1.85	3.12	92.9	102.3	5.14E-02	1.61E+05
10	3	300	0	1.85	3.12	83.2	41.4	1.02E-02	3.18E+04
11	3	300	0	1.85	3.12	97.8	49.2	1.94E-02	6.05E+04
12	3	300	0	1.85	3.12	91.6	48.2	1.96E-02	6.12E+04
13	2	183	0	1.85	1.91	57.1	40.5	2.19E-02	4.17E+04

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
5	1383	7.8	1.85	14.4	86.8	71.3	3.2	2.85E-04	2.47E-02	3.56E+05
13	3674	19.4	1.85	36.0	108.6	68.5	3.2	1.19E-04	1.29E-02	4.64E+05

*TRA CS4 25 Oct 84 11:16 p103 E->W
*DPP .295858E-02
*FIR 14
*LOU 19

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
14	3	300	0	1.85	3.04	63.3	51.2	3.12E-02	9.50E+04
15	3	300	0	1.85	3.04	69.9	36.9	4.74E-03	1.44E+04
16	3	300	0	1.85	3.04	70.1	42.0	4.34E-03	1.32E+04
17	3	300	0	1.85	3.04	74.9	33.3	6.75E-03	2.06E+04
18	3	300	0	1.85	3.04	86.4	54.8	5.94E-03	1.81E+04
19	1	21	0	1.85	0.21	92.9	57.7	4.37E-03	9.31E+02

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
6	1521	8.3	1.85	15.4	73.2	47.3	2.6	1.44E-04	1.05E-02	1.62E+05
19	5195	27.8	1.85	51.4	98.0	63.0	3.1	1.24E-04	1.22E-02	6.26E+05

*TRA CS5 25 Oct 84 11:46 p104 E->W
*DPP .0172
*FIR 24
*LOU 24

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
24	3	250	0	1.85	14.75	56.9	16.9	6.29E-03	9.28E+04

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
1	250	8.0	1.85	14.7	56.9	16.9	4.0	1.11E-04	6.29E-03	9.28E+04
20	5445	35.7	1.85	66.2	88.8	57.1	3.2	1.22E-04	1.09E-02	7.19E+05

*OIE 84C023.DAT
*TRA CS6 25 Oct 84 15:45 p105 E->W
*DPP .302445E-02
*FIR 1
*LOU 6
RESTORE 84C023.DAT

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
1	3	300	1	1.85	3.11	61.3	28.5	1.16E-03	3.62E+03
2	3	300	0	1.85	3.11	64.8	63.8	3.47E-03	1.08E+04

3	3	300	0	1.85	3.11	66.1	68.5	3.51E-03	1.09E+04
4	3	300	0	1.85	3.11	72.5	72.0	2.50E-03	7.79E+03
5	3	300	0	1.85	3.11	75.5	73.0	1.34E-03	4.15E+03
6	1	54	0	1.85	0.56	89.2	73.6	2.30E-03	1.29E+03

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
6	1554	8.7	1.85	16.1	68.8	64.8	4.3	3.48E-05	2.39E-03	3.86E+04
26	6999	44.4	1.85	82.3	84.9	57.4	3.3	1.08E-04	9.20E-03	7.58E+05

*TRA CS7 25 Oct 84 16:16 p105 E->W
*DPP .290368E-02
*FIR 7
*LOU 11

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
7	3	300	0	1.85	2.99	84.3	25.0	7.32E-03	2.19E+04
8	3	300	0	1.85	2.99	62.6	66.2	1.26E-03	3.76E+03
9	3	300	0	1.85	2.99	67.3	68.3	1.09E-03	3.27E+03
10	3	300	0	1.85	2.99	58.3	61.5	1.10E-03	3.28E+03
11	3	212	0	1.85	2.11	42.0	47.1	7.46E-04	1.58E+03

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
5	1412	7.6	1.85	14.1	64.2	38.4	2.1	3.74E-05	2.40E-03	3.38E+04
31	8411	52.0	1.85	96.4	81.9	56.6	3.2	1.00E-04	8.21E-03	7.91E+05

*TRA CS8 25 Oct 84 16:45 p106 E->W
*DPP .283806E-02
*FIR 12
*LOU 17

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
12	3	300	0	1.85	2.92	35.9	14.6	9.28E-03	2.71E+04
13	3	300	0	1.85	2.92	55.7	53.3	6.65E-04	1.94E+03
14	3	300	0	1.85	2.92	70.6	63.0	1.51E-03	4.40E+03
15	3	300	0	1.85	2.92	64.6	65.3	1.52E-03	4.43E+03
16	3	300	0	1.85	2.92	69.8	67.5	1.91E-03	5.59E+03
17	3	297	0	1.85	2.89	77.2	36.8	1.51E-03	4.35E+03

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
6	1797	9.4	1.85	17.5	62.3	33.5	3.0	4.39E-05	2.73E-03	4.78E+04
37	10208	61.5	1.85	113.9	78.9	55.3	3.2	9.34E-05	7.37E-03	8.39E+05

*TRA CS9 25 Oct 84 17:21 p106 E->W
*DPP .28436E-02
*FIR 18
*LOU 22

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
18	3	300	0	1.85	2.93	82.5	23.7	4.90E-03	1.43E+04
19	3	300	0	1.85	2.93	75.4	67.9	2.72E-03	7.95E+03
20	3	300	10	1.85	2.93	82.1	72.1	4.25E-03	1.24E+04

21	3	300	0	1.85	2.93	65.4	63.5	2.23E-03	6.52E+03
22	1	66	0	1.85	0.64	49.5	27.6	8.61E-05	5.54E+01

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
5	1266	6.7	1.85	12.3	74.9	53.0	2.8	4.46E-05	3.34E-03	4.13E+04
42	11474	68.2	1.85	126.2	78.5	55.2	3.2	8.89E-05	6.98E-03	8.80E+05

*TRA CS10 25 Oct 84 17:46 p107 E->W
*DPP .290792E-02
*FIR 23
*LOU 27

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
23	3	300	0	1.85	2.99	48.3	27.7	3.11E-02	9.31E+04
24	3	300	0	1.85	2.99	82.4	67.1	3.32E-03	9.94E+03
25	3	300	10	1.85	2.99	108.2	76.5	7.64E-03	2.29E+04
26	3	300	0	1.85	2.99	107.4	82.2	2.56E-03	7.67E+03
27	1	38	0	1.85	0.38	101.7	70.3	9.31E-04	3.53E+02

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
5	.238	6.7	1.85	12.3	87.1	42.2	1.8	1.25E-04	1.08E-02	1.34E+05
47	12712	74.8	1.85	138.6	79.3	53.5	3.0	9.24E-05	7.32E-03	1.01E+06

*TRA CS11 25 Oct 84 18:11 p107 E->W
*DPP .325885E-02
*FIR 28
*LOU 31

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
28	3	300	0	1.85	3.35	94.2	31.9	5.26E-03	1.76E+04
29	3	300	5	1.85	3.35	82.1	85.2	1.28E-02	4.30E+04
30	3	300	5	1.85	3.35	100.3	63.9	6.00E-03	2.01E+04
31	2	174	1	1.85	1.94	119.6	79.9	2.47E-03	4.80E+03

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
4	1074	6.5	1.85	12.0	96.7	68.9	3.0	7.38E-05	7.13E-03	8.56E+04
51	13786	81.3	1.85	150.6	80.6	54.7	3.0	9.06E-05	7.31E-03	1.10E+06

*OIE 84C024.DAT
*TRA CS12 26 Oct 84 09:34 p110 E->W
*DPP .361011E-02
*FIR 1
*LOU 4
RESTORE 84C024.DAT

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
1	3	208	3	1.85	2.58	173.6	109.8	4.49E+00	1.16E+07
2	3	300	0	1.85	3.71	118.5	93.9	3.00E-03	1.12E+04
3	3	300	7	1.85	3.71	84.2	94.3	4.68E-01	1.74E+06
4	3	300	0	1.85	3.71	93.7	41.6	1.93E-02	7.17E+04

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
4	1108	7.4	1.85	13.7	112.8	107.4	1.2	8.65E-03	9.76E-01	1.34E+07
55	14894	88.7	1.85	164.3	83.3	103.4	1.3	1.06E-03	8.82E-02	1.45E+07

*TRA CS13 26 Oct 84 10:00 p110 E->W
*DPP .294985E-02
*FIR 5
*LOU 8

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
5	2	117	0	1.85	1.18	38.6	20.3	1.38E-02	1.64E+04
6	3	300	7	1.85	3.04	46.1	21.7	1.81E-02	5.50E+04
7	3	300	0	1.85	3.04	117.3	51.4	1.00E-02	3.04E+04
8	3	300	0	1.85	3.04	143.1	114.3	1.06E-02	3.22E+04

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
4	1017	5.6	1.85	10.3	94.9	50.5	2.5	1.37E-04	1 [illegible]E-02	1.34E+05
59	15911	94.3	1.85	174.6	84.0	102.9	1.4	9.97E-04	8 [illegible]02	1.46E+07

*TRA CS14 26 Oct 84 10:21 p110 E->W ! ------ Incorrect PO labels
*DPP .268251E-02
*FIR 9
*LOU 19

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
9	2	138	0	1.85	1.27	158.5	136.8	1.82E-02	2.32E+04
10	3	300	0	1.85	2.76	144.0	85.5	1.76E-02	4.87E+04
11	3	300	0	1.85	2.76	92.4	40.4	8.64E-03	2.38E+04
12	3	300	0	1.85	2.76	99.0	95.0	5.40E-03	1.49E+04
13	3	300	0	1.85	2.76	117.3	92.2	1.90E-02	5.24E+04
14	3	300	0	1.85	2.76	97.4	71.3	1.81E-02	5.01E+04
15	3	300	0	1.85	2.76	81.9	54.7	7.38E-03	2.04E+04
16	3	300	0	1.85	2.76	100.0	72.8	6.58E-03	1.82E+04
17	3	300	0	1.85	2.76	120.7	95.3	1.07E-02	2.95E+04
18	3	300	0	1.85	2.76	118.3	93.1	1.22E-02	3.36E+04
19	2	107	0	1.85	0.98	72.0	68.7	7.54E-03	7.43E+03

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
11	2945	14.6	1.85	27.1	109.0	83.8	6.7	1.09E-04	1.19E-02	3.22E+05
70	18856	108.9	1.85	201.7	87.4	102.5	1.5	8.48E-04	7.41E-02	1.49E+07

*TRA CS15 26 Oct 84 11:17 p111 E->W
*DPP .234742E-02
*FIR 20
*LOU 25

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
20	3	300	0	1.85	2.42	44.6	21.3	1.04E-02	2.51E+04
21	3	300	0	1.85	2.42	62.0	28.7	3.47E-03	8.37E+03
22	3	300	0	1.85	2.42	80.7	30.4	9.78E-03	2.36E+04
23	3	300	0	1.85	2.42	75.9	45.1	7.86E-03	1.90E+04

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     24     3  300     0  1.85   2.42  64.8  51.3  1.49E-02  3.61E+04
     25     3  204    28  1.85   1.64  61.8  60.4  7.37E-02  1.21E+05

   N      P   LEN  WID  AREA   COL   D/C   L/C    VOL/D    SURF/D  BIOMASS
   #      #    KM   KM  KM2     M     M    KM   KG/M3     KG/M2        KG
   6   1704   7.4 1.85  13.7  65.2  49.4   5.4 2.61E-04 1.70E-02 2.33E+05
  76  20560 116.3 1.85 215.4  85.9 101.7   1.5 8.20E-04 7.05E-02 1.52E+07

*TRA CS16 26 Oct 84 11:51 p112 E->W
*DPP .002
*FIR 26
*LOU 30
     PO  SPO   PI  MPI   WID   AREA   COL   D/C    SURF/D   BIOMASS
      #    #    #    #    KM   KM2     M     M    KG/M2        KG
     26    3  300    0  1.85   2.06  73.7  35.9  2.53E-02  5.21E+04
     27    3  300    0  1.85   2.06  98.8  84.8  1.08E-02  2.21E+04
     28    3  300    0  1.85   2.06  97.4  81.5  1.65E-02  3.40E+04
     29    3  300    0  1.85   2.06  68.1  57.5  4.22E-02  8.68E+04
     30    3  300    0  1.85   2.06  74.1  74.7  1.85E-02  3.81E+04

   N      P   LEN  WID  AREA   COL   D/C   L/C    VOL/D    SURF/D  BIOMASS
   #      #    KM   KM  KM2     M     M    KM   KG/M3     KG/M2        KG
   5   1500   5.6 1.85  10.3  82.4  61.6   3.0 2.75E-04 2.27E-02 2.33E+05
  81  22060 121.9 1.85 225.7  85.8 101.1   1.6 7.96E-04 6.83E-02 1.54E+07

*
TRA CS17 26 Oct 84 12:21 p113 E->W ! ------ Check FIR PO label, too few
*pings

pings: INCORRECT CONTROL LINE, TRY AGAIN!

*DPP .01
*FIR 31
*LOU 31
     PO  SPO   PI  MPI   WID   AREA   COL   D/C    SURF/D   BIOMASS
      #    #    #    #    KM   KM2     M     M    KG/M2        KG
     31    3  300    0  1.85  10.29  66.8  65.0  2.53E-03  2.60E+04

   N      P   LEN  WID  AREA   COL   D/C   L/C    VOL/D    SURF/D  BIOMASS
   #      #    KM   KM  KM2     M     M    KM   KG/M3     KG/M2        KG
   1    300   5.6 1.85  10.3  66.8  65.0   2.8 3.78E-05 2.53E-03 2.60E+04
  82  22360 127.4 1.85 236.0  85.0 101.0   1.6 7.70E-04 6.54E-02 1.54E+07

*OIE 84C025.DAT
*ZER
*TRA EP1 28 Oct 84 10:21 p114 E->W ! ------ DPP from hydroacoustic log
*DPP .374065E-02
*FIR 1
*LOU 2
  RESTORE 84C025.DAT
     PO  SPO   PI  MPI   WID   AREA   COL   D/C    SURF/D   BIOMASS
      #    #    #    #    KM   KM2     M     M    KG/M2        KG
      1    3  300    1  1.85   3.85  95.2  80.3  1.51E-02  5.80E+04
      2    2  101   18  1.85   1.30  30.0  31.5  1.11E-01  1.44E+05
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N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
2	401	2.8	1.85	5.1	78.8	45.6	2.0	4.97E-04	3.92E-02	2.02E+05
2	401	2.8	1.85	5.1	78.8	45.6	2.0	4.97E-04	3.92E-02	2.02E+05

*TRA EP2 28 Oct 84 10:30 p114 E->W
*DPP .356009E-02
*FIR 3
*LOU 4

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
3	3	300	16	1.85	3.66	87.3	60.7	6.20E-02	2.27E+05
4	2	141	0	1.85	1.72	112.0	63.5	2.67E-03	4.60E+03

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
2	441	2.9	1.85	5.4	95.2	60.8	1.0	4.52E-04	4.30E-02	2.32E+05
4	842	5.7	1.85	10.5	87.2	53.7	1.5	4.72E-04	4.11E-02	4.33E+05

*TRA EP3 28 Oct 84 10:38 p114 E->W
*DPP .331579E-02
*FIR 5
*LOU 6

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
5	3	300	0	1.85	3.41	98.3	71.5	3.99E-03	1.36E+04
6	3	270	0	1.85	3.07	80.4	63.7	3.98E-03	1.22E+04

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
2	570	3.5	1.85	6.5	89.8	67.8	1.7	4.44E-05	3.99E-03	2.59E+04
6	1412	9.2	1.85	17.0	88.2	54.5	1.5	3.06E-04	2.70E-02	4.59E+05

*TRA EP4 28 Oct 84 10:50 p115 E->W
*DPP .37931E-02
*FIR 7
*LOU 8

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
7	3	300	0	1.85	3.90	83.2	80.9	4.53E-03	1.77E+04
8	3	222	0	1.85	2.89	85.1	76.5	2.69E-03	7.78E+03

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
2	522	3.7	1.85	6.8	84.0	79.5	1.6	4.46E-05	3.75E-03	2.55E+04
8	1934	12.9	1.85	23.8	87.0	55.8	1.5	2.34E-04	2.04E-02	4.85E+05

*TRA EP5 28 Oct 84 11:00 p115 E->W
*DPP .368098E-02
*FIR 9
*LOU 12

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
9	3	300	0	1.85	3.79	139.8	116.4	5.93E-03	2.25E+04

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      10     3  300     0  1.85    3.79   80.9   56.7   5.24E-03   1.98E+04
      11     3  300     0  1.85    3.79   87.5   47.9   2.28E-03   8.63E+03
      12     3  241     0  1.85    3.04   82.5   65.7   4.49E-03   1.37E+04

   N      P   LEN  WID  AREA   COL   D/C   L/C    VOL/D    SURF/D  BIOMASS
   #      #    KM   KM  KM2     M     M    KM   KG/M3     KG/M2        KG
   4   1141   7.8 1.85  14.4  98.5  78.2   3.5 4.55E-05 4.49E-03 6.46E+04
  12   3075  20.6 1.85  38.2  91.3  58.5   1.7 1.57E-04 1.44E-02 5.49E+05

*TRA EP6 28 Oct 84 11:23 p115 E->W
*DPP .466667E-02
*FIR 13
*LOU 15
      PO  SPO   PI  MPI   WID   AREA   COL   D/C    SURF/D   BIOMASS
       #    #    #    #    KM   KM2     M     M    KG/M2         KG
      13    3  300    0  1.85   4.80  67.9  56.3  1.19E-03  5.69E+03
      14    3  300    0  1.85   4.80  36.9  20.0  2.71E-02  1.30E+05
      15    3  300    0  1.85   4.80  35.7  14.2  1.35E-04  6.47E+02

   N      P   LEN  WID  AREA   COL   D/C   L/C    VOL/D    SURF/D  BIOMASS
   #      #    KM   KM  KM2     M     M    KM   KG/M3     KG/M2        KG
   3    900   7.8 1.85  14.4  46.8  21.5   3.8 2.02E-04 9.46E-03 1.36E+05
  15   3975  28.4 1.85  52.6  79.1  51.1   2.1 1.65E-04 1.30E-02 6.85E+05

*TRA EP7 28 Oct 84 11:41 p116 E->W
*DPP .014
*FIR 17
*LOU 17
      PO  SPO   PI  MPI   WID   AREA   COL   D/C    SURF/D   BIOMASS
       #    #    #    #    KM   KM2     M     M    KG/M2         KG
      17    3  300    0  1.85  14.41   7.1  13.6  5.16E-04  7.44E+03

   N      P   LEN  WID  AREA   COL   D/C   L/C    VOL/D    SURF/D  BIOMASS
   #      #    KM   KM  KM2     M     M    KM   KG/M3     KG/M2        KG
   1    300   7.8 1.85  14.4   7.1  13.6   3.9 7.28E-05 5.16E-04 7.44E+03
  16   4275  36.2 1.85  67.0  63.7  50.7   2.2 1.62E-04 1.03E-02 6.93E+05

*! ---------------------------------- DPP from Loran trackplotter
*OIE 84C030.DAT
*UNI KM
*ZER
*TRA LSO 3 Nov 84 10:01 p180 N->S
*DPP .110303E-01
*WID 3.704
*FIR 1
*LOU 2
  RESTORE 84C030.DAT
      PO  SPO   PI  MPI   WID   AREA   COL   D/C    SURF/D   BIOMASS
       #    #    #    #    KM   KM2     M     M    KG/M2         KG
       1    3  300   29  3.70  12.26  90.6  94.8  6.36E-01  7.80E+06
       2    2  162    8  3.70   6.62  96.6  98.1  5.90E-03  3.91E+04

   N      P   LEN  WID  AREA   COL   D/C   L/C    VOL/D    SURF/D  BIOMASS
   #      #    KM   KM  KM2     M     M    KM   KG/M3     KG/M2        KG
```

2	462	5.1	3.70	18.9	92.7	94.9	1.7	4.48E-03	4.15E-01	7.84E+06
2	462	5.1	3.70	18.9	92.7	94.9	1.7	4.48E-03	4.15E-01	7.84E+06

*TRA LS1 3 Nov 84 10:10 p180 E->W
*DPP .625294E-02
*WID 2.0
*FIR 3
*LOU 10

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
3	3	300	10	2.00	3.75	39.1	39.4	2.54E-01	9.53E+05
4	3	300	3	2.00	3.75	14.8	14.3	2.35E-05	8.82E+01
5	3	300	17	2.00	3.75	40.1	91.6	1.17E-04	4.41E+02
6	3	300	14	2.00	3.75	99.1	90.2	9.93E-01	3.73E+06
7	3	300	19	2.00	3.75	52.1	58.0	4.18E-01	1.57E+06
8	3	300	6	2.00	3.75	36.2	39.2	8.59E-04	3.22E+03
9	3	300	2	2.00	3.75	75.9	58.7	2.50E-03	9.37E+03
10	1	27	0	2.00	0.34	124.1	98.1	1.03E-03	3.49E+02

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
8	2127	13.3	2.00	26.6	52.0	74.3	6.2	4.53E-03	2.35E-01	6.26E+06
10	2589	18.4	2.47	45.5	68.9	85.7	3.7	4.50E-03	3.10E-01	1.41E+07

*TRA LS2 3 Nov 84 11:09 p181 W->E
*DPP .555601E-02
*FIR 14
*LOU 22

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
14	3	300	46	2.00	3.33	124.8	90.8	1.09E-04	3.64E+02
15	3	300	13	2.00	3.33	75.8	76.9	1.38E-01	4.60E+05
16	3	300	17	2.00	3.33	130.5	118.3	1.08E+01	3.61E+07
17	3	300	13	2.00	3.33	86.7	112.7	4.68E+00	1.56E+07
18	3	300	19	2.00	3.33	40.2	45.7	4.20E-04	1.40E+03
19	3	300	12	2.00	3.33	27.9	27.8	2.72E-04	9.07E+02
20	3	300	6	2.00	3.33	26.4	16.0	4.91E-06	1.64E+01
21	3	300	36	2.00	3.33	49.1	54.8	2.40E-01	7.99E+05
22	1	37	11	2.00	0.41	123.0	124.7	1.26E-04	5.18E+01

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
9	2437	13.5	2.00	27.1	71.0	115.3	4.8	2.75E-02	1.96E+00	5.30E+07
19	5026	31.9	2.27	72.6	69.7	109.1	4.5	1.33E-02	9.24E-01	6.70E+07

*TRA LS3 3 Nov 84 12:12 p182 E->W
*DPP .602178E-02
*FIR 26
*LOU 31

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
26	3	300	17	2.00	3.61	55.4	73.3	3.59E-01	1.30E+06
27	3	300	4	2.00	3.61	44.2	46.7	2.32E-03	8.38E+03
28	3	300	33	2.00	3.61	70.9	64.9	2.07E-03	7.47E+03

```
      29     3  300     1  2.00    3.61  69.4  74.5  1.55E-02  5.62E+04
      30     3  300     6  2.00    3.61  85.0  90.4  1.50E-03  5.44E+03
      31     1   61     3  2.00    0.73  84.1  91.8  9.49E-04  6.97E+02

   N      P   LEN  WID  AREA   COL   D/C   L/C    VOL/D    SURF/D  BIOMASS
   #      #    KM   KM  KM2     M     M    KM   KG/M3     KG/M2        KG
   6   1561   9.4 2.00  18.8  65.7  73.2   1.2 1.11E-03 7.32E-02 1.38E+06
  25   6587  41.3 2.21  91.4  68.9 108.4   4.5 1.09E-02 7.49E-01 6.84E+07

*TRA LS4 3 Nov 84 12:57 p183 W->E
*DPP .589711E-02
*FIR 35
*LOU 40
     PO  SPO   PI  MPI   WID   AREA   COL   D/C    SURF/D   BIOMASS
      #    #    #    #    KM   KM2     M     M    KG/M2         KG
     35    3  300   33  2.00   3.54 121.6 121.7  6.74E-04  2.38E+03
     36    3  300   22  2.00   3.54 115.1 129.6  2.03E-01  7.18E+05
     37    3  300   30  2.00   3.54  85.8  92.1  2.94E-03  1.04E+04
     38    3  300   13  2.00   3.54  74.7  74.6  2.31E-01  8.19E+05
     39    3  300   38  2.00   3.54  85.1 121.1  8.97E-01  3.17E+06
     40    1   55    5  2.00   0.65 146.2 134.7  5.93E+00  3.85E+06

   N      P   LEN  WID  AREA   COL   D/C   L/C    VOL/D    SURF/D  BIOMASS
   #      #    KM   KM  KM2     M     M    KM   KG/M3     KG/M2        KG
   6   1555   9.2 2.00  18.3  98.2 123.4   7.8 4.76E-03 4.67E-01 8.57E+06
  31   8142  50.5 2.17 109.7  73.8 110.1   4.8 9.52E-03 7.02E-01 7.70E+07

*ZER
*TRA LS4B 3 Nov 84 13:40 p184 W->E ! ------ LS4A 3.34 km
*DPP .0057
*WID 1.852
*FIR 43
*! ------ Remove duplicate PO's from end of data file
*LOU 45
     PO  SPO   PI  MPI   WID   AREA   COL   D/C    SURF/D   BIOMASS
      #    #    #    #    KM   KM2     M     M    KG/M2         KG
     43    3  300   33  1.85   3.17  51.9  60.3  7.10E-04  2.25E+03
     44    3  300   45  1.85   3.17  66.4  72.2  5.56E-03  1.76E+04

   N      P   LEN  WID  AREA   COL   D/C   L/C    VOL/D    SURF/D  BIOMASS
   #      #    KM   KM  KM2     M     M    KM   KG/M3     KG/M2        KG
   2    600   3.4 1.85   6.3  59.2  70.8   2.4 5.29E-05 3.13E-03 1.98E+04
   2    600   3.4 1.85   6.3  59.2  70.8   2.4 5.29E-05 3.13E-03 1.98E+04

*OIE 84C031.DAT
*TRA LS4C 3 Nov 84 13:59 p184
*DPP .016338
*FIR 1
*LOU 1
  RESTORE 84C031.DAT
     PO  SPO   PI  MPI   WID   AREA   COL   D/C    SURF/D   BIOMASS
      #    #    #    #    KM   KM2     M     M    KG/M2         KG
      1    2  142    6  1.85   4.30  63.2  57.2  4.21E-01  1.81E+06
```

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
1	142	2.3	1.85	4.3	63.2	57.2	1.2	6.66E-03	4.21E-01	1.81E+06
3	742	5.7	1.85	10.6	60.8	57.3	1.2	2.83E-03	1.72E-01	1.83E+06

*TRA LS4D 3 Nov 84 14:02 p184
*DPP .453333E-02
*FIR 2
*LOU 2

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
2	3	300	41	1.85	2.52	64.0	73.4	1.03E-03	2.60E+03

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
1	300	1.4	1.85	2.5	64.0	73.4	0.7	1.62E-05	1.03E-03	2.60E+03
4	1042	7.1	1.85	13.1	61.4	57.4	1.2	2.27E-03	1.39E-01	1.83E+06

*TRA LS4E 3 Nov 84 14:08 p185
*DPP .577575E-02
*WID 1.0
*FIR 3
*LOU 5

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
3	3	300	81	1.00	1.73	95.0	82.8	1.04E+00	1.81E+06
4	3	300	43	1.00	1.73	46.8	60.1	1.89E-01	3.27E+05
5	2	167	20	1.00	0.96	77.9	78.6	1.47E+00	1.42E+06

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
3	767	4.4	1.00	4.4	72.5	79.1	2.3	1.11E-02	8.02E-01	3.55E+06
7	1809	11.5	1.52	17.6	64.2	71.7	1.9	4.77E-03	3.06E-01	5.39E+06

*TRA LS4F 3 Nov 84 14:23 p185
*DPP .392658E-02
*FIR 6
*LOU 8

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
6	3	300	32	1.00	1.18	32.4	34.5	2.18E-03	2.57E+03
7	3	300	32	1.00	1.18	145.5	94.6	1.11E+01	1.31E+07
8	3	299	29	1.00	1.17	168.8	148.4	9.65E+00	1.13E+07

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
3	899	3.5	1.00	3.5	115.5	119.6	2.3	5.98E-02	6.91E+00	2.44E+07
10	2708	15.1	1.40	21.1	72.8	110.9	2.2	1.94E-02	1.41E+00	2.98E+07

*! LS4G 7.85 km
*ZER
*TRA GIO 3 Nov 84 16:57 p186 ! ------ Distance from hydroacoustic log
*DPP .528846E-02

*FIR 9
*LOU 10

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
9	3	300	1	1.00	1.59	117.4	107.6	5.53E-03	8.77E+03
10	2	116	0	1.00	0.61	75.5	67.5	6.33E-04	3.88E+02

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
2	416	2.2	1.00	2.2	105.7	105.9	0.8	3.94E-05	4.16E-03	9.15E+03
2	416	2.2	1.00	2.2	105.7	105.9	0.8	3.94E-05	4.16E-03	9.15E+03

*TRA GI1 3 Nov 84 17:05 p186 N->S
*DPP .585664E-02
*WID 1.0
*FIR 11
*LOU 14

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
11	3	300	0	1.00	1.76	38.6	38.6	9.99E-03	1.76E+04
12	3	300	0	1.00	1.76	39.6	44.1	5.42E-03	9.52E+03
13	3	300	0	1.00	1.76	59.3	61.3	3.00E-03	5.26E+03
14	3	244	0	1.00	1.43	77.9	71.1	1.93E-03	2.75E+03

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
4	1144	6.7	1.00	6.7	52.7	46.1	2.3	9.94E-05	5.24E-03	3.51E+04
6	1560	8.9	1.00	8.9	65.8	58.4	2.0	7.56E-05	4.97E-03	4.42E+04

*TRA GI2 3 Nov 84 17:28 p186 N->S
*DPP .461888E-02
*FIR 15
*LOU 17

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
15	3	300	0	1.00	1.39	67.3	66.3	1.33E-02	1.84E+04
16	3	300	0	1.00	1.39	66.2	64.7	2.06E-03	2.85E+03
17	3	279	0	1.00	1.29	48.0	50.9	3.83E-03	4.93E+03

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
3	879	4.1	1.00	4.1	60.8	63.3	1.4	1.06E-04	6.46E-03	2.62E+04
9	2439	13.0	1.00	13.0	64.2	60.2	1.8	8.46E-05	5.44E-03	7.05E+04

*TRA GI3 3 Nov 84 17:45 p187 N->S
*DPP .557127E-02
*FIR 18
*LOU 21

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
18	3	300	0	1.00	1.67	40.1	38.5	6.28E-03	1.05E+04
19	3	300	0	1.00	1.67	71.7	57.7	2.83E-03	4.73E+03
20	3	300	0	1.00	1.67	97.3	65.0	6.79E-04	1.13E+03
21	1	19	1	1.00	0.11	95.1	15.2	9.21E-03	9.75E+02

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
4	919	5.1	1.00	5.1	70.2	44.1	1.7	4.82E-05	3.39E-03	1.73E+04
13	3358	18.1	1.00	18.1	65.9	57.1	1.8	7.37E-05	4.86E-03	8.78E+04

*TRA GI4 3 Nov 84 18:05 p187 N->S
*DPP .751037E-02
*FIR 22
*LOU 22

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
22	3	241	0	1.00	1.81	73.9	52.7	3.62E-03	6.54E+03

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
1	241	1.8	1.00	1.8	73.9	52.7	0.9	4.89E-05	3.62E-03	6.54E+03
14	3599	19.9	1.00	19.9	66.6	56.8	1.7	7.12E-05	4.74E-03	9.43E+04

*TRA GI5 3 Nov 84 18:09 p187 N->S
*DPP .486574E-02
*FIR 23
*LOU 26

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
23	3	300	0	1.00	1.46	52.1	50.3	4.59E-03	6.70E+03
24	3	300	0	1.00	1.46	75.2	62.6	1.73E-03	2.53E+03
25	3	300	0	1.00	1.46	77.3	65.0	2.13E-03	3.11E+03
26	1	31	0	1.00	0.15	92.1	69.2	2.97E-04	4.49E+01

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
4	931	4.5	1.00	4.5	69.0	56.5	1.8	3.96E-05	2.73E-03	1.24E+04
18	4530	24.4	1.00	24.4	67.1	56.7	1.7	6.52E-05	4.37E-03	1.07E+05

*TRA GI6 3 Nov 84 18:28 p188 N->S
*DPP .522327E-02
*FIR 27
*LOU 31

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
27	3	300	0	1.00	1.57	89.6	76.2	6.22E-04	9.75E+02
28	3	300	0	1.00	1.57	91.0	69.3	4.21E-04	6.59E+02
29	3	300	0	1.00	1.57	95.3	78.9	4.97E-04	7.79E+02
30	3	300	0	1.00	1.57	100.1	69.6	1.01E-03	1.58E+03
31	3	278	0	1.00	1.45	104.4	75.0	1.40E-03	2.03E+03

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
5	1478	7.7	1.00	7.7	96.0	73.7	4.7	8.12E-06	7.80E-04	6.02E+03
23	6008	32.1	1.00	32.1	74.0	57.6	1.9	4.74E-05	3.51E-03	1.13E+05

*TRA GI7 3 Nov 84 18:58 p188 E->W
*DPP .567473E-02
*WID 1.6

*FIR 32
*LOU 48

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
32	3	300	0	1.60	2.72	108.7	96.3	2.33E-03	6.34E+03
33	3	300	0	1.60	2.72	115.2	108.6	4.36E-03	1.19E+04
34	3	300	0	1.60	2.72	118.2	111.2	4.54E-03	1.24E+04
35	3	300	0	1.60	2.72	121.1	109.9	4.46E-03	1.21E+04
36	3	300	0	1.60	2.72	122.3	111.7	2.61E-03	7.11E+03
37	3	300	0	1.60	2.72	123.2	103.2	1.13E-03	3.08E+03
38	3	300	0	1.60	2.72	120.2	100.4	5.60E-04	1.52E+03
39	3	300	0	1.60	2.72	117.5	107.3	6.24E-04	1.70E+03
40	3	300	0	1.60	2.72	116.0	101.2	7.91E-04	2.15E+03
41	3	300	0	1.60	2.72	113.1	104.8	8.58E-04	2.34E+03
42	3	300	1	1.60	2.72	102.9	97.4	4.59E-03	1.25E+04
43	3	300	0	1.60	2.72	88.1	84.4	1.99E-02	5.42E+04
44	3	300	0	1.60	2.72	80.9	85.0	8.96E-02	2.44E+05
45	3	300	0	1.60	2.72	55.1	56.2	1.52E-01	4.15E+05
46	3	300	0	1.60	2.72	57.9	55.5	1.03E-01	2.80E+05
47	3	300	0	1.60	2.72	72.1	77.3	5.02E-03	1.37E+04
48	1	76	0	1.60	0.69	80.5	83.8	5.02E-03	3.46E+03

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
17	4876	27.7	1.60	44.3	101.7	67.6	21.9	2.41E-04	2.45E-02	1.08E+06
40	10884	59.8	1.28	76.4	90.1	66.7	20.0	1.74E-04	1.57E-02	1.20E+06

*TRA GI8 3 Nov 84 20:48 p189 W->E
*DPP .583986E-02
*FIR 52
*LOU 66

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
52	3	300	0	1.60	2.80	71.7	53.0	7.70E-03	2.16E+04
53	3	300	0	1.60	2.80	61.4	66.1	4.77E-03	1.34E+04
54	3	300	0	1.60	2.80	57.2	63.3	2.25E-03	6.32E+03
55	3	300	0	1.60	2.80	53.3	57.0	2.80E-03	7.85E+03
56	3	300	0	1.60	2.80	59.1	59.4	6.33E-04	1.77E+03
57	3	300	0	1.60	2.80	59.1	59.6	9.67E-04	2.71E+03
58	3	300	0	1.60	2.80	60.0	64.9	3.98E-03	1.12E+04
59	3	300	0	1.60	2.80	83.2	68.9	1.60E-01	4.48E+05
60	3	300	0	1.60	2.80	100.3	89.0	6.96E-04	1.95E+03
61	3	300	0	1.60	2.80	108.0	98.3	5.85E-04	1.64E+03
62	3	300	0	1.60	2.80	113.2	77.6	1.38E-03	3.86E+03
63	3	300	0	1.60	2.80	120.0	109.3	1.83E-03	5.13E+03
64	3	300	1	1.60	2.80	121.9	112.9	2.08E-03	5.83E+03
65	3	300	0	1.60	2.80	121.3	111.9	2.67E-03	7.49E+03
66	3	271	0	1.60	2.53	120.9	109.3	3.25E-03	8.23E+03

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
15	4471	26.1	1.60	41.8	87.1	70.1	12.7	1.50E-04	1.31E-02	5.47E+05
55	15355	85.9	1.38	118.2	89.0	67.7	17.7	1.66E-04	1.48E-02	1.74E+06

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*TRA GI9 3 Nov 84 22:30 p191 E->W
*DPP .565744E-02
*FIR 69
*LOU 76
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PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
69	3	300	0	1.60	2.72	120.1	74.4	3.74E-03	1.02E+04
70	3	300	0	1.60	2.72	122.1	103.1	2.12E-03	5.74E+03
71	3	300	0	1.60	2.72	117.2	106.7	1.51E-03	4.11E+03
72	3	300	0	1.60	2.72	96.6	95.7	9.88E-04	2.68E+03
73	3	300	0	1.60	2.72	76.3	71.7	3.05E-03	8.27E+03
74	3	300	0	1.60	2.72	59.9	62.9	2.31E-02	6.27E+04
75	3	300	0	1.60	2.72	57.7	61.5	3.48E-03	9.45E+03
76	3	212	0	1.60	1.92	55.7	61.0	1.12E-03	2.15E+03

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
8	2312	13.1	1.60	20.9	89.4	69.3	7.9	5.63E-05	5.03E-03	1.05E+05
63	17667	99.0	1.41	139.1	89.1	67.8	17.2	1.49E-04	1.33E-02	1.85E+06

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*TRA GI10 3 Nov 84 23:28 p192 W->E
*DPP .552163E-02
*FIR 79
*LOU 88
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PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
79	3	300	0	1.60	2.65	54.0	18.6	6.25E-04	1.66E+03
80	3	300	0	1.60	2.65	55.5	49.7	2.55E-04	6.75E+02
81	3	300	0	1.60	2.65	55.0	50.0	8.01E-04	2.12E+03
82	3	300	0	1.60	2.65	55.3	60.6	1.03E-03	2.74E+03
83	3	300	0	1.60	2.65	57.2	59.5	5.38E-04	1.43E+03
84	3	300	0	1.60	2.65	65.2	64.7	2.13E-02	5.66E+04
85	3	300	0	1.60	2.65	94.1	95.4	1.26E-03	3.33E+03
86	3	300	0	1.60	2.65	115.2	102.2	7.19E-03	1.90E+04
87	3	300	0	1.60	2.65	125.5	96.1	5.99E-03	1.59E+04
88	1	51	0	1.60	0.45	125.1	103.2	2.22E-03	9.99E+02

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
10	2751	15.2	1.60	24.3	76.1	76.4	10.2	5.64E-05	4.30E-03	1.04E+05
73	20418	114.2	1.43	163.4	87.2	68.3	16.8	1.37E-04	1.20E-02	1.95E+06

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*
TRA GI11 4 Nov 84 00:35 p193 E->W ! ------ distance from hydroacoustic l
*og

og: INCORRECT CONTROL LINE, TRY AGAIN!

*DPP .611315E-02
*FIR 91
*LOU 97
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PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
91	3	300	0	1.60	2.93	109.8	83.7	2.23E-03	6.53E+03

92	3	300	0	1.60	2.93	78.3	70.2	1.20E-03	3.52E+03
93	3	300	0	1.60	2.93	65.8	67.3	7.45E-04	2.19E+03
94	3	300	0	1.60	2.93	57.2	59.3	8.10E-04	2.38E+03
95	3	300	0	1.60	2.93	53.0	53.0	1.85E-03	5.43E+03
96	3	300	0	1.60	2.93	51.9	52.0	1.08E-03	3.17E+03
97	2	109	0	1.60	1.07	52.8	56.4	1.53E-03	1.63E+03

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
7	1909	11.7	1.60	18.7	68.4	65.5	5.5	1.95E-05	1.33E-03	2.48E+04
80	22327	125.9	1.45	182.1	85.2	68.2	16.6	1.27E-04	1.09E-02	1.98E+06

*TRA GI12 4 Nov 84 01:27 p194 W->E
*DPP .564451E-02
*FIR 101
*LOU 110

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
101	3	300	0	1.60	2.71	39.4	21.1	1.21E-03	3.27E+03
102	3	300	0	1.60	2.71	40.1	35.5	3.28E-04	8.88E+02
103	3	300	0	1.60	2.71	41.1	32.2	1.85E-04	5.01E+02
104	3	300	0	1.60	2.71	48.3	43.1	1.15E-03	3.12E+03
105	3	300	0	1.60	2.71	64.1	63.3	3.98E-03	1.08E+04
106	3	300	0	1.60	2.71	78.0	62.2	6.33E-03	1.71E+04
107	3	300	0	1.60	2.71	96.8	85.0	1.05E-03	2.86E+03
108	3	300	1	1.60	2.71	112.9	101.4	2.39E-03	6.47E+03
109	3	300	0	1.60	2.71	116.6	105.6	2.95E-03	8.00E+03
110	1	23	0	1.60	0.21	117.8	102.2	1.51E-03	3.13E+02

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
10	2723	15.4	1.60	24.6	71.2	70.8	9.4	3.05E-05	2.17E-03	5.34E+04
90	25050	141.2	1.46	206.7	83.6	68.3	16.5	1.18E-04	9.83E-03	2.03E+06

*TRA GI13 4 Nov 84 02:38 p195 E->W
*DPP .590319E-02
*FIR 114
*LOU 122

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
114	3	300	0	1.60	2.83	118.9	109.5	2.01E-03	5.71E+03
115	3	300	0	1.60	2.83	116.5	107.4	1.87E-03	5.29E+03
116	3	300	0	1.60	2.83	108.1	96.5	1.10E-03	3.12E+03
117	3	300	1	1.60	2.83	88.5	85.2	2.16E-03	6.12E+03
118	3	300	0	1.60	2.83	45.0	51.1	4.81E-03	1.36E+04
119	3	300	0	1.60	2.83	15.9	19.1	3.67E-05	1.04E+02
120	3	300	0	1.60	2.83	15.1	16.8	1.31E-05	3.71E+01
121	3	300	0	1.60	2.83	15.2	17.1	1.02E-05	2.89E+01
122	2	141	0	1.60	1.33	15.7	13.5	7.64E-06	1.02E+01

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
9	2541	15.0	1.60	24.0	62.6	79.7	5.3	2.26E-05	1.42E-03	3.40E+04
99	27591	156.2	1.48	230.7	81.4	68.5	16.3	1.10E-04	8.95E-03	2.07E+06

*TRA GI14 4 Nov 84 03:49 p197 W->E
*DPP .639102E-02
*FIR 127
*LOU 133

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
127	3	300	0	1.60	3.07	14.0	13.9	3.12E-05	9.57E+01
128	3	300	0	1.60	3.07	13.2	14.5	2.94E-05	9.01E+01
129	3	300	1	1.60	3.07	15.3	23.4	1.69E-02	5.19E+04
130	3	300	10	1.60	3.07	76.2	34.7	1.47E-02	4.52E+04
131	3	300	0	1.60	3.07	106.0	92.1	8.38E-04	2.57E+03
132	3	300	0	1.60	3.07	118.1	114.0	3.58E-03	1.10E+04
133	1	26	0	1.60	0.27	124.0	70.4	4.61E-03	1.22E+03

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
7	1826	11.7	1.60	18.7	58.1	38.9	6.3	1.03E-04	6.00E-03	1.12E+05
106	29417	167.9	1.49	249.4	79.6	67.0	15.8	1.10E-04	8.73E-03	2.18E+06

*TRA GI15 4 Nov 84 04:37 p198 E->W
*DPP .602603E-02
*FIR 136
*LOU 143

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
136	3	300	0	1.60	2.89	130.1	113.8	2.36E-03	6.82E+03
137	3	300	0	1.60	2.89	126.8	113.9	1.65E-03	4.78E+03
138	3	300	0	1.60	2.89	107.0	98.2	1.47E-03	4.26E+03
139	3	300	0	1.60	2.89	61.2	69.5	1.75E-02	5.07E+04
140	3	300	0	1.60	2.89	16.8	14.1	3.81E-05	1.10E+02
141	3	300	0	1.60	2.89	16.2	17.9	8.69E-06	2.51E+01
142	3	300	0	1.60	2.89	14.7	13.7	2.21E-05	6.40E+01
143	3	205	0	1.60	1.98	14.8	21.6	2.81E-04	5.55E+02

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
8	2305	13.9	1.60	22.2	62.9	78.4	5.5	4.82E-05	3.03E-03	6.73E+04
114	31722	181.8	1.49	271.6	78.3	67.3	15.4	1.06E-04	8.27E-03	2.24E+06

*TRA GI16 4 Nov 84 05:35 p199 W->E
*DPP .606552E-02
*FIR 146
*LOU 155

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
146	3	300	0	1.60	2.91	16.8	22.7	7.29E-04	2.12E+03
147	3	300	0	1.60	2.91	17.2	22.0	3.52E-04	1.02E+03
148	3	300	0	1.60	2.91	17.2	13.9	2.57E-05	7.48E+01
149	3	300	0	1.60	2.91	17.7	13.3	1.86E-05	5.42E+01
150	3	300	0	1.60	2.91	38.9	60.1	1.88E-03	5.46E+03
151	3	300	0	1.60	2.91	104.8	88.0	9.29E-04	2.70E+03
152	3	300	0	1.60	2.91	134.6	117.2	1.09E-03	3.16E+03
153	3	300	0	1.60	2.91	139.1	116.5	1.68E-03	4.91E+03

154	3	300	0	1.60	2.91	146.0	125.9	1.35E-03	3.94E+03
155	2	139	0	1.60	1.35	150.6	100.0	8.05E-04	1.09E+03

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
10	2839	17.2	1.60	27.6	74.2	89.1	10.6	1.20E-05	8.90E-04	2.45E+04
124	34561	199.0	1.50	299.1	77.9	67.6	15.4	9.74E-05	7.59E-03	2.27E+06

*TRA GI17 4 Nov 84 06:43 p200 E->W
*DPP .564506E-02
*FIR 158
*LOU 168

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
158	3	300	0	1.60	2.71	155.9	92.7	1.87E-03	5.08E+03
159	3	300	0	1.60	2.71	150.9	115.1	1.24E-03	3.36E+03
160	3	300	0	1.60	2.71	146.7	119.6	6.90E-04	1.87E+03
161	3	300	0	1.60	2.71	126.9	114.7	4.84E-04	1.31E+03
162	3	300	0	1.60	2.71	86.4	83.8	1.51E-03	4.10E+03
163	3	300	0	1.60	2.71	35.1	46.4	1.38E-02	3.74E+04
164	3	300	0	1.60	2.71	20.8	13.8	7.53E-06	2.04E+01
165	3	300	0	1.60	2.71	19.7	13.6	4.99E-06	1.35E+01
166	3	300	0	1.60	2.71	20.8	14.4	1.28E-05	3.48E+01
167	3	300	0	1.60	2.71	20.1	14.2	3.63E-05	9.82E+01
168	2	116	0	1.60	1.05	19.5	0.0	0.00E+00	0.00E+00

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
11	3116	17.6	1.60	28.1	76.1	62.2	7.7	2.49E-05	1.89E-03	5.33E+04
135	37677	216.6	1.51	327.3	77.7	67.4	15.2	9.13E-05	7.10E-03	2.32E+06

*TRA GI18 4 Nov 84 07:50 p201 S->N ! ------ DPP from elapse time
*DPP .549454E-02
*FIR 170
*LOU 179

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
170	3	300	1	1.60	2.64	19.0	12.5	1.65E-04	4.36E+02
171	3	300	0	1.60	2.64	19.6	24.7	3.93E-06	1.04E+01
172	3	300	0	1.60	2.64	18.0	17.0	1.26E-06	3.31E+00
173	3	300	0	1.60	2.64	17.4	14.4	3.00E-04	7.92E+02
174	3	300	0	1.60	2.64	17.1	22.7	4.94E-05	1.30E+02
175	3	300	0	1.60	2.64	16.1	14.5	4.53E-05	1.19E+02
176	3	300	0	1.60	2.64	16.3	19.5	2.89E-06	7.63E+00
177	3	300	0	1.60	2.64	18.1	18.0	7.02E-06	1.85E+01
178	3	300	0	1.60	2.64	48.2	16.8	3.73E-06	9.85E+00
179	3	232	1	1.60	2.04	74.9	82.3	1.46E-04	2.98E+02

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
10	2932	16.1	1.60	25.8	25.4	25.7	6.6	2.79E-06	7.08E-05	1.83E+03
145	40609	232.7	1.52	353.1	73.9	67.4	15.2	8.91E-05	6.58E-03	2.32E+06

*TRA GI19 4 Nov 84 08:48 p202
*DPP .555833E-02
*FIR 180
*LOU 183

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
180	3	300	0	1.60	2.67	77.4	82.3	6.74E-04	1.80E+03
181	3	300	0	1.60	2.67	79.1	88.3	5.03E-03	1.34E+04
182	3	300	0	1.60	2.67	106.7	95.0	9.62E-03	2.57E+04
183	3	300	5	1.60	2.67	123.6	118.5	4.59E-04	1.23E+03

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
4	1200	6.7	1.60	10.7	96.7	93.0	3.5	4.08E-05	3.95E-03	4.21E+04
149	41809	239.4	1.52	363.7	74.6	67.9	15.0	8.72E-05	6.51E-03	2.37E+06

*ZER
*TRA GX1 4 Nov 84 09:12 p202 ! ------ Distance from Loran track plotter
*DPP .558422E-02
*FIR 184
*LOU 186

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
184	3	300	0	1.60	2.68	121.1	107.8	1.47E-03	3.94E+03
185	3	300	0	1.60	2.68	99.3	86.6	1.08E-02	2.89E+04
186	1	59	0	1.60	0.53	81.7	86.6	2.04E-02	1.08E+04

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
3	659	3.7	1.60	5.9	107.7	88.5	2.6	6.87E-05	7.40E-03	4.36E+04
3	659	3.7	1.60	5.9	107.7	88.5	2.6	6.87E-05	7.40E-03	4.36E+04

*TRA GX2 4 Nov 84 09:30 p203
*DPP .586103E-02
*FIR 188
*LOU 190

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
188	3	300	0	1.60	2.81	115.0	65.5	2.77E-03	7.79E+03
189	3	300	0	1.60	2.81	94.2	97.8	7.15E-04	2.01E+03
190	1	62	0	1.60	0.58	81.6	84.6	5.07E-03	2.95E+03

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
3	662	3.9	1.60	6.2	102.5	75.0	1.8	2.00E-05	2.05E-03	1.28E+04
6	1321	7.6	1.60	12.1	105.0	85.5	2.4	4.43E-05	4.66E-03	5.63E+04

*TRA GX3 4 Nov 84 09:49 p203
*DPP .591528E-02
*FIR 192
*LOU 194

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
192	3	300	0	1.60	2.84	102.8	99.8	3.29E-02	9.33E+04

193	3	300	0	1.60	2.84	92.2	96.3	1.56E-02	4.42E+04
194	1	61	0	1.60	0.58	87.9	91.9	6.82E-04	3.93E+02

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
3	661	3.9	1.60	6.3	96.6	98.7	1.5	2.28E-04	2.20E-02	1.38E+05
9	1982	11.5	1.60	18.4	102.1	94.8	1.7	1.04E-04	1.06E-02	1.94E+05

*TRA GX4 4 Nov 84 10:07 p204
*DPP .618333E-02
*FIR 196
*LOU 197

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
196	3	300	0	1.60	2.97	104.2	107.1	2.69E-02	7.97E+04
197	3	300	0	1.60	2.97	93.0	94.7	3.79E-02	1.13E+05

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
2	600	3.7	1.60	5.9	98.6	99.8	2.0	3.29E-04	3.24E-02	1.92E+05
11	2582	15.2	1.60	24.3	101.3	97.3	1.9	1.57E-04	1.59E-02	3.86E+05

*TRA GX5 4 Nov 84 10:25 p204
*DPP .587302E-02
*FIR 199
*LOU 201

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
199	3	300	0	1.60	2.82	99.9	93.0	1.64E-02	4.62E+04
200	3	300	7	1.60	2.82	81.0	79.0	2.85E-02	8.02E+04
201	1	30	0	1.60	0.28	74.1	72.5	2.56E-04	7.22E+01

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
3	630	3.7	1.60	5.9	89.7	84.1	2.0	2.38E-04	2.14E-02	1.27E+05
14	3212	18.9	1.60	30.2	99.0	94.1	1.9	1.72E-04	1.70E-02	5.13E+05

*TRA GX6 4 Nov 84 10:44 p205
*DPP .0061
*FIR 204
*LOU 205

PO	SPO	PI	MPI	WID	AREA	COL	D/C	SURF/D	BIOMASS
#	#	#	#	KM	KM^2	M	M	KG/M^2	KG
204	3	300	0	1.60	2.93	92.6	98.2	1.62E-02	4.75E+04
205	3	300	0	1.60	2.93	82.3	82.6	1.96E-04	5.74E+02

N	P	LEN	WID	AREA	COL	D/C	L/C	VOL/D	SURF/D	BIOMASS
#	#	KM	KM	KM^2	M	M	KM	KG/M^3	KG/M^2	KG
2	600	3.7	1.60	5.9	87.4	98.0	0.9	9.40E-05	8.22E-03	4.81E+04
16	3812	22.5	1.60	36.1	97.1	94.4	1.8	1.60E-04	1.56E-02	5.61E+05

*TRA GX7 4 Nov 84 11:03 p206
*DPP .592767E-02

*FIR 208
*LOU 210

PO #	SPO #	PI #	MPI #	WID KM	AREA KM^2	COL M	D/C M	SURF/D KG/M^2	BIOMASS KG
208	3	300	0	1.60	2.85	75.6	82.7	2.62E-02	7.44E+04
209	3	300	0	1.60	2.85	71.3	52.0	6.97E-05	1.98E+02
210	1	36	0	1.60	0.34	78.5	73.9	2.94E-02	1.00E+04

N #	P #	LEN KM	WID KM	AREA KM^2	COL M	D/C M	L/C KM	VOL/D KG/M^3	SURF/D KG/M^2	BIOMASS KG
3	636	3.8	1.60	6.0	73.7	81.5	1.2	1.90E-04	1.40E-02	8.46E+04
19	4448	26.3	1.60	42.1	93.8	92.7	1.7	1.64E-04	1.53E-02	6.46E+05