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HYDROACOUSTIC HERRING SURVEY RESULTS FROM HECATE STRAIT DECEMBER 3-15, 1990.

W. E. RICKER CRUISE 90HER2

by

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Two major Pacific herring overwintering areas in Hecate Strait are Juan Perez Sound, in the Southern Queen Charlotte Islands and the vicinity of Browning Entrance on the mainland side of Hecate Strait. Echo integration biomass estimates of midwater herring totalled 15,235 tonnes in the Browning Entrance area and 32,575 tonnes in Juan Perez Sound. The effects of bottom echo interference during the day and a limited echo integration range near the surface at night were mitigated during this survey by sounding during a 6-8 hour period at dusk and dawn. Six repeated soundings in Juan Perez Sound gave a measure of the variability of the hydroacoustic biomass estimates over 3 successive evenings. The biomass estimates determined during this survey are similar to those determined by other stock assessment methods.

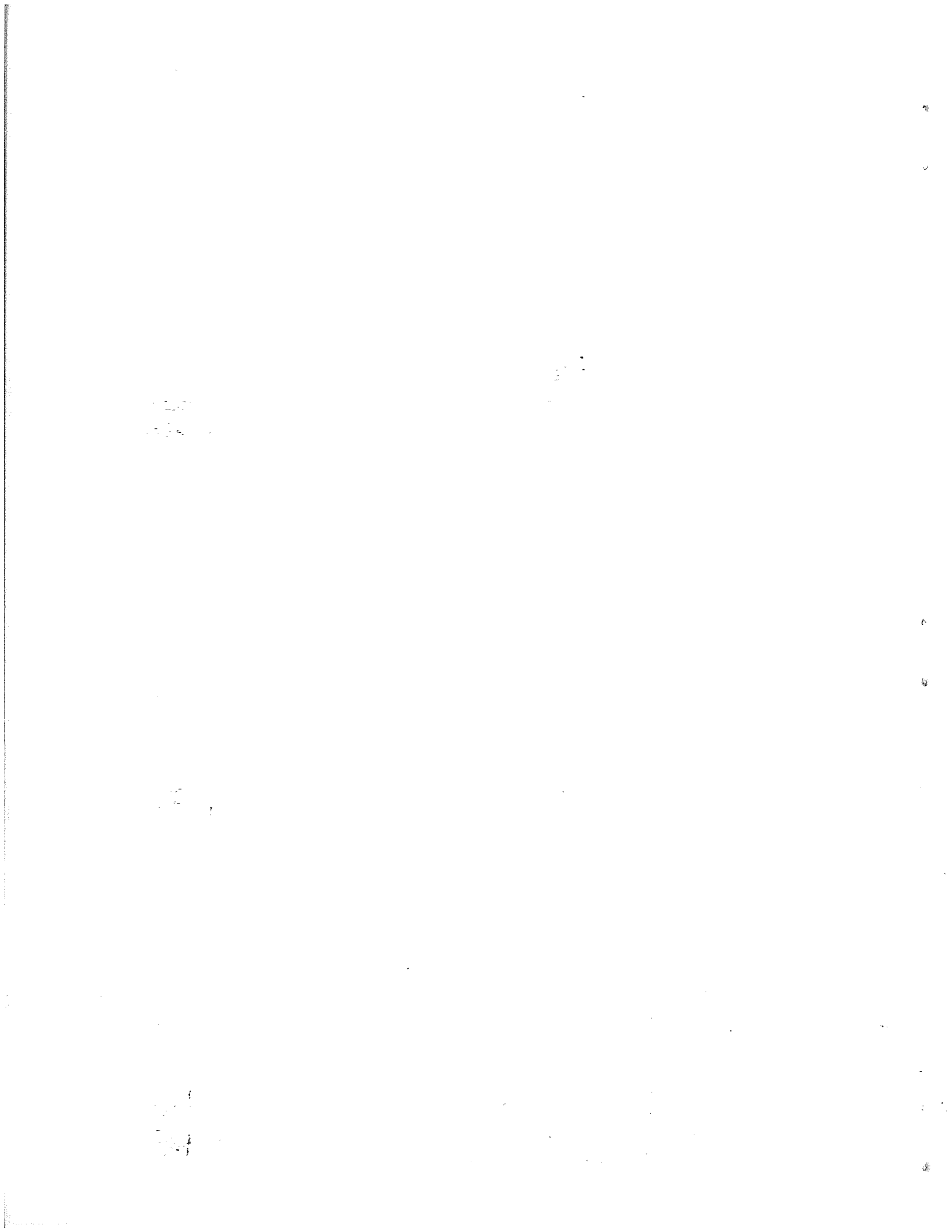
Key words: Pacific herring, Hecate Strait, hydroacoustic, biomass estimate, survey

RÉSUMÉ

McCarter, P. B., P. Withler, D. E. Hay, and R. Kieser. 1991. Hydroacoustic herring survey results from Hecate Strait, December 3-15, 1990. W. E. RICKER cruise 90HER2. Can. Manusc. Rep. Fish. Aquat. Sci. 2108: 69 p.

Il y a deux importantes zones d'hivernage pour le hareng du Pacifique dans le détroit d'Hecate, l'une est le détroit de Juan Perez, dans les îles de la Reine-Charlotte sud, et l'autre se trouve au voisinage de l'entrée Browning du côté de la terre ferme du détroit d'Hecate. Les estimations de la biomasse de hareng semi-pélagique à l'aide de l'écho-intégrateur totalisaient 15 235 tonnes dans l'entrée Browning et 32 575 tonnes dans le détroit de Juan Perez. Les effets de l'interférence de l'écho de fond pendant le jour et de l'intervalle restreint de l'écho-intégrateur près de la surface durant la nuit, ont été atténués pendant cette étude grâce à des sondages pendant une période de 6-8 heures à l'aube et au crépuscule. Six sondages répétés dans le détroit de Juan Perez ont permis de mesurer la variabilité des estimations hydroacoustiques de la biomasse pendant 3 soirs successifs. Les estimations de la biomasse pendant cette étude sont semblables à celles obtenues par d'autres méthodes d'évaluation des stocks.

Mots clés: hareng du Pacifique, détroit d'Hecate, hydroacoustique, estimation de la biomasse, étude



INTRODUCTION

The objective of this survey was to examine the feasibility of obtaining hydroacoustic estimates of Pacific herring (Clupea harengus pallasi). Midwater trawl tows were conducted to obtain herring samples and to confirm species composition of major aggregations determined by echogram interpretation. Survey grid patterns were based on the experience gained from previous winter acoustic and fishing surveys in 1984 (Kieser et al. 1987), 1985 (McCarter et al. 1987), 1987 (McCarter et al. 1988) and 1988 (McCarter et al. 1989). This survey contributes to the Hecate Strait Project in which the overall objective is to map fish assemblages and develop an ecological basis for mixed-species assessment and management techniques. The survey was conducted by the W. E. RICKER and a schedule is given in Appendix Table 1.

The hydroacoustic biomass estimates determined during the survey are derived statistically rather than empirically and are compared with other statistical stock estimates which are based on spawn surveys and analyses of catch and age structure (Haist and Schweigert, 1991). The hydroacoustic estimate is independent from these other methods and represents the best available hydroacoustic estimate in view of the dynamic behaviour of herring and the time and resources available.

METHODS

HYDROACOUSTIC EQUIPMENT

The hydroacoustic equipment installed on the W. E. RICKER was configured for echo integration. Its major components were a Biosonics model 101 (1985) echo sounder, Biosonics model 121 (1979) echo integrator and a Biosonics model 111 (1985) chart recorder. The measured echo intensity data were processed on an IBM PC compatible microcomputer and analog data were recorded on VHS video cassette tapes. An 8 by 13 degree, Simrad (#4318) 38 kHz ceramic transducer was mounted in a torpedo-shaped body which was towed behind the vessel to minimize interference. The echo sounder, transducer and cable were calibrated at the hydroacoustic barge of the University of Washington, Seattle, August 1990. A fish target strength of -32 dB/kg was used to convert the measured backscattering strength to fish density estimates. Biomass estimates were obtained by extrapolating the measured surface density over the area of interest.

SURVEY AREA

Parallel transects 3-10 nm in length were spaced 1.0 nm apart in Browning Entrance and 0.5 nm apart in Juan Perez Sound. Transect grids were

completed in a 6-8 hour period primarily at dusk and dawn when most herring were in midwater schools. This was especially important in the deeper waters of Juan Perez Sound where fish are difficult to distinguish from bottom during the day and much of the biomass is shallower than the towed body at night. Separate transect grids were completed on four major fishing grounds in the Browning Entrance area. Figure 1 shows the locations of the transect grids on the Freeman's ground, Whiterocks ground, Bonilla ground and inshore Browning Entrance ground. The Freeman's transect grid was surveyed twice. One survey was done during full daylight and the other at dusk. Figure 2 shows the locations of the Juan Perez area grids. One transect grid was done at dawn and dusk over 3 successive evenings in Juan Perez Sound and another grid was done once at the sound's entrance.

The transducer was towed at a depth of 10-15 meters while the ship's speed was maintained at 8-10 knots. The echo integration range or depth strata selected in the Browning Entrance area included the entire water column starting 5 m below the transducer to 4 m from the sea floor. In the deeper waters of Juan Perez Sound the integration range was set starting 5 m below the transducer to a maximum depth of 140 m from the transducer or to 10 m from the sea floor over shoals. These depth strata were chosen to maintain bottom tracking over irregular bottom, to minimize bottom echo integration, to avoid transducer near field effects and to avoid inclusion of other fish species in the herring biomass estimate.

FISHING AND SAMPLING

Fishing equipment on the W. E. RICKER included a Canadian Diamond 5 midwater trawl with 40 fathom sweepnet lines and 3 m² Suberkrub otter boards. Catches were brought aboard and species weights estimated. Herring samples were placed in buckets and frozen. Species catch compositions were interpreted and applied to hydroacoustic biomass estimates after echograms were closely examined. Scales for age determinations were later removed from 100 herring in each sample. Herring standard length measurements were recorded to the nearest millimetre, fish weights and gonad weights to the nearest gram and sex and maturity determined whenever possible.

HYDROACOUSTIC DATA PROCESSING

Average echo intensity values measured by the echo integrator over one minute intervals (sequences) and by selected depth strata were logged by a microcomputer. An event file was logged concurrently on another microcomputer by entering the event number, time, position, sequence number and analog tape number at the start and end of each transect. A set of BASIC programs were used to perform calculations for biomass estimation and to produce biomass distribution plots. The calculated parameters included transect bearing, transect length (km), average speed (kn), area covered (km²), biomass centroid

depth (m), volume density (kg/m^3), surface density (kg/m^2) and cumulative biomass (t). Further detail regarding the analysis and programs are given by Kieser et al. (1987). Parameters used for this survey are listed at the beginning of Appendix Table 2. Fish distributions are plotted as vertical uprights along each transect. The vertical uprights are plotted at one minute intervals using a logarithmic scale of 0.01 to $1.0 \text{ kg}/\text{m}^2$.

RESULTS AND DISCUSSION

BIOMASS ESTIMATES AND DISTRIBUTION PLOTS

Table 1 contains a summary of all biomass estimates. Browning Entrance transect grids comprised a total area of 627 km^2 . Mean biomass estimates were 4,585 tonnes on the Freeman's grid (Figs. 3-4), 7,560 tonnes on the Whiterocks grid (Fig. 5), 1,170 tonnes on the Bonilla grid (Fig. 6) and 1,920 tonnes on the inshore Browning Entrance grid (Fig. 7). Juan Perez Sound transect grids comprised a total area of 164 km^2 . Mean biomass estimate were 32,575 tonnes inside the sound (Figs. 8-13) and 316 tonnes at the entrance (Fig. 14). A summary of the biomass data by transect and grid pattern is given in Appendix Table 2.

REPETITIVE HYDROACOUSTIC SURVEYS

During daylight coverage of the Freeman's ground, herring schools appeared as numerous, dense, near-bottom aggregations 60-80 m from the transducer. At dusk they appeared as light skimmers between 40 and 60 metres. Total biomass was estimated at 4,730 t during daylight and 4,440 t at dusk over the same transect grid.

In Juan Perez Sound, repeated coverage at dawn and dusk over 3 successive evenings showed a change in the distribution of herring from a dispersed school configuration throughout the entire sound to a concentration at the head of the sound and into Sedgwick Bay and Darwin Sound (Figs. 8-13). Previous hydroacoustic surveys have shown significant differences in distribution and total biomass between night and day. This survey shows significant distribution changes over three successive evenings and relatively small changes in total biomass. Biomass estimates were 24,100 t (dawn 1), 18,100 t (dusk 1), 27,100 t (dawn 2), 32,000 t (dusk 2), 40,800 t (dusk 3) and 30,400 t (dawn 3). The mean biomass in the area ($32,575 \pm 5,851 \text{ t SD}$) does not include the first dawn and dusk biomass estimates as technical difficulties with the echo integration system resulted in incomplete coverage. The depth distribution of herring schools at the time of integration was relatively consistent with ninety percent or more of the biomass integrated

between 5 and 40 m from the transducer during the second and third dawn and dusk surveys.

TRAWL FISHING

Midwater trawl fishing was conducted on major acoustic targets located on the Whiterock ground, in Juan Perez Sound and in Sedgwick Bay. A two hour Whiterocks tow yielded an estimated 100 kg of large herring and a few small blackcod. A 40 minute tow in Juan Perez Sound, SW of Ramsay Island yielded approximately 1300 kg of juvenile dogfish and a 20 minute tow at the head of Sedgwick Bay yielded an estimated 6000 kg of large herring and a few adult dogfish. Table 2 documents fishing locations and catches.

TEMPERATURE, SALINITY AND PLANKTON DATA

Five 'Cooperative Plankton Research' (COPRA) CTD/plankton stations were completed using the Guildline system and a 0.25 m² bongo equipped with 350 um black Nitex nets. A General Oceanic flowmeter with a low speed rotor was used to measure the volume of seawater filtered. Six additional CTD casts were conducted at 5 nm intervals along a East-West transect extending seaward of Juan Perez Sound. Depth of casts ranged from 65 m to 355 m. Table 3 summarizes the CTD data collected during the survey.

COMPARISON OF HYDROACOUSTIC ESTIMATES WITH OTHER BIOMASS ESTIMATES

The predicted stock biomass from age-structured and escapement models respectively, were 25,600 t and 20,900 t in the Queen Charlotte Islands District (assuming average recruitment) by Haist and Schweigert, 1991. A 50:50 weighting of the models produced a 23,200 t forecast. This compares with a hydroacoustic survey estimate of 32,575 t in Juan Perez Sound.

In the Prince Rupert District, the predicted stock biomass from age-structured and escapement models respectively, were 60,700 t and 19,400 t. For several reasons, the age-structured model estimate was not used in 1990/91 (Haist and Schweigert, 1991). The hydroacoustic survey estimate was 15,235 t in the Browning Entrance area.

CONCLUSIONS

Overwintering Hecate Strait herring were concentrated in the same areas as previous winter surveys in 1984 (Kieser et al. 1987), 1985 (McCarter et al. 1987), 1987 (McCarter et al. 1988) and 1988 (McCarter et al. 1989). Biomass estimates were also in reasonable agreement with previous survey results and those of other stock assessment methods. In the Prince Rupert District it appears that stock size is continuing to decrease since the 1985-86 season, although the decrease could be attributable to incomplete hydroacoustic coverage in the Browning Entrance area. In the Queen Charlotte Island area it appears that stock size is continuing to increase since the 1985-86 season. Other stock assessment methods based on spawn surveys and analyses of catch and age structure (Haist and Schweigert, 1991) support this view. Hydroacoustic surveys using the integration technique have significant potential, however, more effort must be expended to ensure complete and consistent coverage of overwintering herring schools. Depth coverage limitations of the present echo integration system call for a survey design, precisely coordinated to coincide with the diurnal migration patterns of herring at each location and time. This survey provided an opportunity to assess the variability of estimates under such a survey design.

ACKNOWLEDGEMENTS

We thank Captain D. Parfitt and crew of the W. E. RICKER for their generous cooperation and assistance. Students, Melanie Clarke and Keri Ann Snodgrass assisted in monitoring acoustic instruments and recording data.

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Table 1. Summary of herring biomass estimates (t) by locality obtained during W. E. RICKER cruise, December 3-15, 1990.

Locality	Event Number	Transect Name	Survey Area (km ²)	Estimated Biomass (t)	Time (PST)	Date (D/M/Y)
Freeman's ground	3-22	F1-F8	165.7	4,440	14:11-22:13	05.12.90
Browning Entr. (inshore)	25-43	E6-E1	169.3	1,920	01:41-08:04	08.12.90
Freeman's ground	43-69	F1-F8	164.8	4,730	08:04-15:20	08.12.90
Whiterocks ground	70-87	W1-W8	138.8	7,560	15:43-21:44	08.12.90
Bonilla ground	89-114	B1-B9	153.2	1,170	22:04-04:45	08.12.90 09.12.90
Juan Perez Snd. (dawn 1)	116-143	J14-J1	72.6	24,100 ^a	00:59-07:31	10.12.90
Juan Perez Snd. (dusk 1)	145-166	J1-J14	87.7	18,100 ^b	14:09-19:59	10.12.90
Juan Perez Snd. (dawn 2)	170-190	J1-J14	89.0	27,100	02:45-09:00	11.12.90
Juan Perez Snd. (dusk 2)	192-212	J1-J14	89.0	32,000	13:58-20:16	11.12.90
Perez Entrance	214-234	P9-P1	74.5	316	02:06-07:52	12.12.90
Juan Perez Snd. (dusk 3)	236-257	J14-J1	89.4	40,800	13:42-19:32	12.12.90
Juan Perez Snd. (dawn 3)	262-285	J1-J14	89.2	30,400	01:46-07:54	13.12.90

^aminimum estimate due to several integration failures.

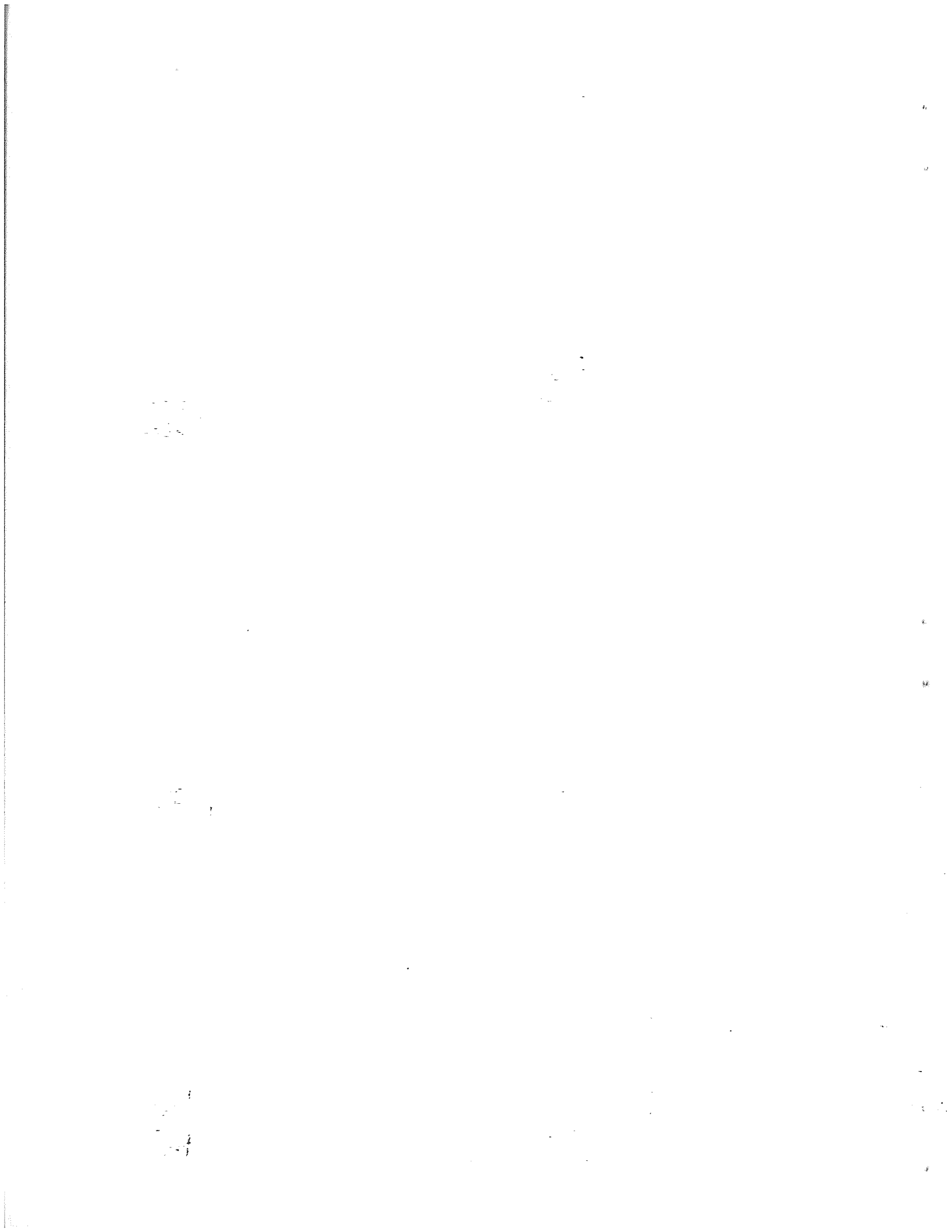
^bminimum estimate due to incorrectly set depth stata.

Table 2. Midwater trawling locations and species compositions of catches made by the W. E. RICKER, December 3-15, 1990.

Tow number	1	2	3
Date (Day/Mo.)	09/12	11/12	13/12
Time (P.S.T.)	09:55	10:35	13:15
Duration (min)	125	40	20
Location	Whiterocks	Juan Perez Snd.	Sedgwick Bay
<hr/>			
Start			
Latitude (o ')	53 43.1	52 32.8	52 39.1
Longitude (o ')	130 46.6	131 29.3	131 33.8
Finish			
Latitude (o ')	53 44.8	52 31.4	52 37.2
Longitude (o ')	130 50.3	131 26.5	131 32.5
Bottom depth (m)			
Start	115	200	100
Finish	109	-	150
Net depth (m)			
Start	95	100	110
Finish	100	120	120
Speed (kts)	3-4	3-4	3-4
Warp length (m)	250	300	300
Spiny dogfish (adult)	-	-	50
Spiny dogfish (juven)	-	1300	-
Pacific herring	100	-	6000
Sablefish	3	-	-
Total catch (kg)	103	1300	6050

Table 3. Summary of CTD data collected during W. E. RICKER cruise, December 3-15, 1990.

Station Name	Latitude (deg min)	Longitude (deg min)	Date (Y/M/D)	Time	Max Depth (m)	Surface Salin (o/oo)	Surface Temp (° C)	CTD Cast Number
F1	49 20.3	124 05.0	901203	1048	355	28.2	8.8	1
E1	51 0.2	127 50.5	901204	0919	97	31.3	9.1	2
H2	53 25.0	130 45.0	901209	1459	134	31.7	8.2	3
H1	52 30.0	130 40.0	901209	2135	65	32.1	9.0	4
ST0	52 32.2	131 28.8	901211	2117	196	31.3	7.6	5
ST1	52 32.0	131 20.7	901212	1304	256	31.9	7.9	6
ST2	52 31.5	131 12.1	901212	0835	124	32.3	8.1	7
ST3	52 31.2	131 03.7	901212	0921	165	32.0	8.2	8
ST4	52 30.9	130 55.8	901212	1004	65	32.1	8.2	9
ST5	52 30.3	130 48.1	901212	1051	85	32.2	8.3	10
F2	49 29.0	124 31.5	901215	1029	272	27.3	7.9	11



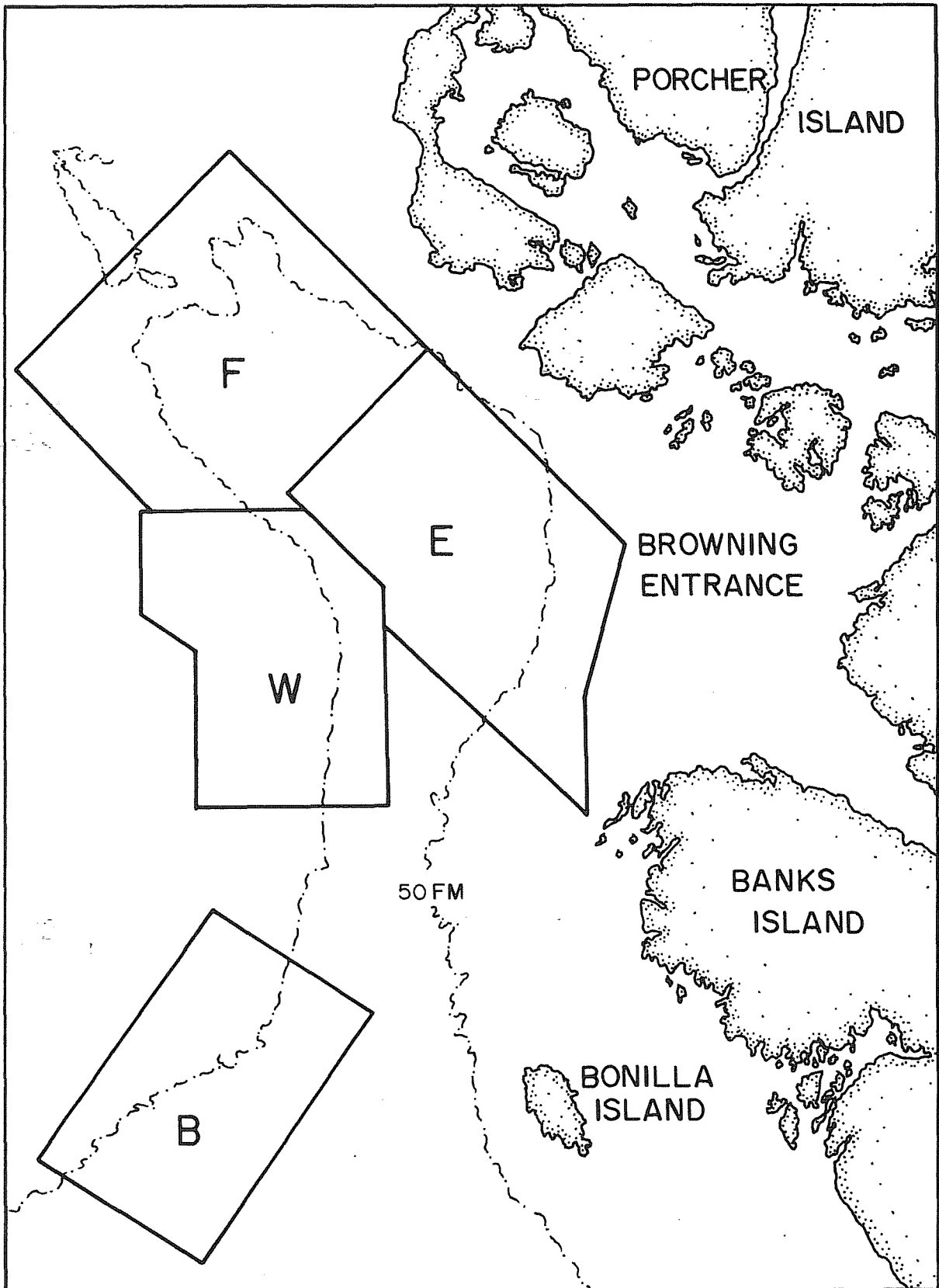
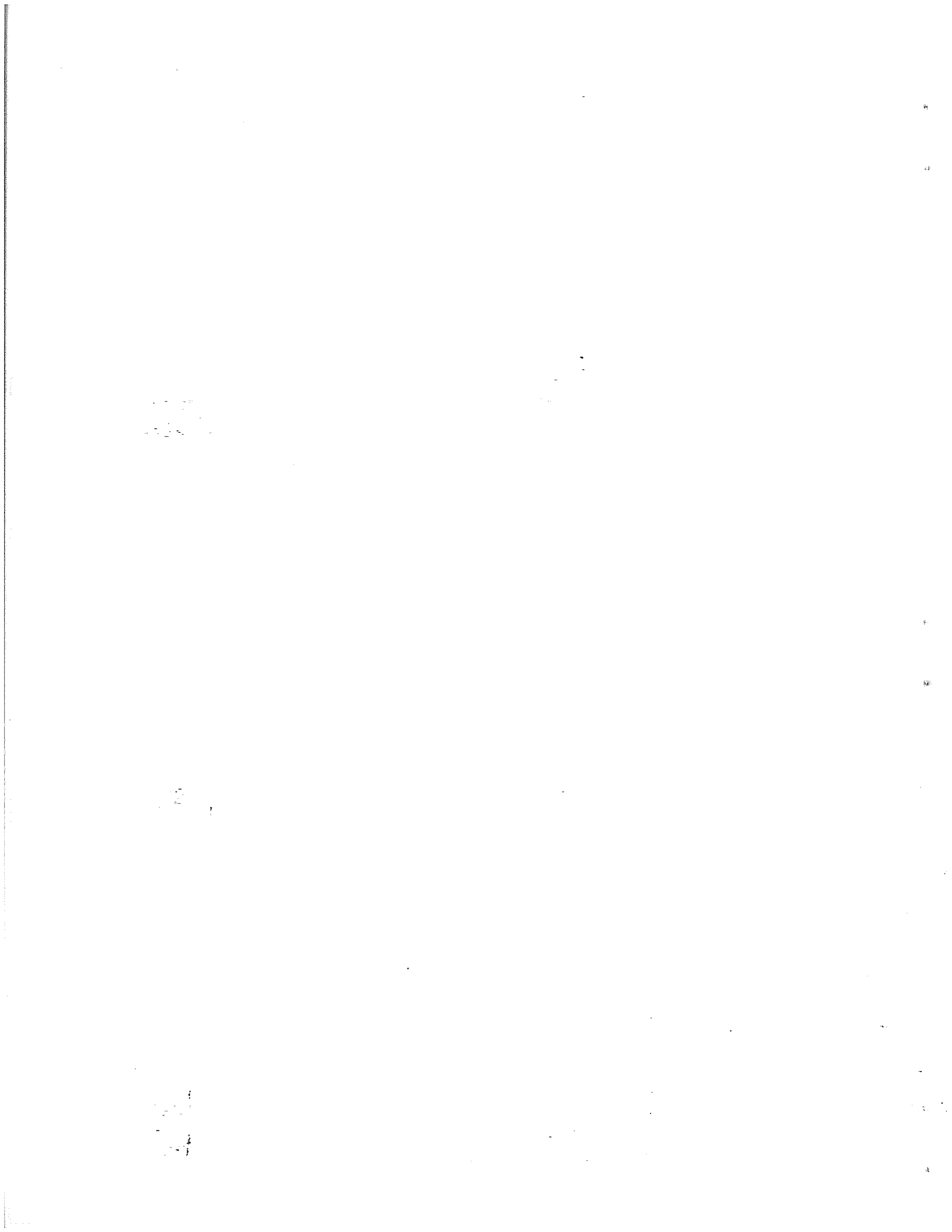


Fig. 1: Location of transect grids in Browning Entrance during W. E. RICKER cruise 90HER2, December 3-15, 1990 (F - Freeman's ground, W - Whiterocks ground, B - Bonilla ground, E - Browning Entrance, inshore).



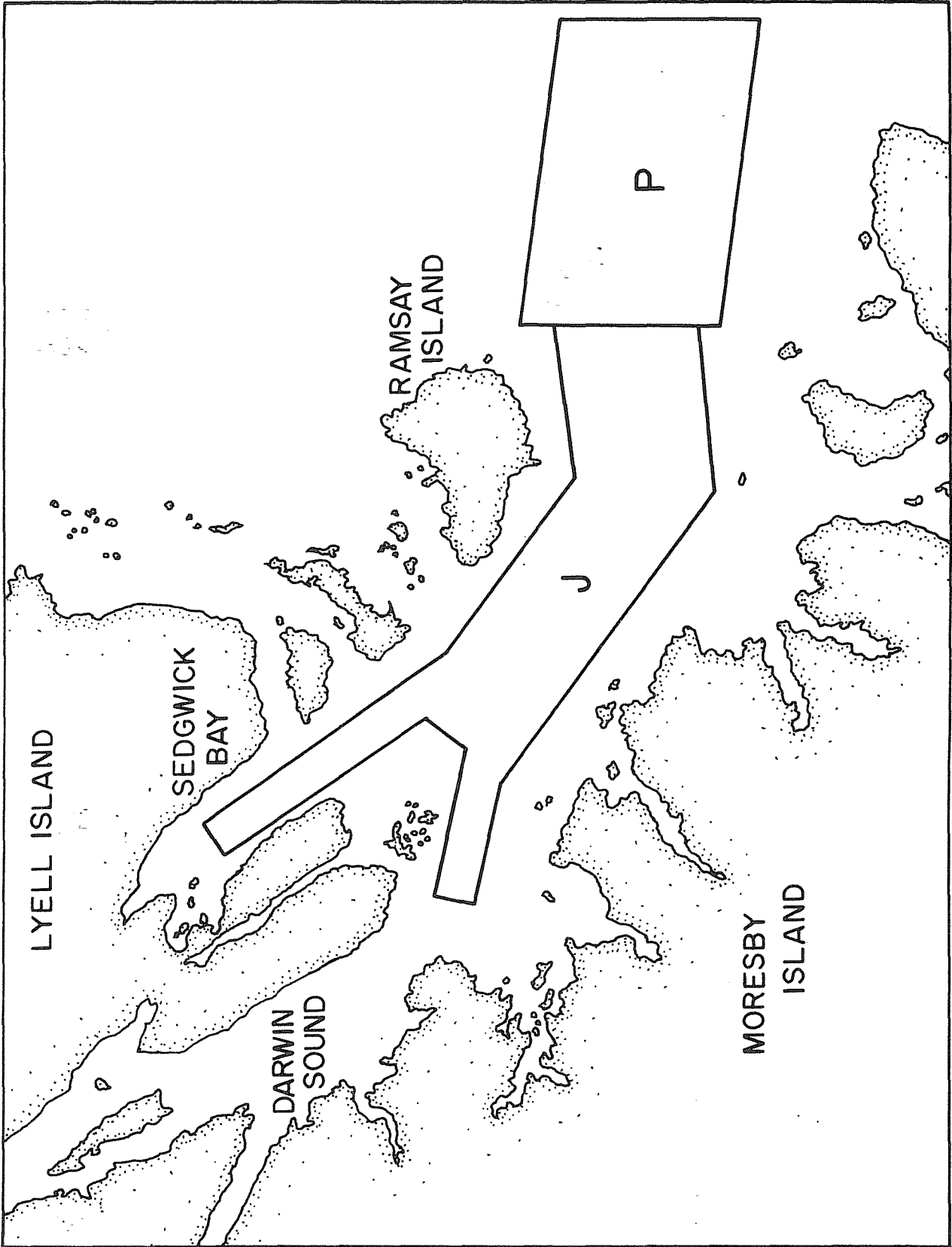
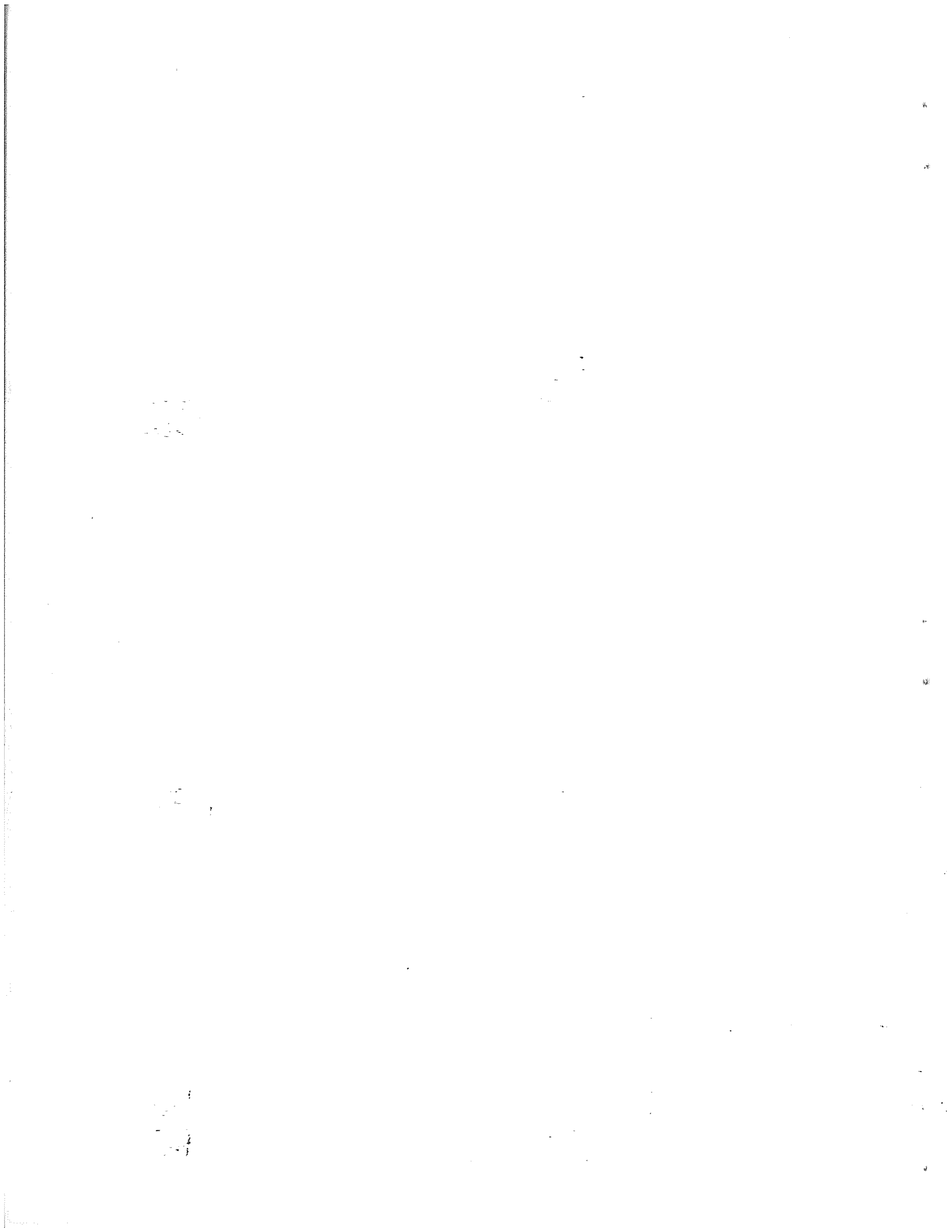


Fig. 2. Location of transect grids in Juan Perez Sound during W. E. RICKER cruise 90HER2, December 3-15, 1990 (J - Juan Perez grid, P - Juan Perez entrance grid).



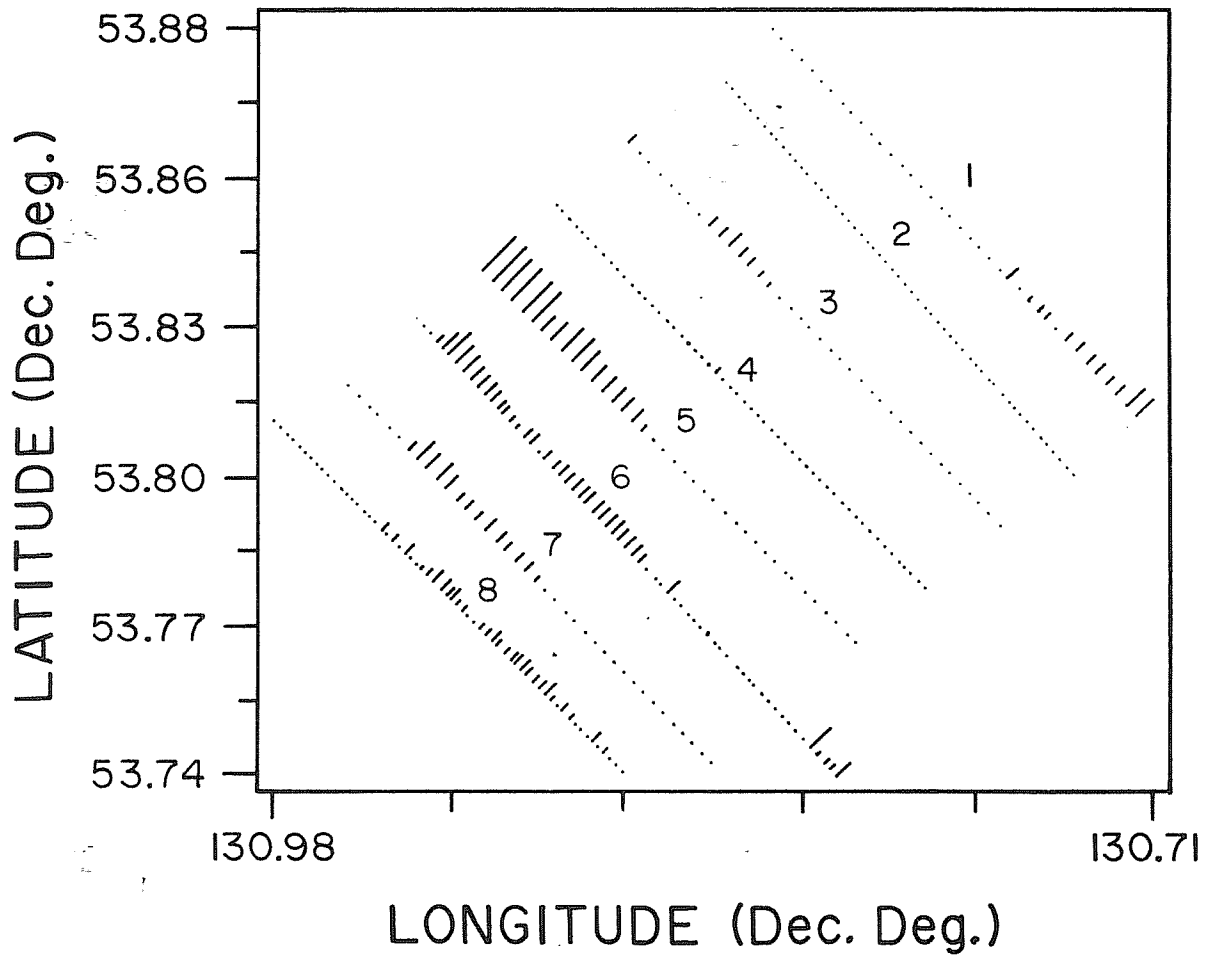
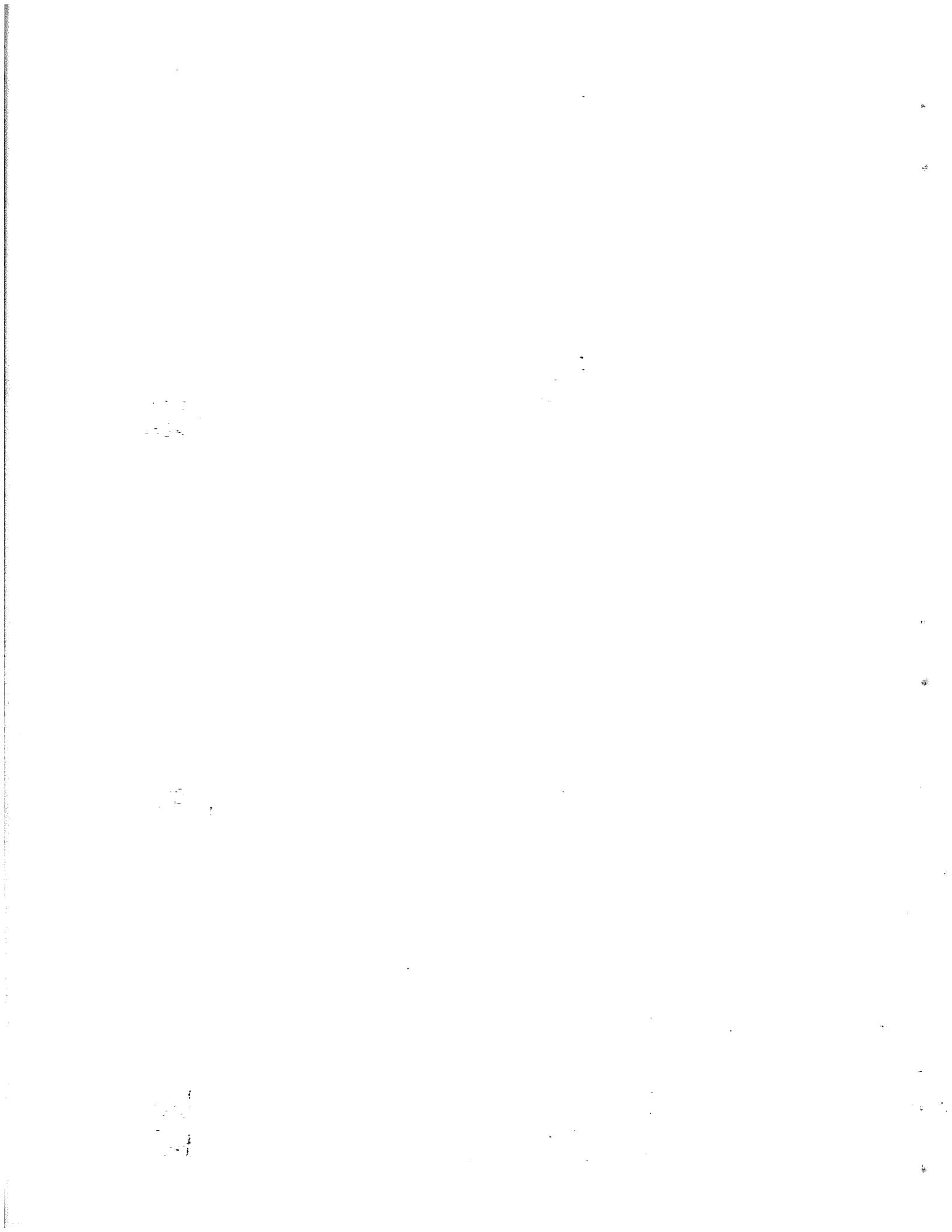


Fig. 3. Biomass density map of the Freeman's ground (dusk). Total biomass estimated at 4,440 t. Density bars along transects are marked at one minute intervals and use a logarithmic scale of 0.01 to 1.0 kg/m².



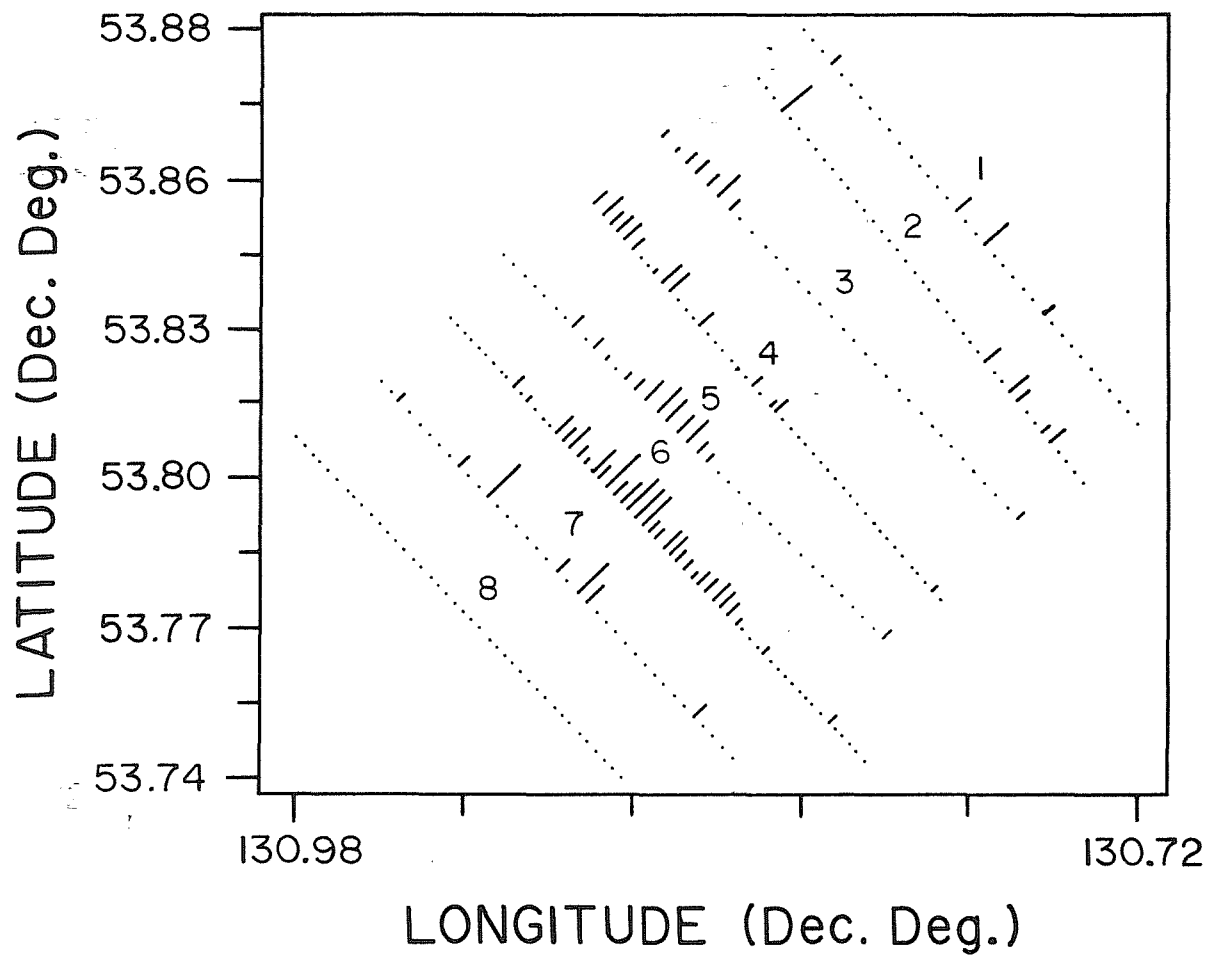
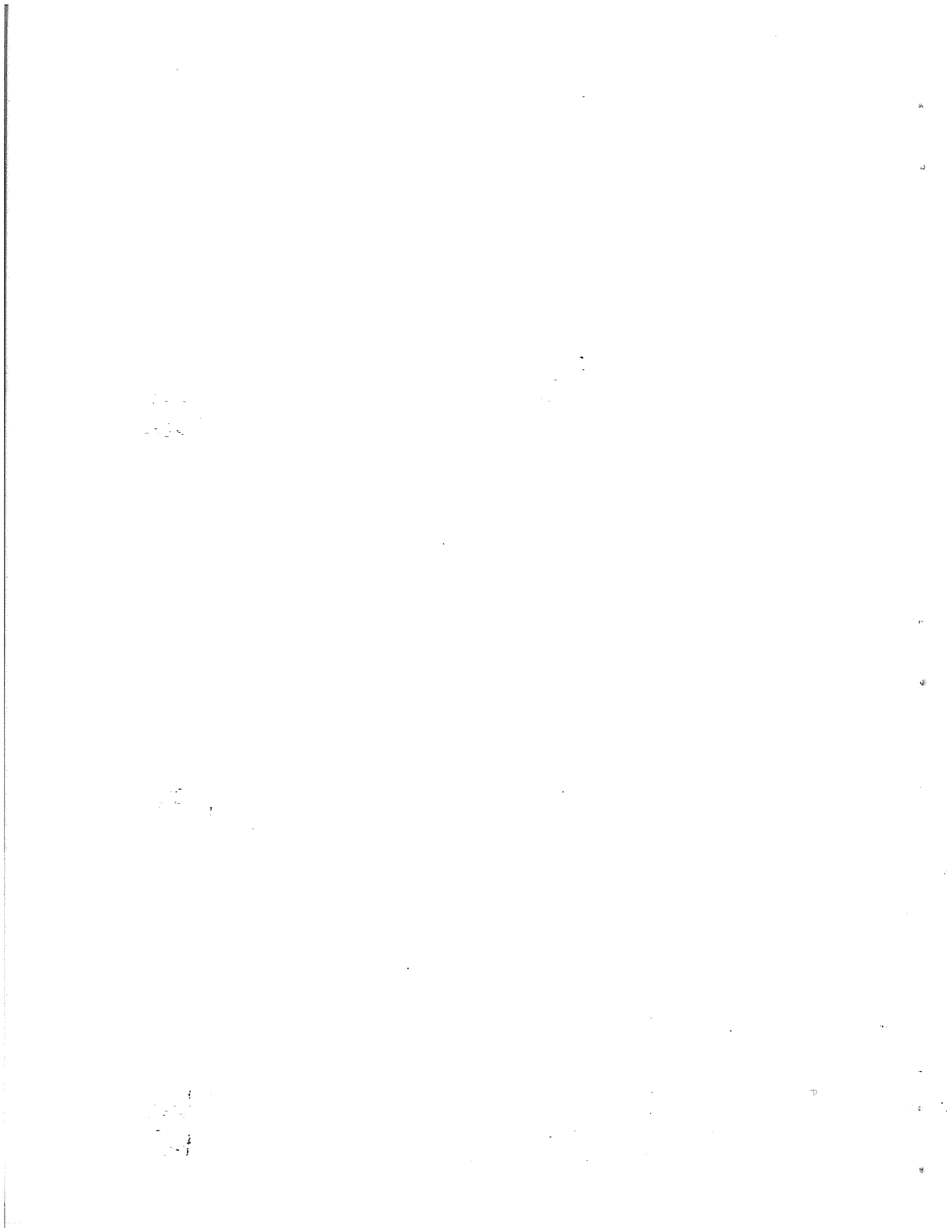


Fig. 4. Biomass density map of the Freeman's ground (day). Total biomass estimated at 4,730 t. Density bars are marked at one minute intervals and use a logarithmic scale of 0.01 to 1.0 kg/m².



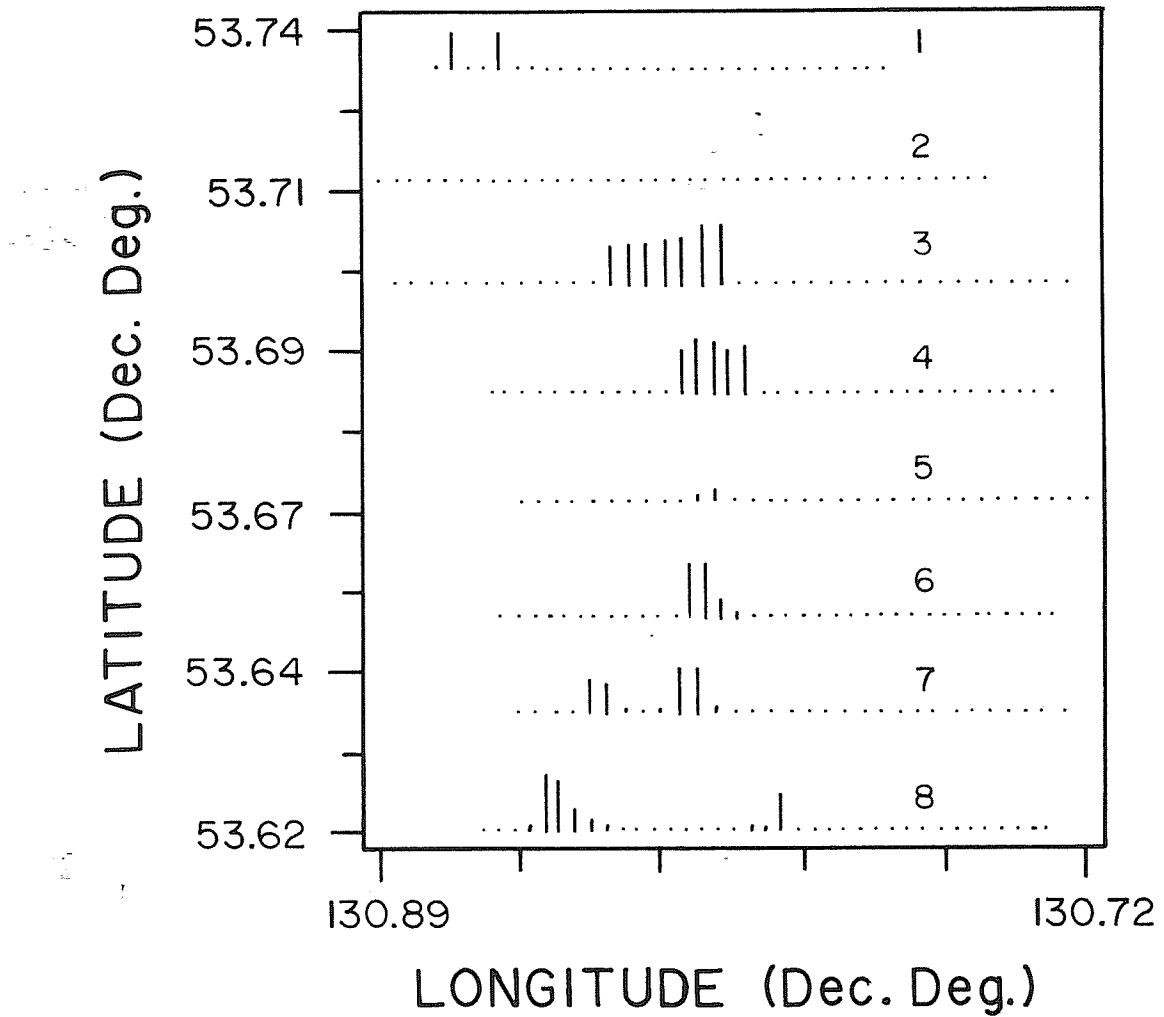
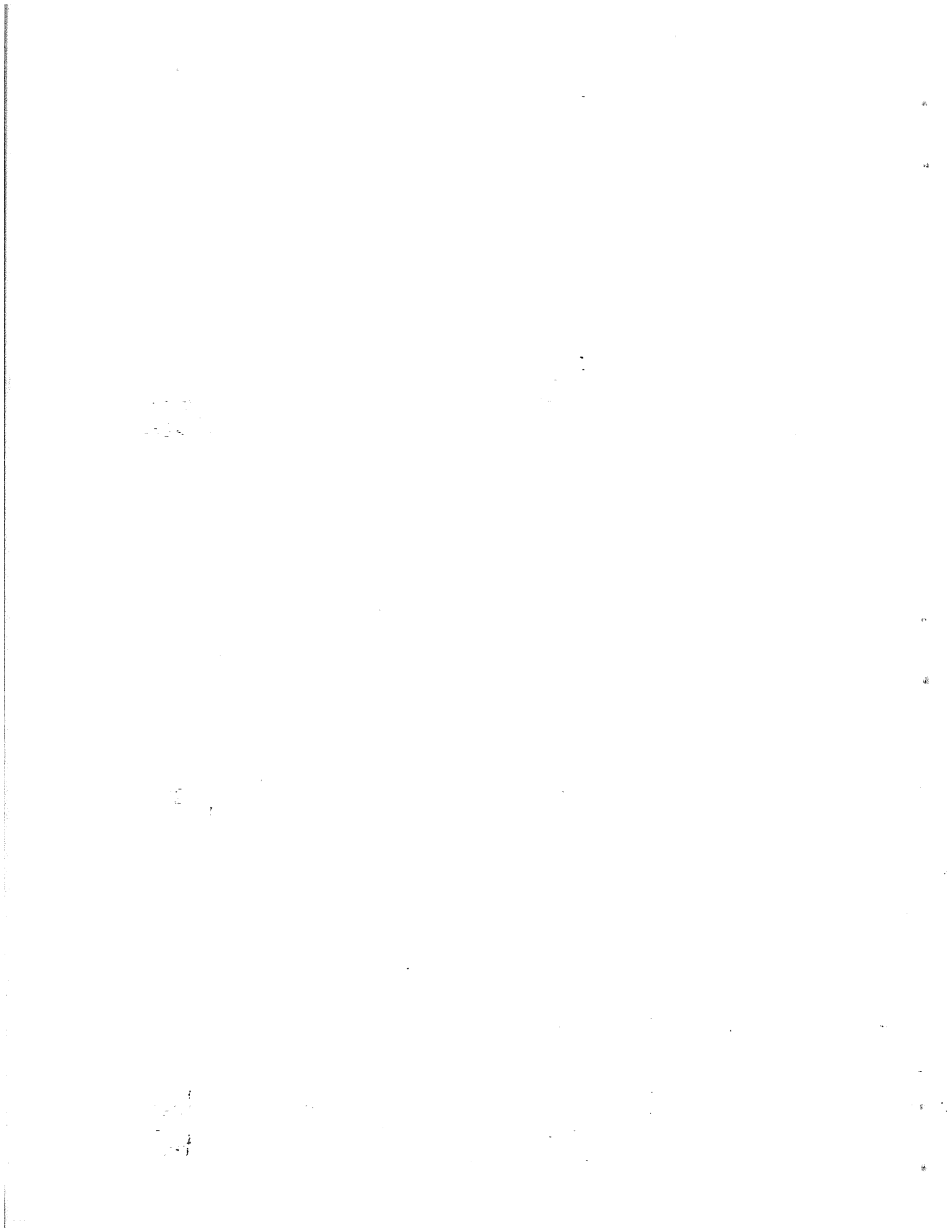


Fig. 5, Biomass density map of the Whiterocks ground (dusk). Total biomass estimated at 7,560 t. Density bars along transects are marked at one minute intervals and use a logarithmic scale of 0.01 to 1.0 kg/m².



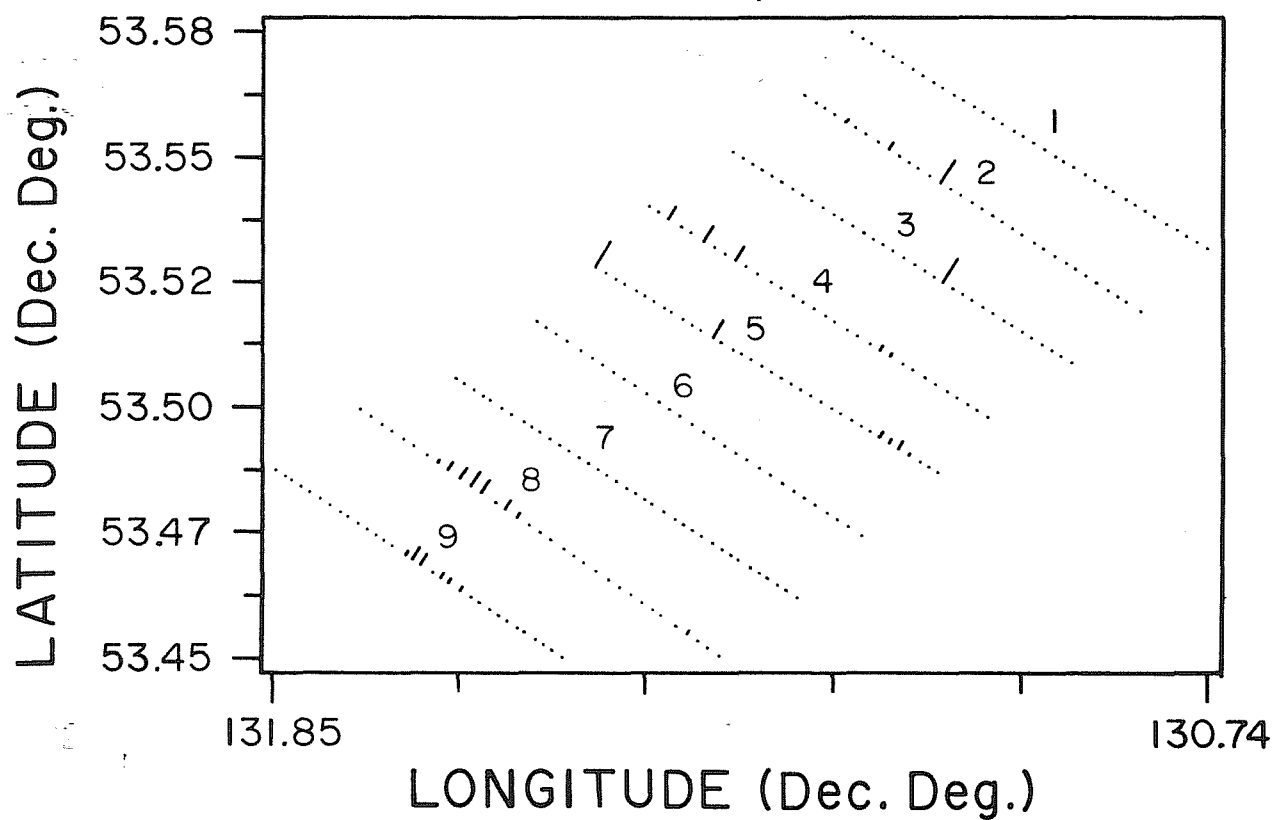
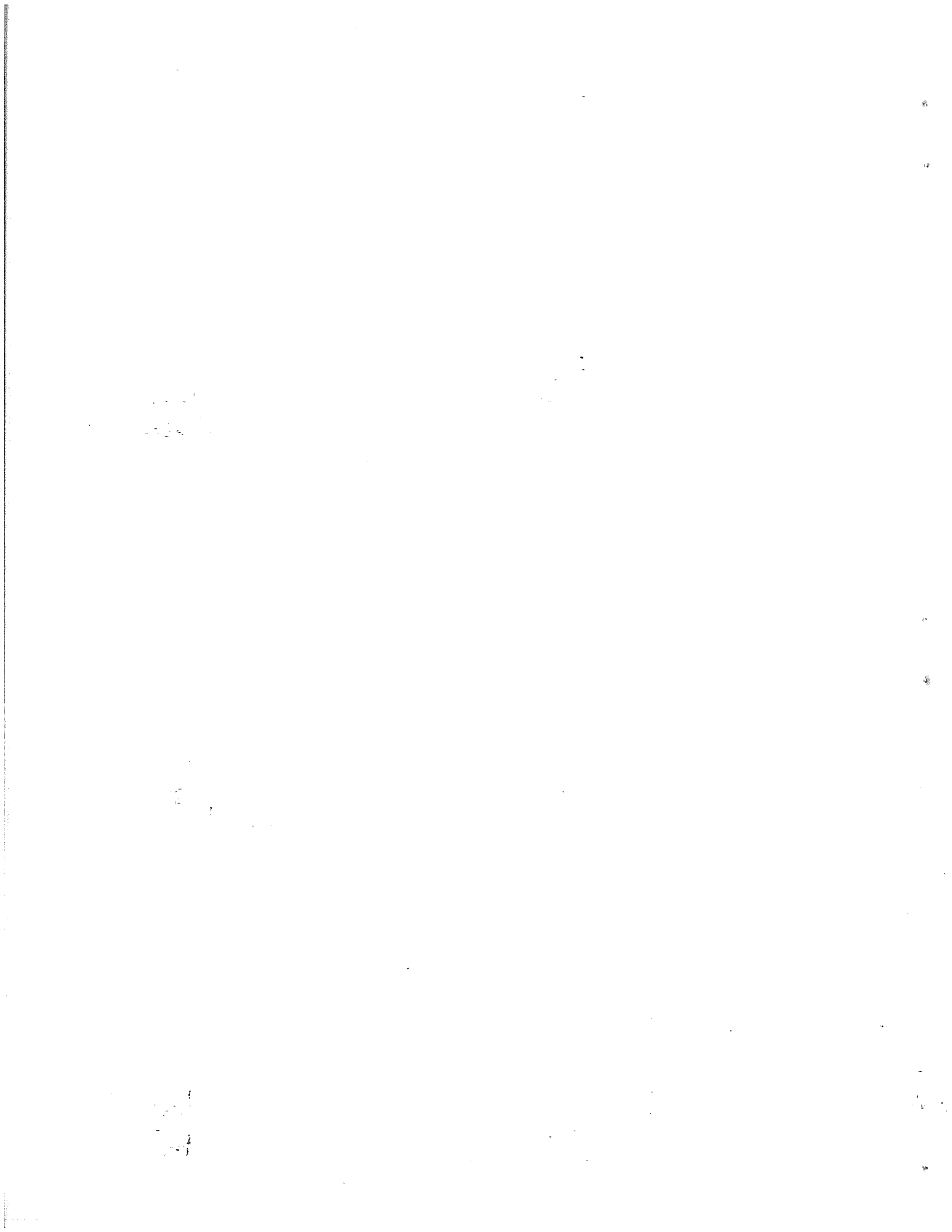


Fig. 6: Biomass density map of the Bonilla ground (dawn). Total biomass estimated at 1,170 t. Density bars along transects are marked at one minute intervals and use a logarithmic scale of 0.01 to 1.0 kg/m².



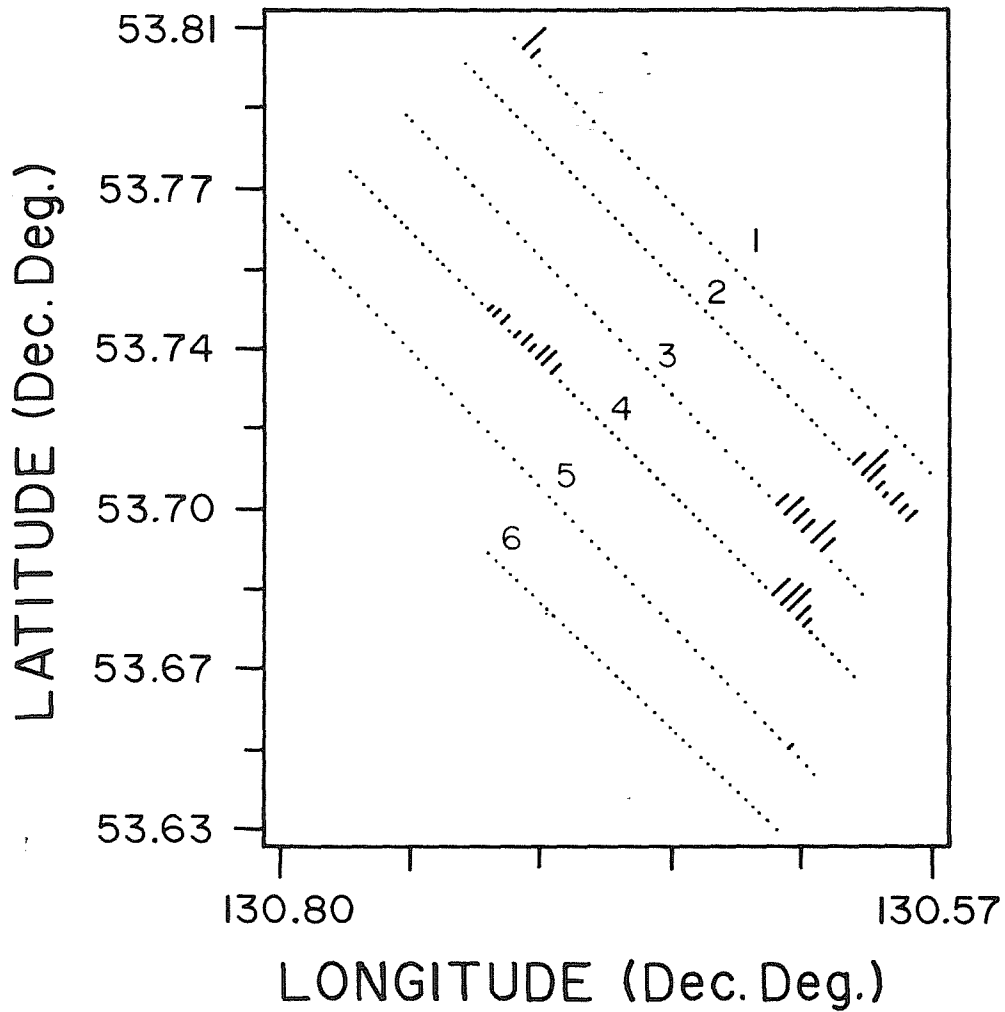
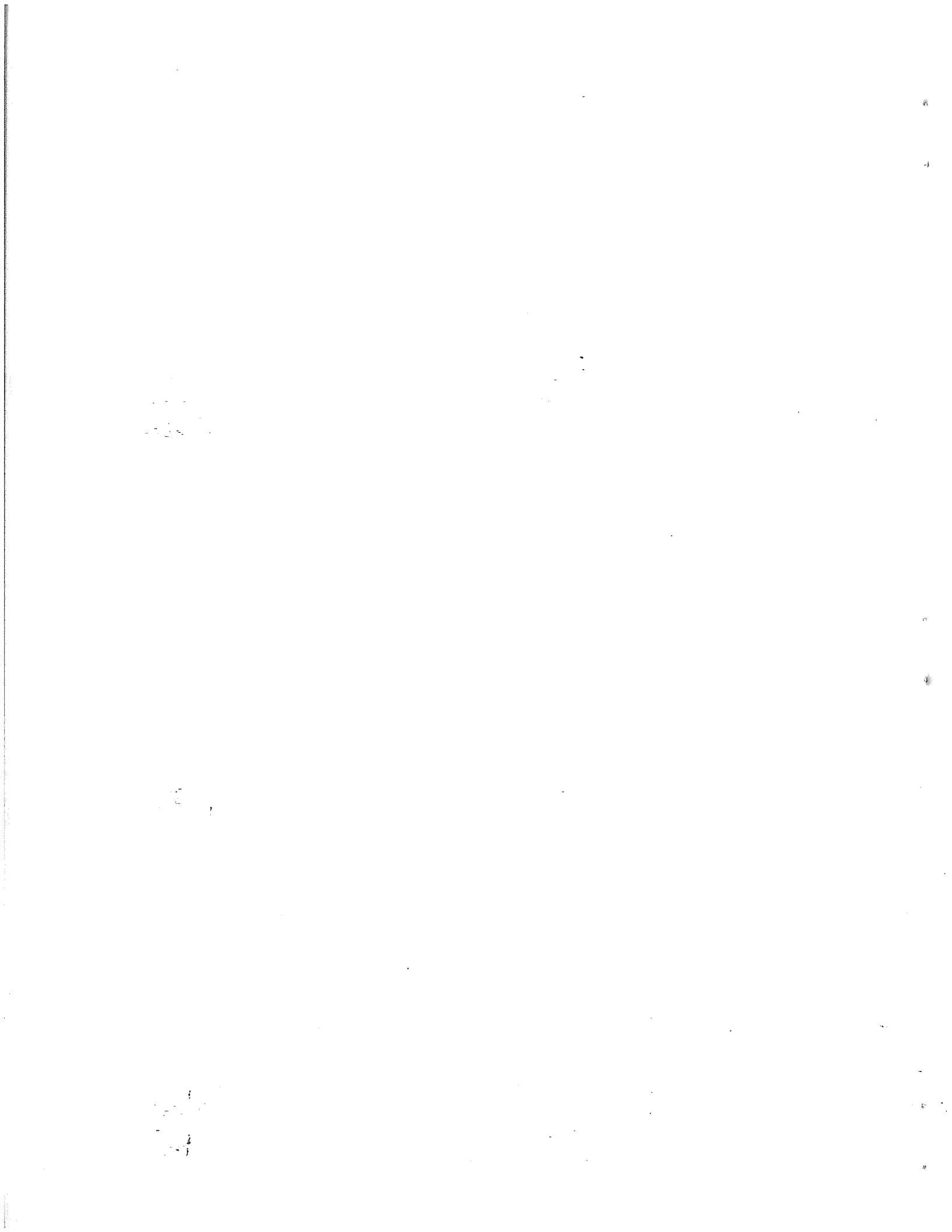


Fig. 7. Biomass density map of the Browning Entrance inshore ground (dawn). Total biomass estimated at 1,920 t. Density bars along transects are marked at one-minute intervals and use a logarithmic scale of 0.01 to 1.0 kg/m².



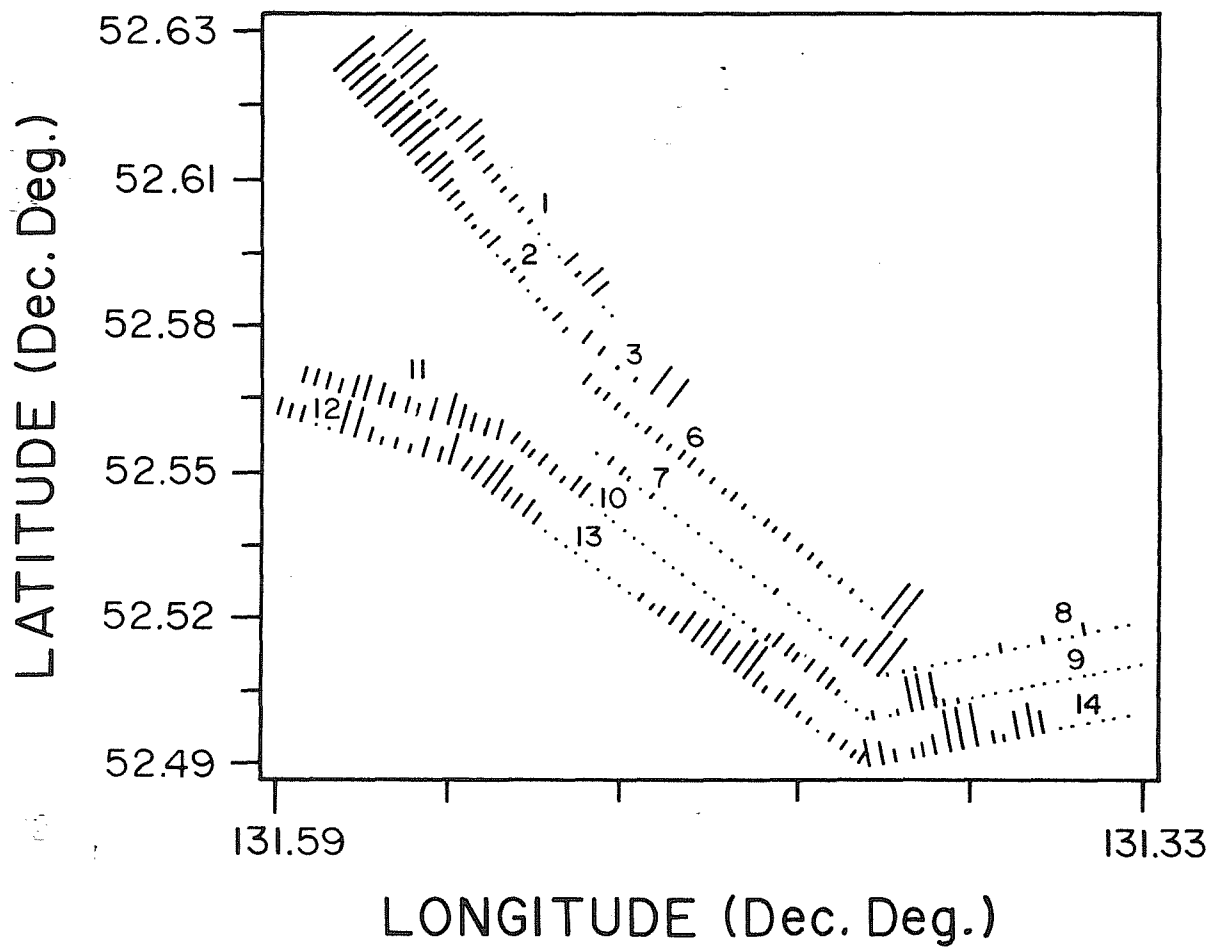
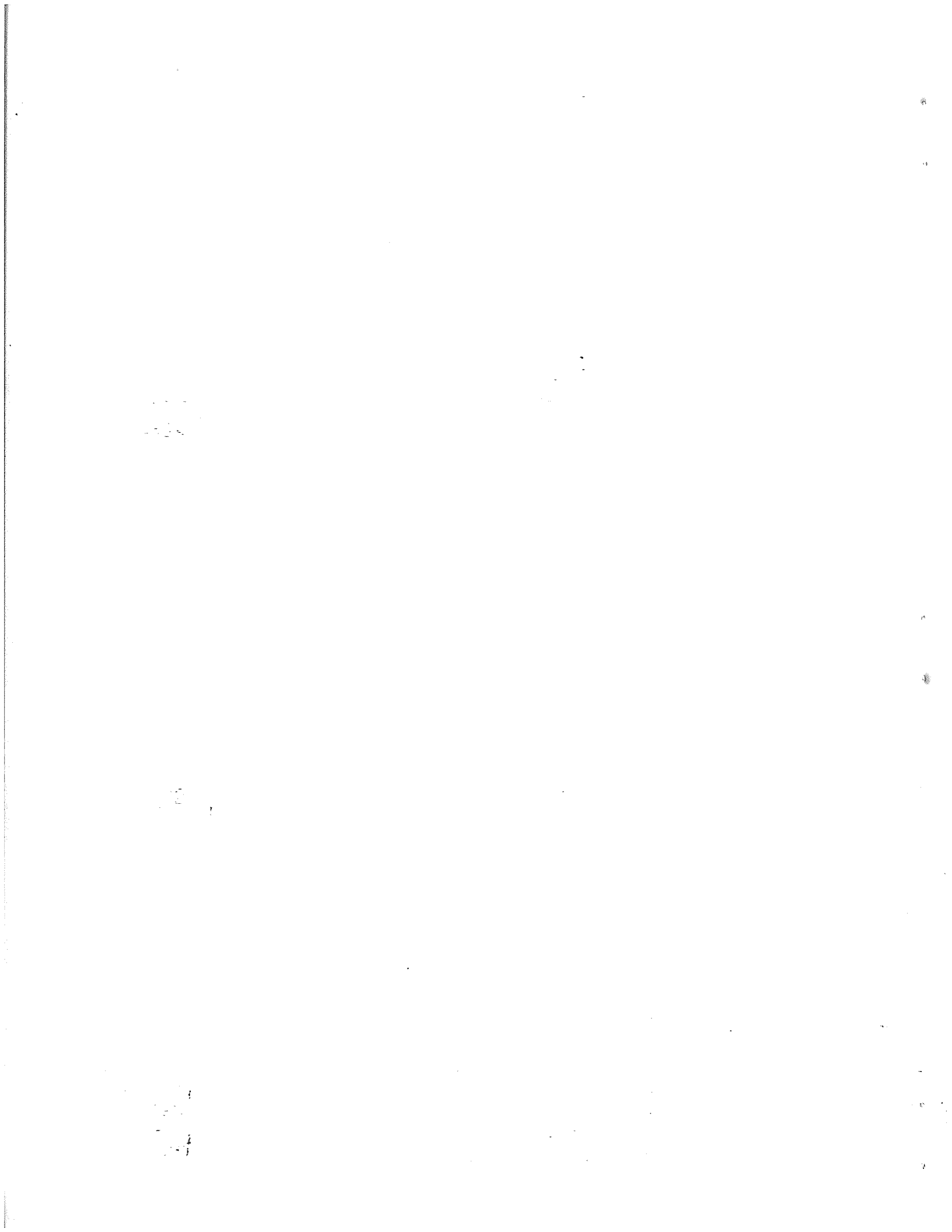


Fig. 8. Biomass density map of Juan Perez Sound (dawn 1). Total biomass estimated at 24,100 t. Density bars along transects are marked at one minute intervals and use a logarithmic scale of 0.01 to 1.0 kg/m². This is a minimum estimate due to several integration failures.



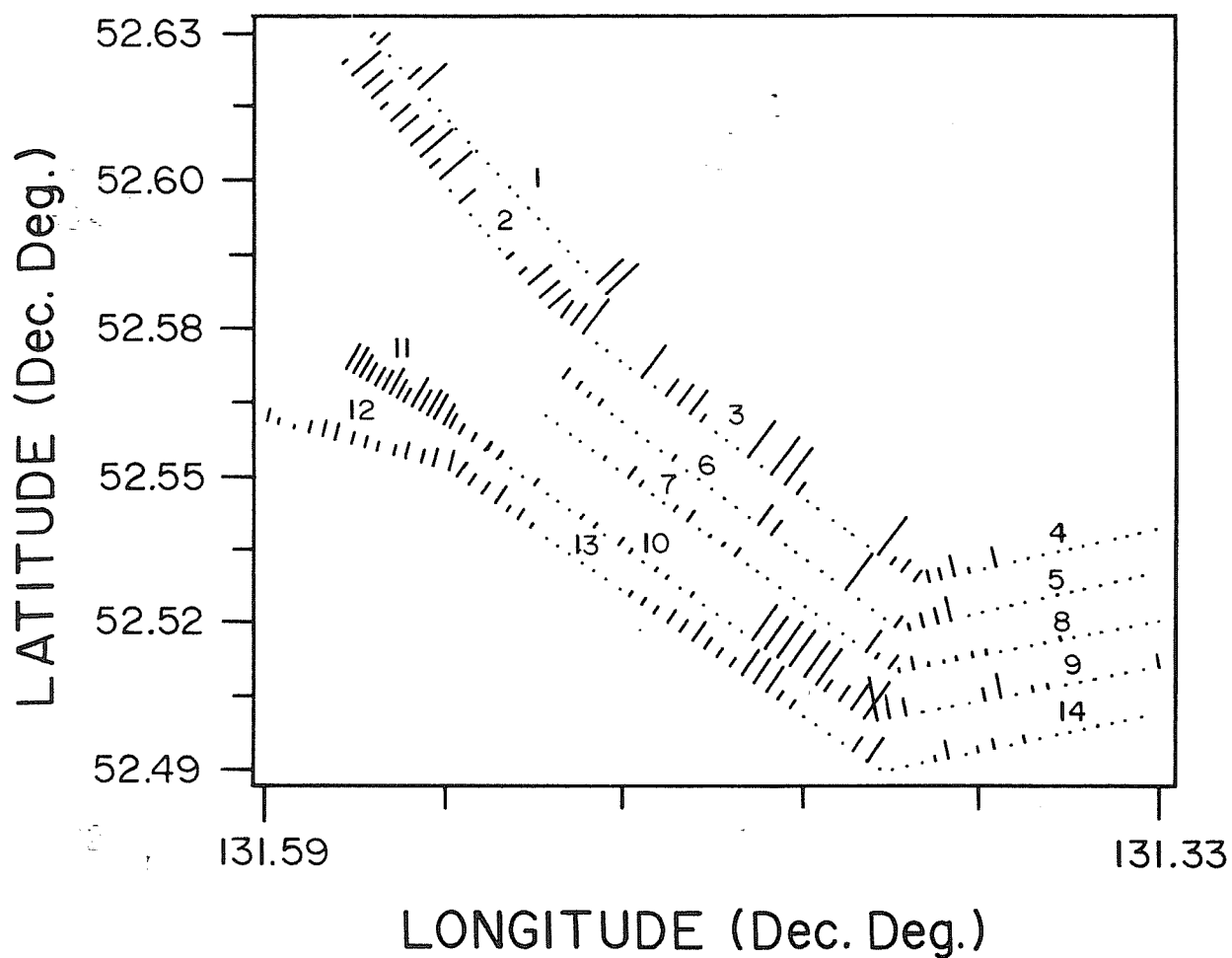
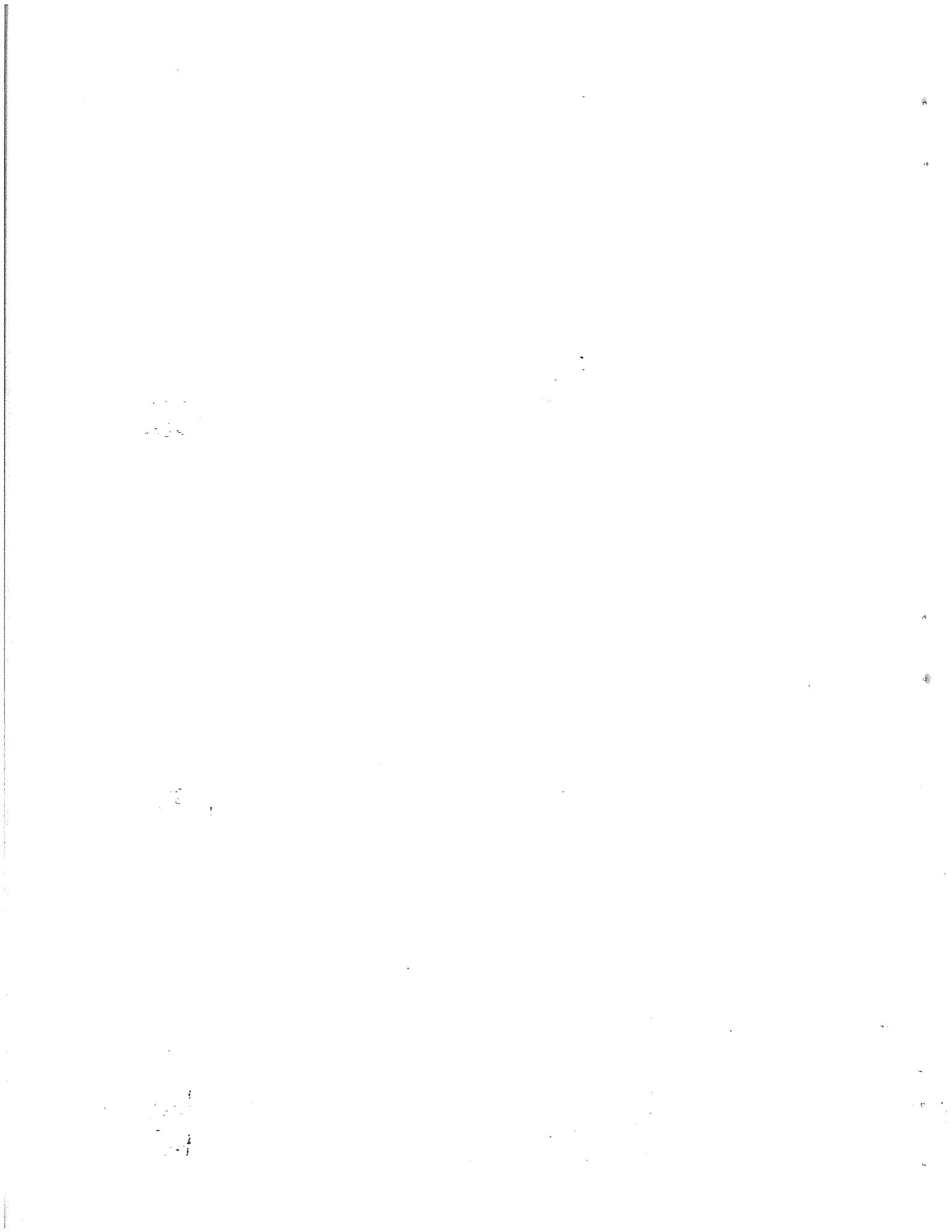


Fig. 9. Biomass density map of Juan Perez Sound (dusk 1). Total biomass estimated at 18,100 t. Density bars along transects are marked at one minute intervals and use a logarithmic scale of 0.01 to 1.0 kg/m². This is a minimum estimate due to incorrectly set integration ranges.



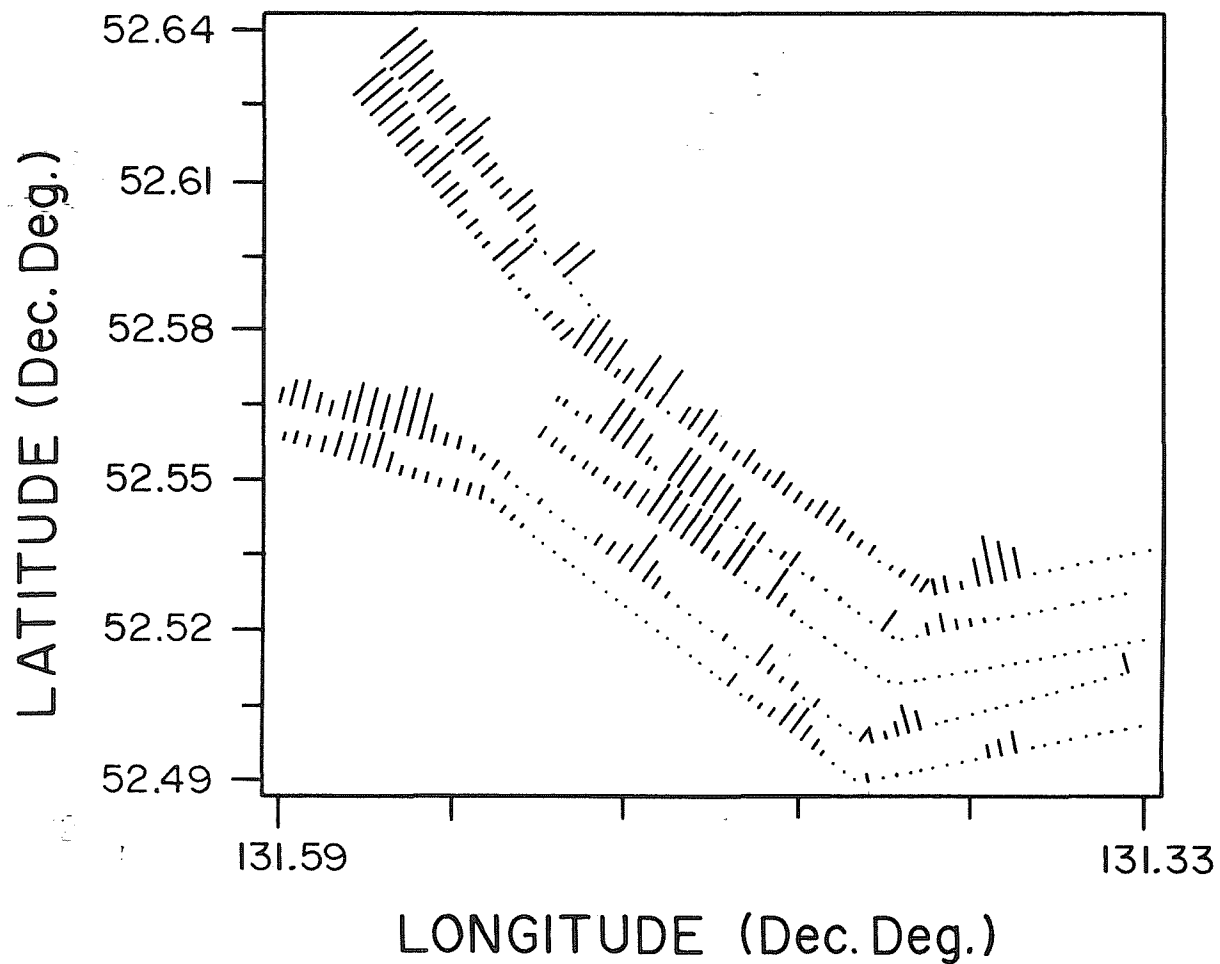
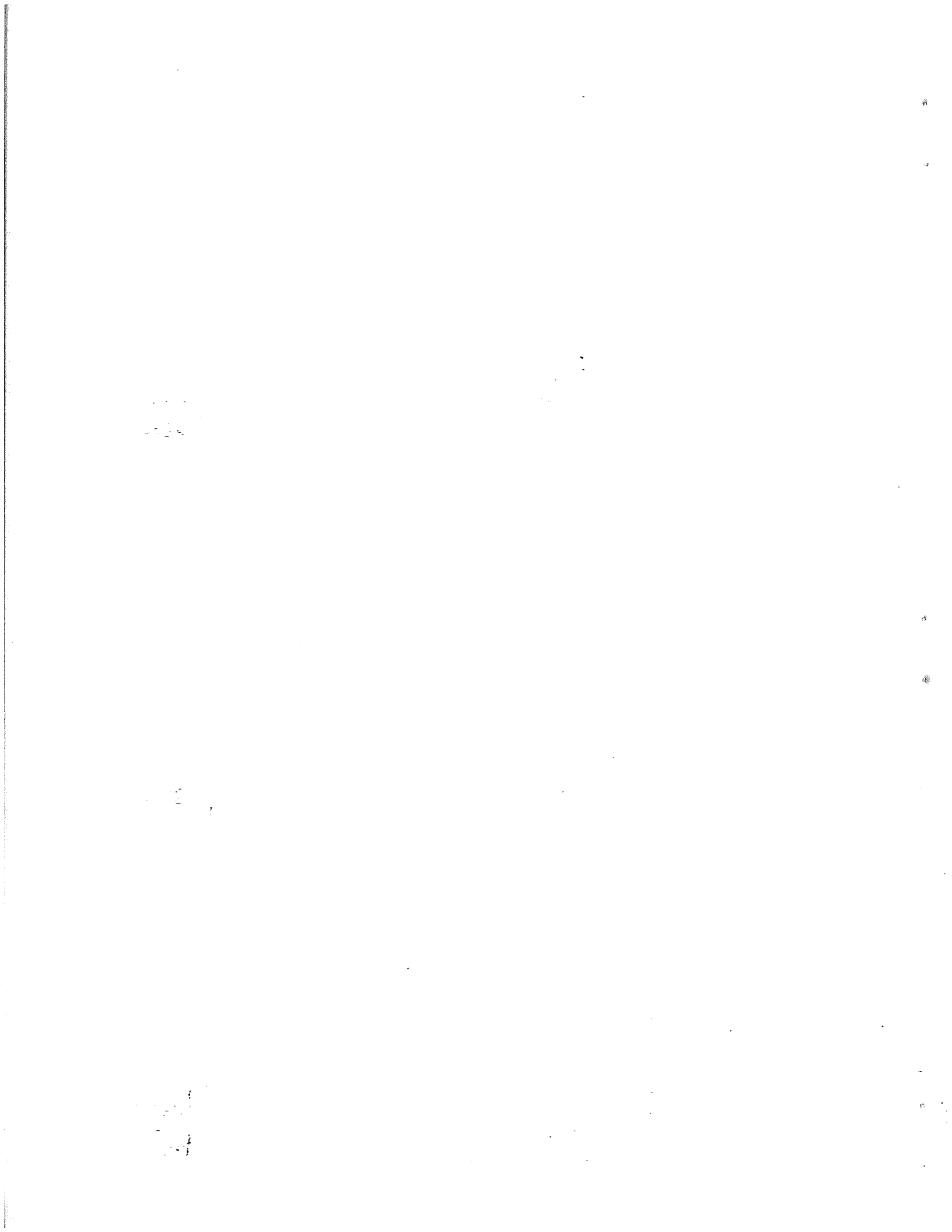


Fig. 10. Biomass density map of Juan Perez Sound (dawn 2). Total biomass estimated at 27,100 t. Density bars along transects are marked at one minute intervals and use a logarithmic scale of 0.01 to 1.0 kg/m².



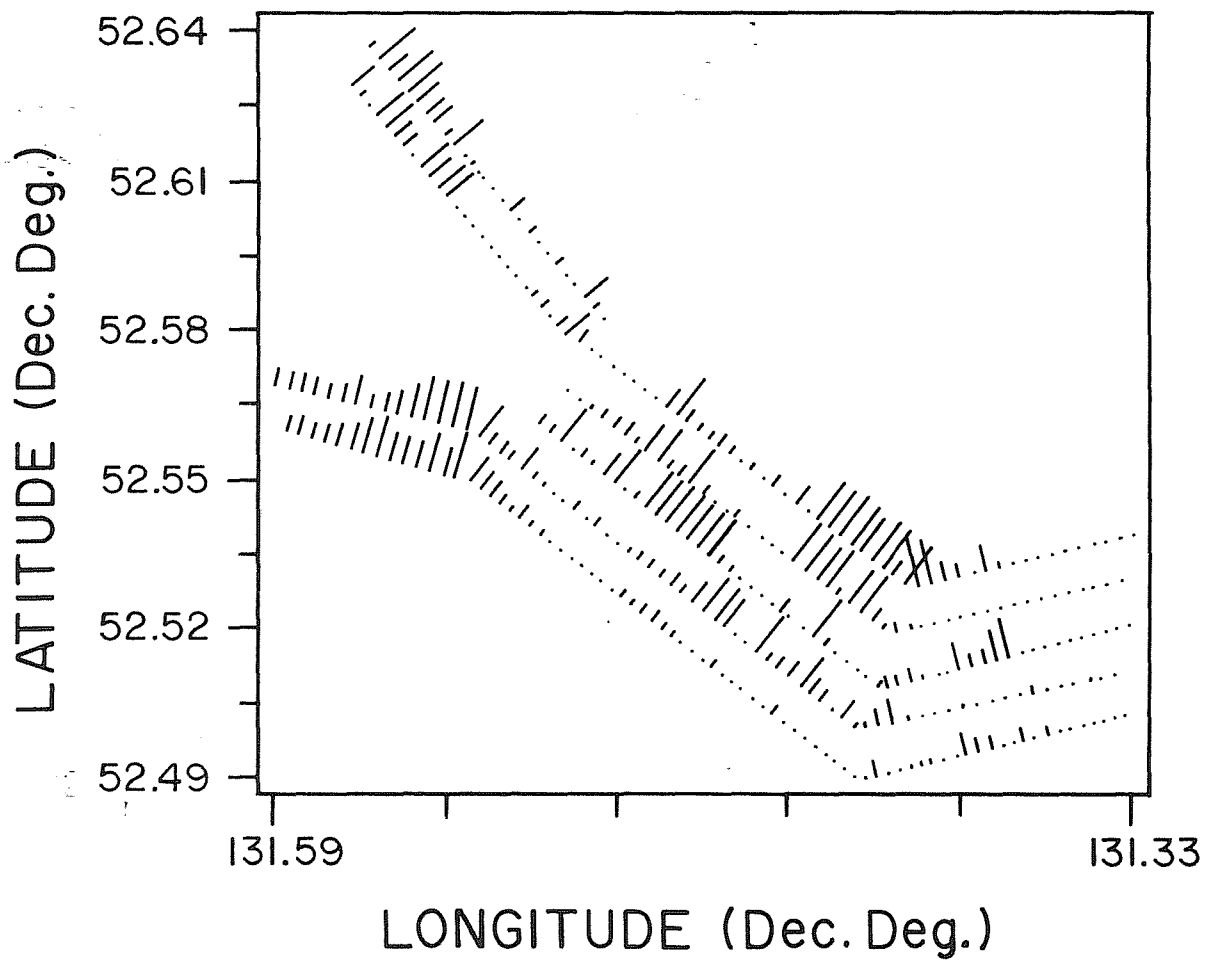
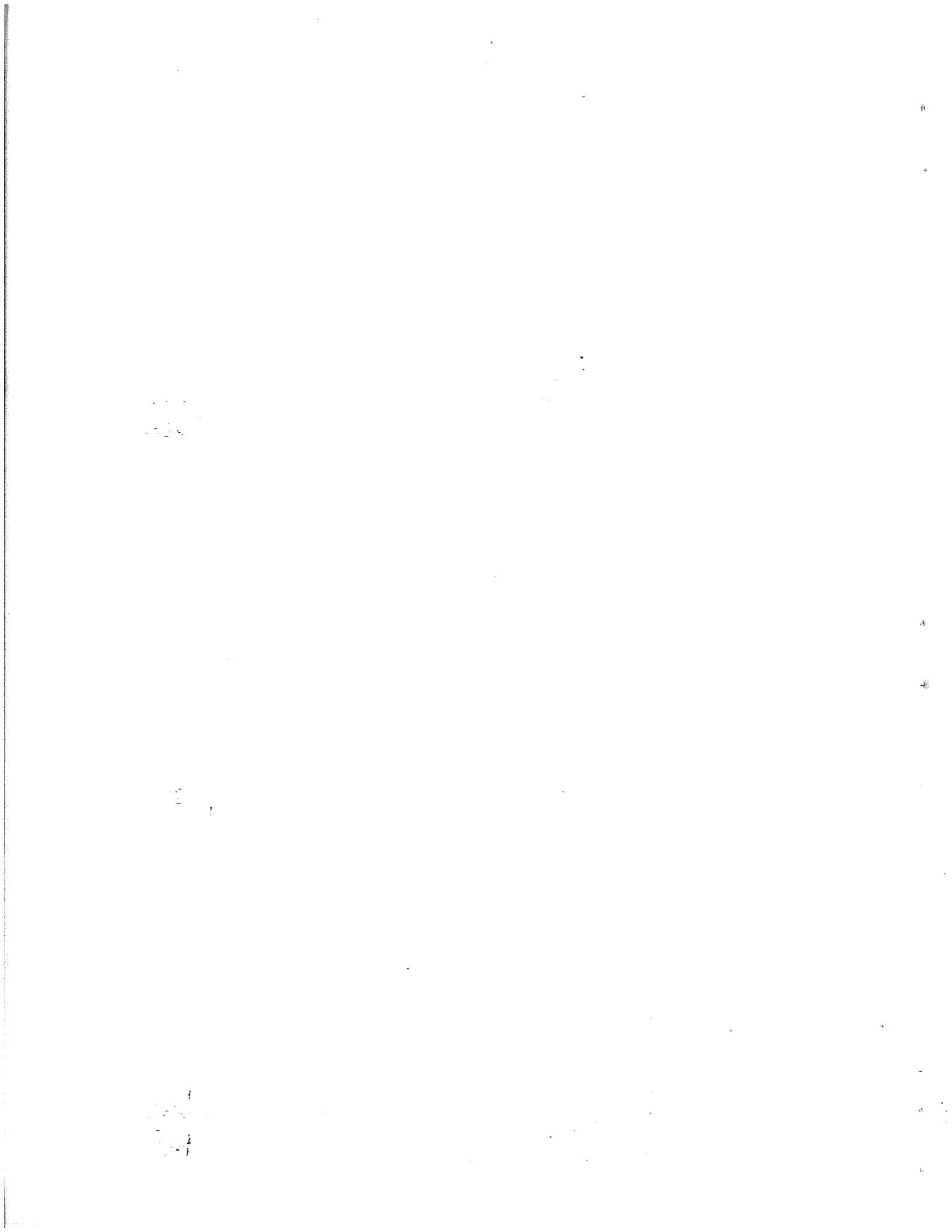


Fig. 11. Biomass density map of Juan Perez Sound (dusk 2). Total biomass estimated at 32,000 t. Density bars along transects are marked at one minute intervals and use a logarithmic scale of 0.01 to 1.0 kg/m².



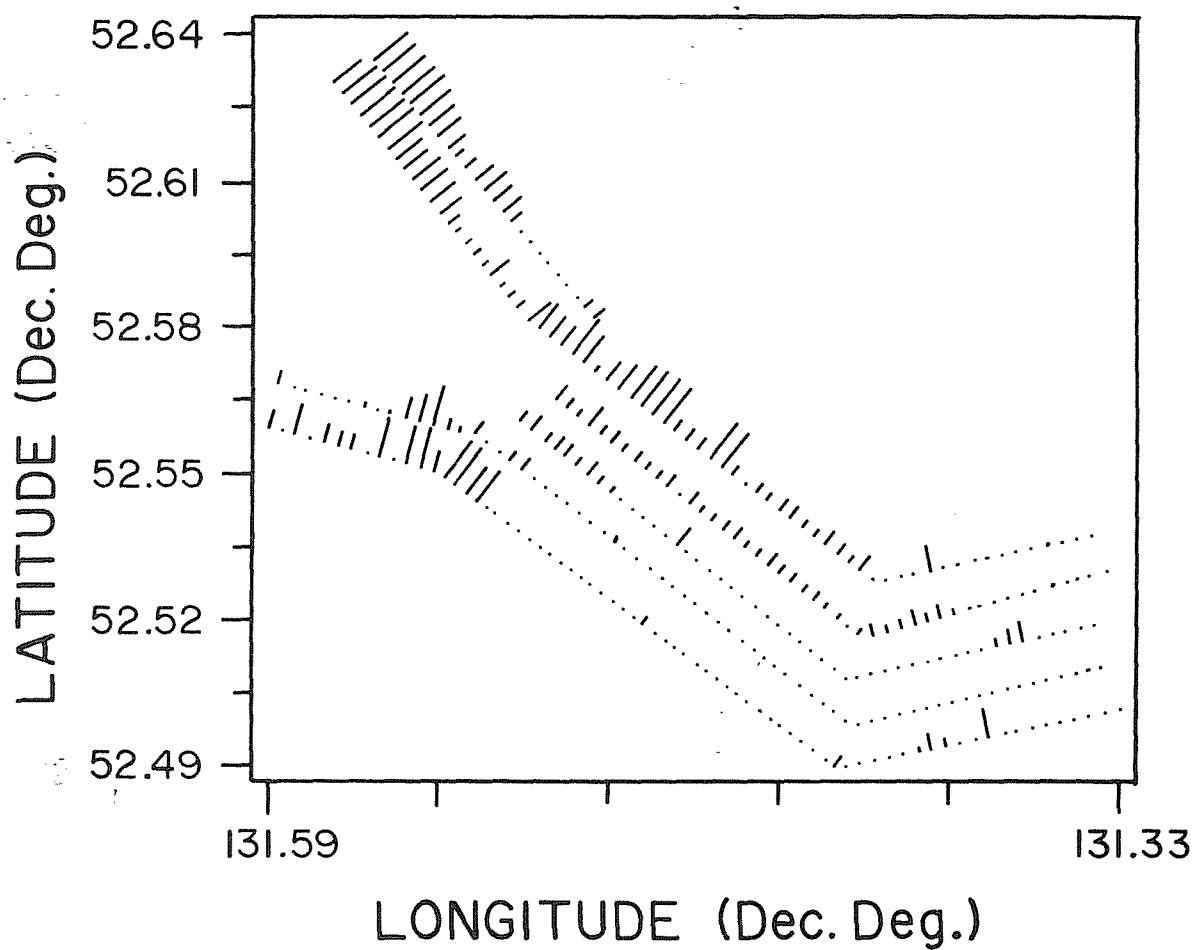
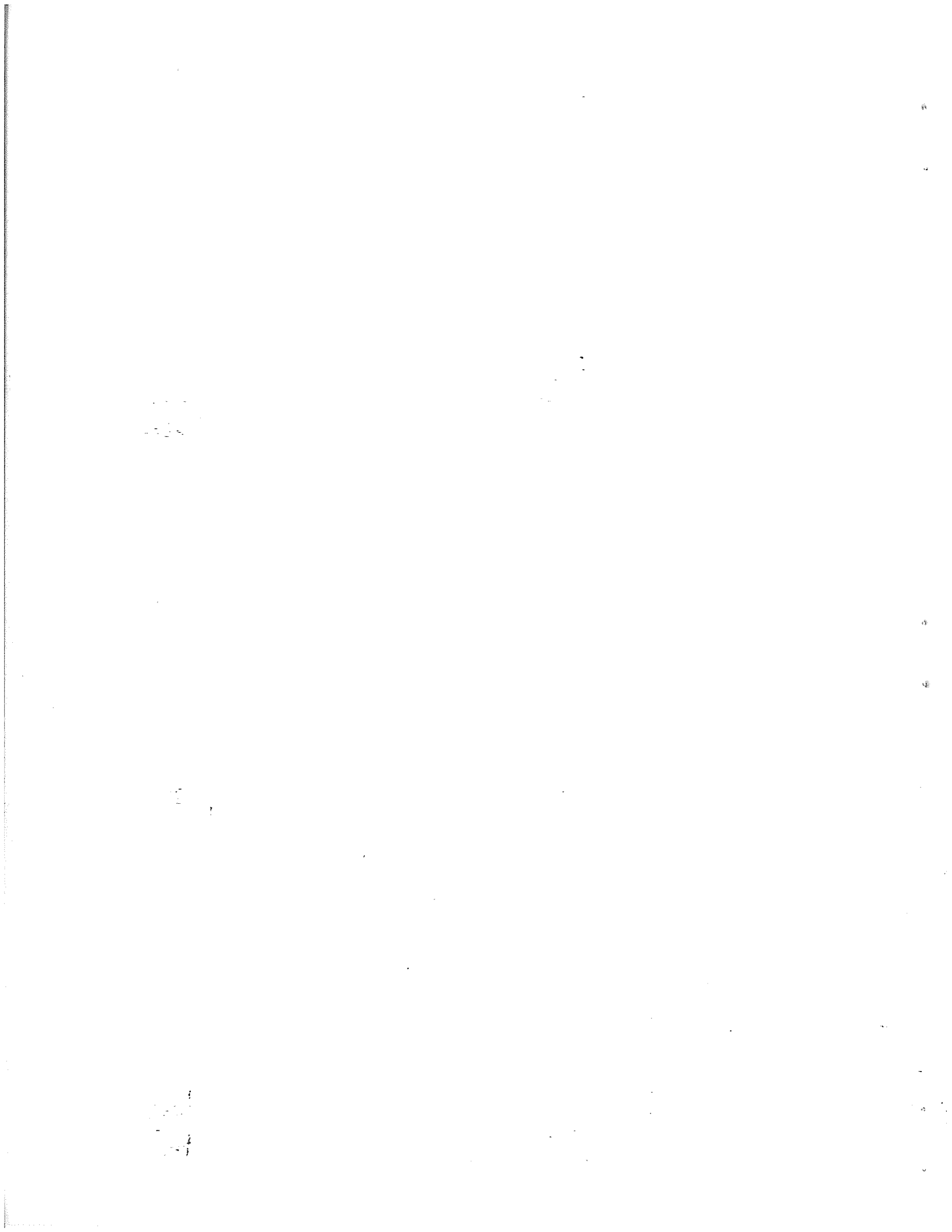


Fig. 12. Biomass density map of Juan Perez Sound (dusk 3). Total biomass estimated at 40,800 t. Density bars along transects are marked at one minute intervals and use a logarithmic scale of 0.01 to 1.0 kg/m².



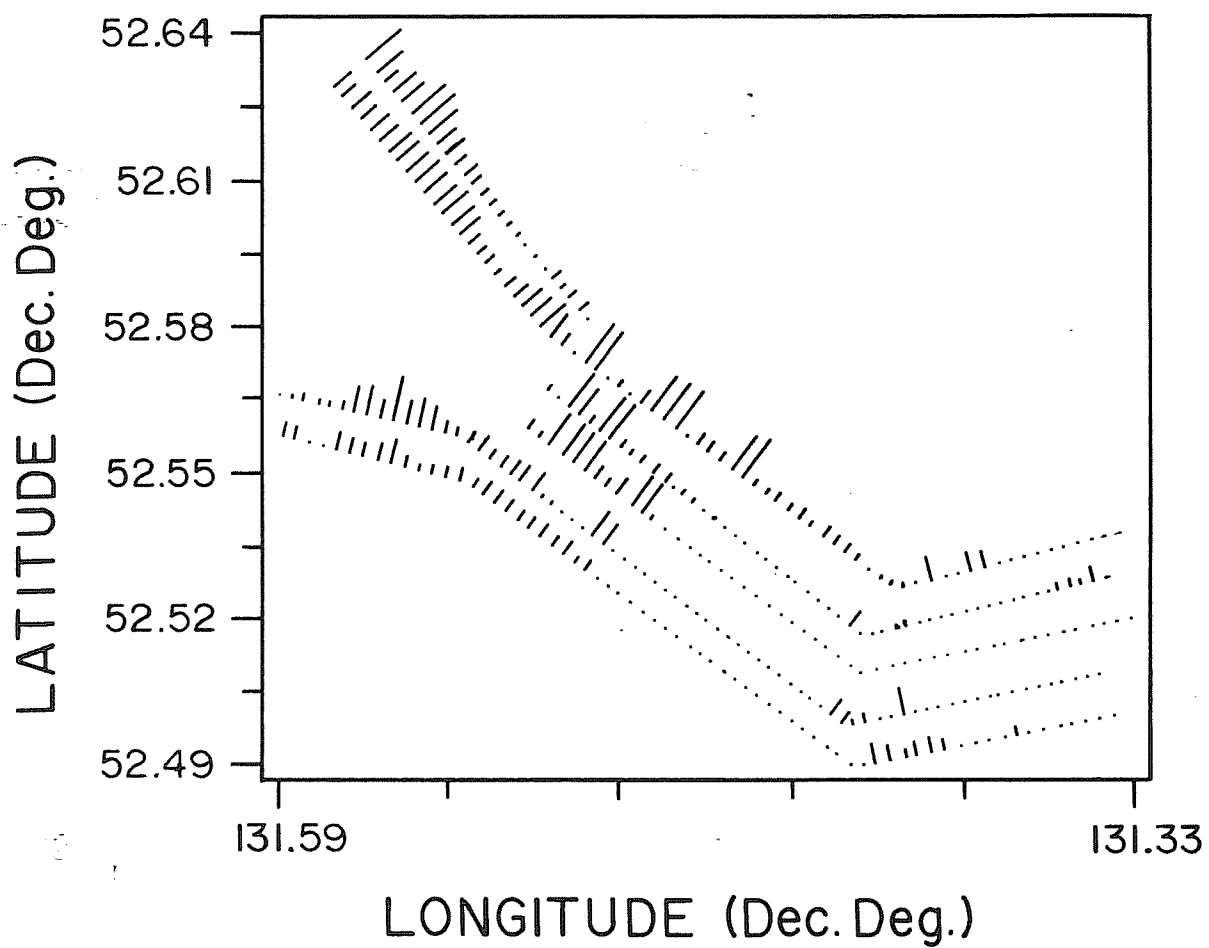
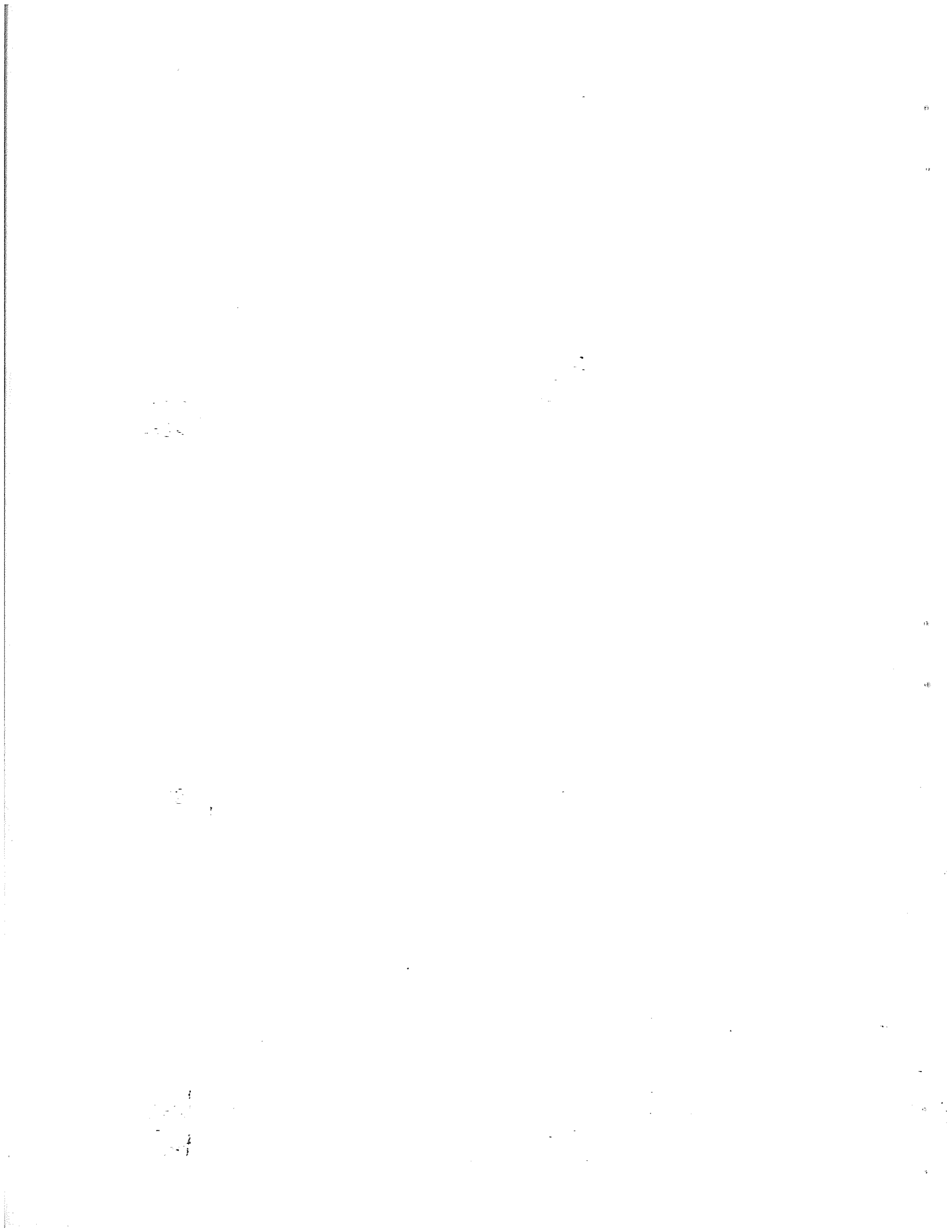


Fig. 13. Biomass density map of Juan Perez Sound (dawn 3). Total biomass estimated at 30,400 t. Density bars along transects are marked at one minute intervals and use a logarithmic scale of 0.01 to 1.0 kg/m².



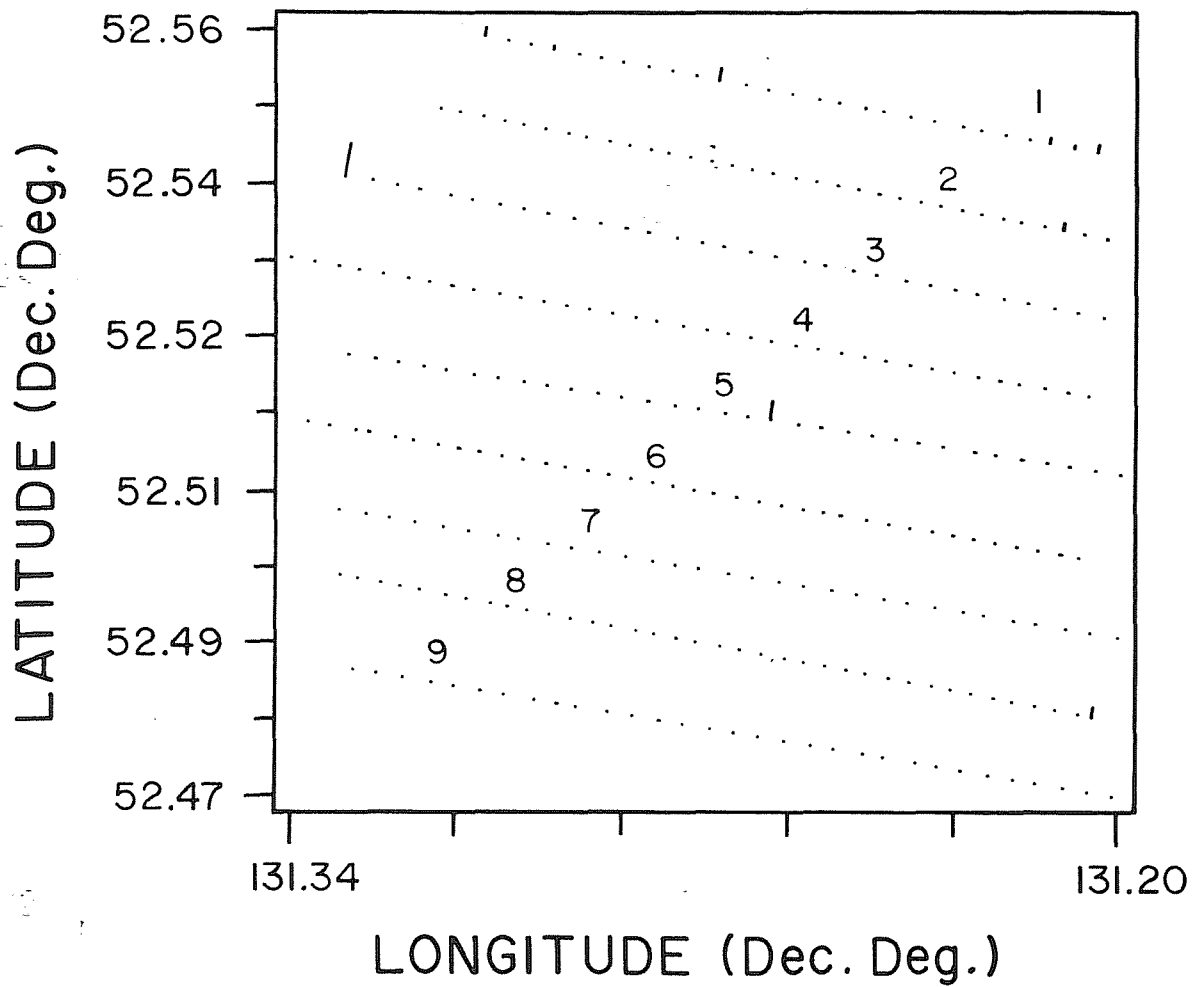
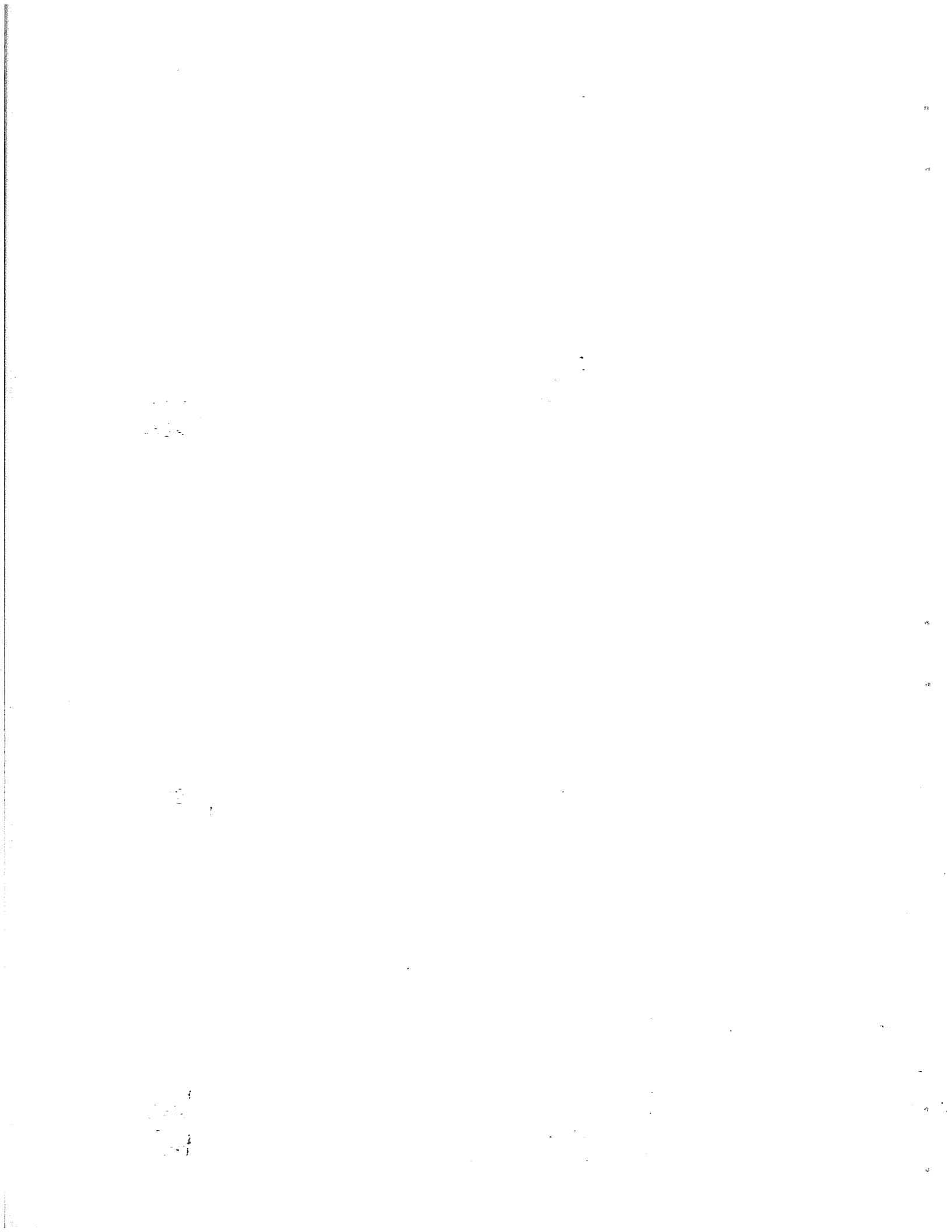


Fig. 14. Biomass density map of Juan Perez - entrance (dawn). Total biomass estimated at 316 t. Density bars along transects are marked at one minute intervals and use a logarithmic scale of 0.01 to 1.0 kg/m².



Appendix Table 1. Cruise schedule of the W. E. RICKER, December 3-15, 1990.

Date	Time	Activity
29 Nov	08:00	Load D-5 midwater trawl net and sweeplines
03 Dec	08:00	Scientific party, B. McCarter, P. Withler, M. Clarke and K. Snodgrass board W. E. RICKER at PBS, Nanaimo
	10:30	W. E. RICKER depart Departure Bay, Nanaimo
	10:48	CTD/BONGO at COPRA STATION F1 (Ballenas Is.)
		CTD/BONGO at COPRA STATION F2 aborted due to bad weather
04	09:19	CTD at COPRA STATION E1 (Pine Is.)
	15:00	Deploy towed body transducer, test and calibrate
05	13:11	Commence transects F1-F8 (Freeman's ground)
06	00:00	Jog in Principie Channel due to bad weather
07	13:00	SAR call for vessel NORSAL
08	01:41	Commence transects E6-E1 (Browning Entrance - inshore)
	08:04	Commence transects F1-F8 (Freeman's ground)
	15:43	Commence transects W1-W8 (Whiterocks ground)
	22:04	Commence transects B1-B9 (Bonilla ground)
09	06:00	Commence fishing on Bonilla ground
	09:00	Commence fishing on Whiterock ground
	09:55	Commence trawl tow #1 on Whiterock ground
	14:59	CTD/BONGO at COPRA STATION H2 (Bonilla Is.)
	21:35	CTD/BONGO at COPRA STATION H1 (Ramsay Is.)
10	01:00	Commence transects J14-J1 (Juan Perez Sound - dawn 1)
	14:09	Commence transects J1-J14 (Juan Perez Sound - dusk 1)
11	02:45	Commence transects J1-J14 (Juan Perez Sound - dawn 2)
	08:00	Commence fishing in Juan Perez Sound
	10:35	Commence trawl tow #2 in Juan Perez Sound
	13:58	Commence transects J1-J14 (Juan Perez Sound - dusk 2)
	21:17	CTD at station ST0 in Juan Perez Sound
12	02:06	Commence transects P9-P1 (Juan Perez - entrance)
	08:35	CTD at station ST2 east of Juan Perez Sound
	09:21	CTD at station ST3 east of Juan Perez Sound
	10:04	CTD at station ST4 east of Juan Perez Sound
	10:51	CTD at station ST5 east of Juan Perez Sound
	13:04	CTD at station ST1 east of Juan Perez Sound
	13:42	Commence transects J14-J1 (Juan Perez Sound - dusk 3)
13	01:46	Commence transects J1-J14 (Juan Perez Sound - dawn 3)
	13:15	Commence trawl tow #3 in Sedgwick Bay
	23:00	Depart Juan Perez Sound
15	10:29	CTD/BONGO at COPRA STATION F2 (Sisters Is.)
	14:00	W. E. RICKER return Departure Bay, Nanaimo
17	08:00	Offload fishing gear and samples

Appendix Table 2. Edited biomass output of W. E. RICKER cruise, December 3-15, 1990. A biomass estimate in tonnes is given for each transect under the far right column headed 'BIOMASS' and a cumulative biomass follows on the line below which is underlined at completion. Parameters are described as follows:

Current parameters	Description
ICO OBIO.CON	Input control file (file name, TT: or N)
IDA HHERR01.D89	Input echo integration file (file name or N)
OFB OBIO.YFB	Output full biomass (file name, TT: or N)
FBO CUM	For full biomass output: SEQ, CUM, BOTH
CEV 0,99999	Choose first and last event
DEB 0	Debugging output: 0, 1, 2
ECH Y	Echo control lines: Y or N
TLL 218.5	Transmit level (dB) re 1 uPascal at 1m
RSS -134.77	Receiver sensitivity (dB) re 1 Volt/uPascal
BFF -17.55	Beam factor (dB)
REF 1.0	Reference range for receiver TVG (m)
ALP .0099	Absorption coefficient for receiver TVG (dB/m)
SOU 1490.0	Speed of sound in water (m/sec)
TAU 0.6	Pulse length (m/sec)
GAI -1.4 -12.0	Bandpass + shell gain (dB) Receiver gain (dB)
TVC 0,0	Near range and TVG correction factor (dB)
TVG 20,0.0099 20,0.0099	Time varied gain = $20 \log R + 2*ALP*R$
TSS -32.0	Target strength (dB/Kg)
MME 0,100	Min. & max. accepted integration value (V^2)
DEP 5,200	Min. & max. depth strata or window (m)
UNI NM	Units for DPP and WID: km or nm
DPP 0.001	Distance per ping (UNI/ping)
WID 1.0	Width of transects (nm)
AVE 1	Number of Sequences to be averaged
EVE 3 14:11 53 48.7 130 42.8	Event number, Time, Position (Lat./Long.)
DAT 05-DEC-90	Date DD-MMM-YY
TRA F1 23 60 2280 6.0 318 0.6 9	T-name Seq1 Seq2 Pit Dis Bea TimeD Speed
LOU	Zero 1. cumulative biomass output
ZER	Zero 1. and 2. cumulative biomass output
EXI	Close files, exit

Other symbols and units of measurement:

T-name	Transect name	Len	Length of transect (km)
Seq1	First sequence number	Area	Area of transect coverage (km^2)
Seq2	Last sequence number	Rang	Average total range (m)
Pit	Total number of pings	Col	Av. integrated range of column (m)
Dis	Total distance (nm)	Dcs	Av. dist. of biomass to surface (m)
Bea	Compass bearing	Dcb	Av. dist. of biomass to bottom (m)
TimeD	Time (hrs) to complete	Lcb	Av. dist. of biomass from Seq1 (km)
Speed	Av. ship's speed (kn)	Vol D	Volume density (kg/m^3)
		Surf D	Surface or area density (kg/m^2)
		Biomass	Biomass of target (tonnes)

Appendix Table 2 (Cont'd.)

Transmit level (TLL 218.50 dB) and receiver sensitivity (RSS -134.77 dB) were determined during an August, 1990 SYSTEM CALIBRATION at the hydroacoustic barge of the University of Washington, Seattle. Biosonics model 101 (1985) echo sounder, Biosonics model 121 (1979) echo integrator and Simrad transducer #4318 (1980) with 300 m cable.

*

*EVE 1 13:57 53 48.74 130 41.15 ! Start-up integrator, Tape # 1

*DAT 05-DEC-90

*UNI NM

*IDA HHERR01.D89

*WID 1.0

*DEP 5,200

*EVE 2 14:07 53 48.27 130 42.34 ! Sequence synchronization

*

*EVE 3 14:11 53 48.65 130 42.82 ! FREEMAN GRID - DUSK COVERAGE 1

*!

*!	Tra	T-name	Seq1	Seq2	Pit	Dis	Bea	TimeD	Speed
*!			#	#	#	nm	o	hrs	kn

*!

*TRA	F1		23	60	2280	6.002	318.138	0.617	9.733
------	----	--	----	----	------	-------	---------	-------	-------

*ZER

> Overall gain Gai0d! dB: 49.283 8.478E+04

> with TSS: 17.283 5.349E+01

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
#	#	km	km^2	m	m	m	m	km	kg/m^3	kg/m^2	t
38	2280	11.1	20.6	54.9	49.9	32.6	38.6	1.8	2.46E-04	1.23E-02	2.52E+02
38	2280	11.1	20.6	54.9	49.9	32.6	38.6	0.0	2.46E-04	1.23E-02	2.52E+02

*

*EVE 4 14:23 53 50.05 130 44.82 ! RX gain from -6 to -12

*

*EVE 5 14:28 53 50.81 130 45.99 ! Turn off skipper sounder

*

*EVE 6 14:48 53 53.12 130 49.61 !

*TRA END

*

*EVE 7 15:03 53 52.49 130 50.43 !

*TRA F2 75 129 3300 5.875 139.993 0.733 8.011

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
		km	km^2	m	m	m	m	km	kg/m^3	kg/m^2	t
55	3300	10.9	20.2	78.6	73.6	37.2	42.4	5.5	2.32E-05	1.70E-03	3.43E+01
93	5580	22.0	40.7	66.6	61.6	33.2	39.0	0.0	1.14E-04	7.03E-03	2.87E+02

*

*EVE 8 15:29 53 50.31 130 47.29 ! Waypoint

*

*EVE 9 15:47 53 47.99 130 44.03 !

*TRA END

*EVE 10 16:09 53 47.39 130 45.30 !

*TRA F3 141 178 2280 6.009 317.638 0.617 9.744

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
38	2280	11.1	20.6	88.6	83.6	69.2	15.6	7.1	9.10E-05	7.61E-03	1.57E+02
131	7860	33.1	61.3	74.0	69.0	45.9	30.7	0.0	1.05E-04	7.23E-03	4.43E+02

*

*EVE 11 16:46 53 51.83 130 52.16 ! Switching from GPS to loran

*TRA END

*

*EVE 12 17:02 53 51.09 130 53.51 !

*TRA F4 194 247 3240 5.987 137.585 0.883 6.778

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
54	3240	11.1	20.5	86.1	81.1	63.4	19.9	4.4	6.26E-05	5.08E-03	1.04E+02
185	11100	44.2	81.9	77.0	72.0	49.2	28.7	0.0	9.29E-05	6.69E-03	5.48E+02

*

*EVE 13 17:55 53 46.67 130 46.67 !

*TRA END

*

*EVE 14 18:10 53 46.06 130 47.85 !

*TRA F5 262 299 2280 5.987 316.327 0.600 9.978

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
38	2280	11.1	20.5	95.4	90.4	59.6	17.9	9.8	1.45E-03	1.31E-01	2.70E+03
223	13380	55.3	102.4	80.7	75.7	57.9	19.7	0.0	4.18E-04	3.17E-02	3.24E+03

*

*EVE 15 18:46 53 50.39 130 54.85 !

*TRA END

*

*EVE 16 19:01 53 49.83 130 56.00 ! Porpoise noise

*TRA F6 315 377 3780 6.988 139.324 1.067 6.552

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
63	3780	12.9	24.0	89.0	84.0	68.9	16.5	5.1	3.21E-04	2.70E-02	6.47E+02
286	17160	68.2	126.4	82.3	77.3	59.7	19.2	0.0	3.98E-04	3.08E-02	3.89E+03

*

*EVE 17 19:48 53 46.11 130 50.26 ! Tape # 2

*

*EVE 18 20:05 53 44.53 130 48.29 !

*TRA END

*

*EVE 19 20:20 53 44.65 130 50.51 !

*TRA F7 393 430 2280 5.938 318.104 0.650 9.135

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
38	2280	11.0	20.4	83.8	78.8	58.8	22.3	6.9	2.05E-04	1.62E-02	3.29E+02
324	19440	79.2	146.8	82.5	77.5	59.6	19.4	0.0	3.71E-04	2.87E-02	4.22E+03

*

*EVE 20 20:59 53 49.07 130 57.22 !

*TRA END

*EVE 21 21:13 53 48.63 130 58.56 ! Porpoise noise

*TRA F8 446 505 3600 5.521 136.429 1.000 5.521

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
60	3600	10.2	18.9	56.8	51.8	40.9	19.7	5.9	2.30E-04	1.19E-02	2.25E+02
384	23040	89.5	165.7	79.5	74.5	58.7	19.4	0.0	3.60E-04	2.68E-02	<u>4.44E+03</u>

*

*EVE 22 22:13 53 44.63 130 52.12 ! Quit sounding, weather worsens

*TRA END

*

*EVE 23 01:15 53 43.16 130 45.56 ! Start-up integrator

*DAT 08-DEC-90

*IDA HHERR02.D89

*

*EVE 24 01:23 53 43.54 130 46.32 ! Sequence Synchronization

*

*EVE 25 01:41 53 41.72 130 43.84 ! BROWNING ENTRANCE GRID - DAWN COVERAGE 1

*!

*!	Tra	T-name	Seq1	Seq2	Pit	Dis	Bea	TimeD	Speed
*!			#	#	#	nm	o	hrs	kn

*!

*TRA	E6		28	66	2340	5.223	135.576	0.650	8.035
------	----	--	----	----	------	-------	---------	-------	-------

*ZER

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
#	#	km	km^2	m	m	m	m	km	kg/m^3	kg/m^2	t
39	2340	9.7	17.9	88.8	83.8	47.3	48.6	4.2	9.77E-06	8.19E-04	1.47E+01
39	2340	9.7	17.9	88.8	83.8	47.3	48.6	0.0	9.77E-06	8.19E-04	1.47E+01

*

*EVE 26 02:20 53 37.99 130 37.67 !

*TRA END

*

*EVE 27 02:26 53 38.71 130 36.82 !

*TRA E5 72 134 3780 10.061 318.284 1.033 9.736

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
63	3780	18.6	34.5	99.5	94.5	50.7	32.3	7.7	1.67E-05	1.58E-03	5.45E+01
102	6120	28.3	52.4	95.8	90.8	49.9	35.8	0.0	1.45E-05	1.32E-03	6.92E+01

*

*EVE 28 02:58 53 42.47 130 42.48 ! Waypoint

*

*EVE 29 03:28 53 46.22 130 48.13 !

*TRA END

*

*EVE 30 03:41 53 46.78 130 46.72 !

*TRA E4 147 216 4200 9.262 136.781 1.167 7.939

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
70	4200	17.2	31.8	100.2	95.2	78.0	8.7	11.4	1.79E-04	1.71E-02	5.42E+02
172	10320	45.5	84.2	97.5	92.5	74.8	11.7	0.0	7.85E-05	7.26E-03	6.11E+02

*EVE 31 04:18 53 43.30 130 31.16 ! Waypoint

*

*EVE 32 04:45 53 40.51 130 37.13 ! Tape # 3

*

*EVE 33 04:51 53 40.03 130 36.00 !

*TRA END

*

*EVE 34 04:59 53 41.04 130 35.80 !

*TRA E3 225 278 3240 8.709 318.478 0.883 9.859

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
54	3240	16.1	29.9	91.0	86.0	47.0	8.3	2.8	1.96E-04	1.69E-02	5.04E+02
226	13560	61.6	114.1	95.8	90.8	62.3	10.2	0.0	1.08E-04	9.77E-03	1.11E+03

*

*EVE 35 05:33 53 45.15 130 41.99 ! Waypoint

*

*EVE 36 05:52 53 47.56 130 45.56 !

*TRA END

*

*EVE 37 06:05 53 48.21 130 44.27 !

*TRA E2 292 351 3600 8.262 137.999 1.017 8.127

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
60	3600	15.3	28.3	85.5	80.5	40.6	8.2	13.2	2.02E-04	1.63E-02	4.61E+02
286	17160	76.9	142.4	93.7	88.7	55.9	9.6	0.0	1.25E-04	1.11E-02	1.58E+03

*

*EVE 38 06:39 53 44.91 130 39.22 ! Waypoint

*

*EVE 39 07:06 53 42.07 130 34.92 !

*TRA END

*

*EVE 40 07:15 53 42.70 130 34.39 ! Keeping Seaward of transect

*TRA E1 362 409 2880 7.835 317.756 0.817 9.594

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
48	2880	14.5	26.9	73.7	68.7	64.9	9.1	13.3	1.85E-04	1.27E-02	3.42E+02
334	20040	91.4	169.3	90.6	85.6	57.5	9.5	0.0	1.32E-04	1.13E-02	<u>1.92E+03</u>

*

*EVE 41 07:43 53 45.85 130 39.41 ! Waypoint

*

*EVE 42 07:56 53 47.56 130 41.80 ! Waypoint

*EVE 43 08:04 53 48.50 130 43.30 ! FREEMAN GRID - DAYTIME COVERAGE 1

*!

*! Tra T-name Seq1 Seq2 Pit Dis Bea TimeD Speed
*! # # # nm o hrs kn

*!

*TRA F1 410 445 2160 5.914 321.063 0.600 9.856

*ZER

N #	P #	Len km	Area km ²	Rang m	Col m	Dcs m	Dcb m	Lcb km	Vol D kg/m ³	Surf D kg/m ²	Biomass t
36	2160	11.0	20.3	46.5	41.5	35.1	6.2	5.4	2.42E-04	1.00E-02	2.04E+02
36	2160	11.0	20.3	46.5	41.5	35.1	6.2	0.0	2.42E-04	1.00E-02	2.04E+02

*

*EVE 44 08:26 53 51.05 130 47.63 ! Waypoint

*

*EVE 45 08:40 53 53.10 130 49.60 ! Position Corrected

*TRA END

*

*EVE 46 09:09 53 52.55 130 50.34 ! Restart integrator

*IDA HHERR03.D89

*TRA F2 19 59 2460 5.908 143.181 0.800 7.385

N #	P #	Len km	Area km ²	Rang m	Col m	Dcs m	Dcb m	Lcb km	Vol D kg/m ³	Surf D kg/m ²	Biomass t
41	2460	10.9	20.3	56.3	51.3	49.0	7.4	5.1	3.31E-04	1.70E-02	3.44E+02
77	4620	21.9	40.5	51.4	46.4	43.8	6.9	0.0	2.91E-04	1.35E-02	5.47E+02

*

*EVE 47 09:36 53 49.82 130 46.60 ! Waypoint

*

*EVE 48 09:57 53 47.82 130 44.34 ! Sound paper ran out

*TRA END

*

*EVE 49 10:02 53 47.38 130 45.47 !

*TRA F3 65 97 1980 5.975 319.010 0.600 9.959

N #	P #	Len km	Area km ²	Rang m	Col m	Dcs m	Dcb m	Lcb km	Vol D kg/m ³	Surf D kg/m ²	Biomass t
33	1980	11.1	20.5	85.0	80.0	54.1	27.0	8.7	1.45E-04	1.16E-02	2.38E+02
110	6600	33.0	61.0	62.6	57.6	47.0	13.0	0.0	2.23E-04	1.29E-02	7.85E+02

*

*EVE 50 10:07 53 47.89 130 46.87 ! Waypoint

*

*EVE 51 10:21 53 49.66 130 48.99 ! Waypoint

*

*EVE 52 10:38 53 51.89 130 52.11 !

*TRA END

*

*EVE 53 10:52 53 51.95 130 53.83 ! Tape # 4

*EVE 54 10:58 53 51.11 130 53.32 ! Change from LORAN to GPS
 *TRA F4 119 165 2820 5.984 140.839 0.783 7.639

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
47	2820	11.1	20.5	88.3	83.3	56.3	19.1	2.7	2.34E-04	1.95E-02	4.00E+02
157	9420	44.0	81.6	69.1	64.1	50.1	15.1	0.0	2.27E-04	1.45E-02	1.18E+03

*
 *EVE 55 11:03 53 50.66 130 52.16 ! Waypoint
 *

*EVE 56 11:23 53 48.83 130 49.91 ! Waypoint
 *

*EVE 57 11:45 53 46.47 130 46.92 !

*TRA END
 *

*EVE 58 11:51 53 46.04 130 47.91 !
 *TRA F5 172 209 2280 6.148 316.916 0.633 9.707

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
38	2280	11.4	21.1	90.7	85.7	74.0	10.3	6.5	3.11E-04	2.67E-02	5.62E+02
195	11700	55.4	102.7	73.5	68.5	57.8	13.5	0.0	2.48E-04	1.70E-02	1.75E+03

*
 *EVE 59 12:10 53 48.24 130 51.46 ! Waypoint
 *

*EVE 60 12:29 53 50.53 130 55.02 !

*TRA END
 *

*EVE 61 12:39 53 49.81 130 55.94 !
 *TRA F6 220 278 3540 6.851 138.733 1.000 6.851

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
59	3540	12.7	23.5	83.3	78.3	61.2	18.1	5.5	7.90E-04	6.19E-02	1.45E+03
254	15240	68.1	126.2	75.3	70.3	59.3	15.6	0.0	3.61E-04	2.54E-02	3.20E+03

*
 *EVE 62 13:05 53 47.40 130 52.31 ! Waypoint
 *

*EVE 63 13:39 53 44.66 130 48.29 !

*TRA END
 *

*EVE 64 13:52 53 44.65 130 50.63 !
 *TRA F7 292 328 2220 5.913 318.809 0.617 9.589

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
37	2220	11.0	20.3	68.7	63.7	67.1	6.3	6.6	1.17E-03	7.45E-02	1.51E+03
291	17460	79.1	146.4	74.4	69.4	61.8	12.6	0.0	4.63E-04	3.22E-02	4.71E+03

*
 *EVE 65 14:11 53 46.88 130 53.98 ! Waypoint
 *

*EVE 66 14:29 53 49.10 130 57.22 !

*TRA END

*EVE 67 14:40 53 48.43 130 58.76 !

*TRA F8 341 380 2400 5.358 137.972 0.667 8.037

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
40	2400	9.9	18.4	47.4	42.4	12.9	35.1	3.9	1.97E-05	8.37E-04	1.54E+01
331	19860	89.0	164.8	71.4	66.4	61.7	12.7	0.0	4.32E-04	2.87E-02	4.73E+03

*

*EVE 68 14:59 53 46.65 130 55.99 ! Waypoint

*

*EVE 69 15:20 53 44.45 130 52.69 !

*TRA END

*

*EVE 70 15:43 53 44.03 130 52.84 ! WHITEROCK GRID - DUSK COVERAGE 1

*IDA HHERR04.D89

*!

*!	Tra	T-name	Seq1	Seq2	Pit	Dis	Bea	TimeD	Speed
*!			#	#	#	nm	o	hrs	kn

*!

*TRA	W1		4	32	1740	4.046	90.143	0.483	8.371
------	----	--	---	----	------	-------	--------	-------	-------

*ZER

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
#	#	km	km^2	m	m	m	m	km	kg/m^3	kg/m^2	t
29	1740	7.5	13.9	88.7	83.7	47.9	9.3	1.1	1.92E-04	1.60E-02	2.23E+02
29	1740	7.5	13.9	88.7	83.7	47.9	9.3	0.0	1.92E-04	1.60E-02	2.23E+02

*

*EVE 71 15:48 53 44.06 130 51.64 ! Sequence synchronization

*

*EVE 72 16:12 53 44.02 130 46.00 !

*TRA END

*

*EVE 73 16:26 53 43.00 130 44.52 !

*TRA W2 47 84 2280 5.415 270.000 0.633 8.549

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
38	2280	10.0	18.6	83.7	78.7	50.8	39.2	4.5	2.07E-05	1.63E-03	3.02E+01
67	4020	17.5	32.5	85.8	80.8	48.2	12.9	0.0	9.64E-05	7.79E-03	2.53E+02

*

*EVE 74 17:04 53 43.00 130 53.67 !

*TRA END

*

*EVE 75 17:15 53 42.04 130 53.47 ! Tape # 5

*TRA W3 97 134 2280 6.003 89.714 0.650 9.236

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
38	2280	11.1	20.6	77.0	72.0	46.0	4.7	5.0	1.34E-03	9.62E-02	1.98E+03
105	6300	28.6	53.0	82.4	77.4	46.2	5.6	0.0	5.44E-04	4.21E-02	2.23E+03

*

*EVE 76 17:54 53 42.07 130 43.33 !

*TRA END

*EVE 77 18:07 53 41.02 130 43.55 !

*TRA W4 148 183 2160 5.023 270.115 0.583 8.610

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
36	2160	9.3	17.2	76.4	71.4	45.9	7.0	5.6	9.75E-04	6.96E-02	1.20E+03
141	8460	37.9	70.3	80.9	75.9	46.1	6.1	0.0	6.44E-04	4.89E-02	3.43E+03

*

*EVE 78 18:42 53 41.03 130 52.03 !

*TRA END

*

*EVE 79 18:54 53 40.03 130 51.56 !

*TRA W5 195 227 1980 5.054 90.568 0.550 9.189

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
33	1980	9.4	17.3	81.4	76.4	36.9	38.5	4.6	3.73E-05	2.85E-03	4.94E+01
174	10440	47.3	87.6	81.0	76.0	46.0	6.6	0.0	5.23E-04	3.98E-02	3.48E+03

*

*EVE 80 19:11 53 39.75 130 47.14 ! Course deviation for traffic

*

*EVE 81 19:27 53 39.98 130 43.03 !

*TRA END

*

*EVE 82 19:37 53 38.93 130 43.53 !

*TRA W6 238 273 2160 4.944 270.000 0.600 8.239

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
36	2160	9.2	17.0	85.1	80.1	39.8	9.1	5.8	1.31E-03	1.05E-01	1.78E+03
210	12600	56.5	104.6	81.7	76.7	43.9	7.4	0.0	6.57E-04	5.04E-02	5.27E+03

*

*EVE 83 20:13 53 38.93 130 51.87 !

*TRA END

*

*EVE 84 20:25 53 38.04 130 51.66 !

*TRA W7 286 316 1860 4.909 89.765 0.517 9.501

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
31	1860	9.1	16.8	86.6	81.6	42.3	5.0	2.7	4.57E-04	3.73E-02	6.28E+02
241	14460	65.5	121.4	82.3	77.3	43.7	7.2	0.0	6.28E-04	4.86E-02	5.90E+03

*

*EVE 85 20:56 53 38.06 130 43.38 !

*TRA END

*

*EVE 86 21:08 53 37.08 130 43.61 !

*TRA W8 329 365 2220 5.074 268.307 0.600 8.457

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
37	2220	9.4	17.4	87.4	82.4	36.5	7.7	7.9	1.16E-03	9.53E-02	1.66E+03
278	16680	74.9	138.8	83.0	78.0	42.1	7.3	0.0	6.98E-04	5.44E-02	<u>7.56E+03</u>

*

*EVE 87 21:44 53 36.93 130 52.16 !

*TRA END

*EVE 88 21:56 53 33.72 130 52.20 ! Start-up integrator

*IDA HHERR05.D89

*

*EVE 89 22:04 53 34.62 130 51.66 ! BONILLA GRID - DAWN COVERAGE 1

*!

*! Tra T-name Seq1 Seq2 Pit Dis Bea TimeD Speed
*! # # # nm o hrs kn

*!

*TRA B1 10 45 2160 5.151 122.794 0.617 8.354

*ZER

N #	P #	Len km	Area km ²	Rang m	Col m	Dcs m	Dcb m	Lcb km	Vol D kg/m ³	Surf D kg/m ²	Biomass t
36	2160	9.5	17.7	101.6	96.6	88.3	33.5	5.9	2.80E-05	2.71E-03	4.78E+01
36	2160	9.5	17.7	101.6	96.6	88.3	33.5	0.0	2.80E-05	2.71E-03	4.78E+01

*

*EVE 90 22:24 53 33.14 130 47.68 ! Waypoint

*

*EVE 91 22:41 53 31.83 130 44.37 !

*TRA END

*

*EVE 92 22:53 53 31.05 130 45.73 !

*TRA B2 58 90 1980 4.950 304.308 0.550 8.999

N #	P #	Len km	Area km ²	Rang m	Col m	Dcs m	Dcb m	Lcb km	Vol D kg/m ³	Surf D kg/m ²	Biomass t
33	1980	9.2	17.0	93.3	88.3	69.5	13.7	5.3	1.31E-04	1.16E-02	1.97E+02
69	4140	18.7	34.6	97.5	92.5	73.2	17.6	0.0	7.63E-05	7.06E-03	2.45E+02

*

*EVE 93 23:10 53 32.42 130 49.36 ! Waypoint

*

*EVE 94 23:26 53 33.84 130 52.61 ! Tape # 6

*TRA END

*

*EVE 95 23:40 53 33.12 130 54.03 !

*TRA B3 105 139 2100 4.972 123.440 0.583 8.524

N #	P #	Len km	Area km ²	Rang m	Col m	Dcs m	Dcb m	Lcb km	Vol D kg/m ³	Surf D kg/m ²	Biomass t
35	2100	9.2	17.1	80.7	75.7	65.2	14.0	5.2	1.13E-04	8.53E-03	1.45E+02
104	6240	27.9	51.7	92.0	87.0	70.2	16.2	0.0	8.67E-05	7.54E-03	3.90E+02

*

*EVE 96 00:15 53 30.38 130 47.05 !

*DAT 09-DEC-90

*TRA END

*

*EVE 97 00:29 53 29.66 130 48.72 !

*TRA B4 154 185 1920 4.981 304.060 0.533 9.340

N #	P #	Len km	Area km ²	Rang m	Col m	Dcs m	Dcb m	Lcb km	Vol D kg/m ³	Surf D kg/m ²	Biomass t
32	1920	9.2	17.1	76.2	71.2	61.2	8.8	6.2	1.37E-04	9.73E-03	1.66E+02
136	8160	37.1	68.8	88.1	83.1	67.5	14.0	0.0	9.73E-05	8.09E-03	5.56E+02

*EVE 98 00:44 53 26.65 130 51.84 ! Waypoint

*

*EVE 99 01:01 53 32.45 130 55.66 ! Longitude corrected

*TRA END

*

*EVE 100 01:11 53 31.68 130 56.73 !

*TRA B5 196 231 2160 4.956 122.736 0.600 8.260

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
36	2160	9.2	17.0	74.5	69.5	52.3	13.0	2.7	1.97E-04	1.37E-02	2.32E+02
172	10320	46.3	85.8	85.4	80.4	63.0	13.7	0.0	1.14E-04	9.19E-03	7.89E+02

*

*EVE 101 01:27 53 30.52 130 53.65 ! Waypoint

*

*EVE 102 01:47 53 29.00 130 49.72 !

*TRA END

*

*EVE 103 01:58 53 28.20 130 51.24 !

*TRA B6 244 273 1800 4.857 305.346 0.517 9.401

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
30	1800	9.0	16.7	78.1	73.1	45.3	29.7	5.1	2.67E-05	1.95E-03	3.25E+01
202	12120	55.3	102.4	84.2	79.2	62.3	14.4	0.0	1.01E-04	8.01E-03	8.21E+02

*

*EVE 104 02:11 53 29.40 130 53.89 ! Waypoint

*

*EVE 105 02:29 53 31.01 130 57.90 !

*TRA END

*

*EVE 106 02:41 53 30.27 130 59.51 !

*TRA B7 286 322 2220 5.053 124.473 0.617 8.194

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
37	2220	9.4	17.3	76.6	71.6	51.7	25.3	4.6	2.60E-05	1.86E-03	3.23E+01
239	14340	64.7	119.8	83.1	78.1	61.9	14.8	0.0	9.12E-05	7.12E-03	8.53E+02

*

*EVE 107 03:03 53 28.50 130 55.23 ! Waypoint

*

*EVE 108 03:18 53 27.41 130 52.51 !

*TRA END

*

*EVE 109 03:28 53 26.66 130 54.03 !

*TRA B8 333 365 1980 5.456 306.169 0.550 9.921

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
33	1980	10.1	18.7	76.5	71.5	65.8	9.0	5.9	1.61E-04	1.15E-02	2.16E+02
272	16320	74.8	138.5	82.2	77.2	62.7	13.6	0.0	1.00E-04	7.72E-03	1.07E+03

*

*EVE 110 03:50 53 28.78 130 58.78 ! Waypoint

*

*EVE 111 04:01 53 29.88 131 01.43 !

*TRA END

*EVE 112 04:13 53 29.11 131 03.12 !
 *TRA B9 378 409 1920 4.300 124.253 0.533 8.062

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
32	1920	8.0	14.7	62.1	57.1	55.2	10.1	4.5	1.22E-04	6.98E-03	1.03E+02
304	18240	82.7	153.2	80.3	75.3	62.1	13.3	0.0	1.02E-04	7.65E-03	<u>1.17E+03</u>

*
 *EVE 113 04:32 53 27.70 130 59.55 ! Waypoint
 *

*EVE 114 04:45 53 26.69 130 57.15 !

*TRA END

*

*EVE 115 00:41 52 29.98 131 15.71 ! Start-up integrator

*DAT 10-DEC-90

*IDA HHERR06.D89

*WID 0.5

*DEP 5,140

*EVE 116 00:59 52 30.17 131 20.15 ! JUAN PEREZ GRID - DAWN COVERAGE 1

*!

*!	Tra	T-name	Seq1	Seq2	Pit	Dis	Bea	TimeD	Speed
*!			#	#	#	nm	o	hrs	kn

*!

*TRA	J14		20	39	1200	2.983	258.395	0.333	8.950
------	-----	--	----	----	------	-------	---------	-------	-------

*ZER

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
#	#	km	km^2	m	m	m	m	km	kg/m^3	kg/m^2	t
20	1200	5.5	5.1	118.8	108.3	23.7	63.0	3.5	9.11E-03	9.86E-01	5.05E+03
20	1200	5.5	5.1	118.8	108.3	23.7	63.0	0.0	9.11E-03	9.86E-01	5.05E+03

*

*EVE 117 01:19 52 29.57 131 24.95 !

*TRA J13 40 78 2340 5.626 307.954 0.650 8.655

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
39	2340	10.4	9.6	151.2	122.3	44.8	104.9	5.2	6.96E-04	8.52E-02	8.22E+02
59	3540	15.9	14.8	139.9	117.5	26.7	68.9	0.0	3.38E-03	3.97E-01	5.87E+03

*

*EVE 118 01:31 52 30.62 131 27.12 ! Tape # 7

*

*EVE 119 01:58 52 33.03 131 32.24 !

*TRA J12 79 92 840 2.111 287.077 0.250 8.446

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
14	840	3.9	3.6	96.9	91.8	99.0	23.0	1.7	9.12E-04	8.37E-02	3.03E+02
73	4380	19.9	18.4	131.5	112.4	30.2	66.6	0.0	2.99E-03	3.36E-01	6.17E+03

*

*EVE 120 02:13 52 33.65 131 35.56 ! Plotter reading from GPS until 04:50

*TRA END

*EVE 121 02:17 52 34.01 131 35.12 !

*TRA J11 98 113 960 2.373 106.652 0.283 8.376

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
16	960	4.4	4.1	184.7	135.0	49.7	134.0	2.3	5.76E-04	7.77E-02	3.16E+02
89	5340	24.2	22.5	141.1	116.5	31.2	69.9	0.0	2.48E-03	2.89E-01	6.49E+03

*

*EVE 122 02:34 52 33.33 131 31.38 ! Late event entry

*TRA J10 114 149 2160 5.134 129.418 0.583 8.801

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
36	2160	9.5	8.8	209.0	134.8	46.2	153.5	4.5	1.63E-04	2.20E-02	1.93E+02
125	7500	33.8	31.3	160.2	121.6	31.6	72.3	0.0	1.76E-03	2.14E-01	6.68E+03

*

*EVE 123 03:09 52 30.07 131 24.86 ! Longitude corrected

*TRA J9 150 172 1380 3.111 76.999 0.400 7.778

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
23	1380	5.8	5.3	153.8	129.8	24.7	90.8	1.1	4.81E-03	6.25E-01	3.33E+03
148	8880	39.5	36.6	159.3	122.8	29.3	78.5	0.0	2.23E-03	2.74E-01	1.00E+04

*

*EVE 124 03:33 52 30.77 131 19.88 !

*TRA END

*

*EVE 125 03:39 52 31.23 131 20.13 !

*TRA J8 180 197 1080 2.834 257.153 0.317 8.949

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
18	1080	5.2	4.9	208.8	134.6	101.8	89.5	2.5	7.57E-05	1.02E-02	4.95E+01
166	9960	44.8	41.5	165.1	124.2	29.6	78.5	0.0	1.95E-03	2.43E-01	1.01E+04

*

*EVE 126 03:58 52 30.60 131 24.67 !

*TRA J7 198 223 1560 4.087 309.691 0.483 8.456

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
26	1560	7.6	7.0	209.8	135.0	28.3	213.9	0.3	2.96E-03	4.00E-01	2.80E+03
192	11520	52.3	48.5	171.6	125.8	29.4	108.0	0.0	2.11E-03	2.65E-01	1.29E+04

*

*EVE 127 04:27 52 33.21 131 29.84 ! Integrator fails

*TRA END

*

*EVE 128 04:31 52 33.52 131 30.45 ! Restart integrator

*IDA HHERR07.D89

*

*EVE 129 04:32 52 33.70 131 30.80 !

*TRA END

*EVE 130 04:39 52 34.00 131 30.10 !
 *TRA J6 8 37 1800 4.517 129.279 0.517 8.743

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
30	1800	8.4	7.7	196.7	134.9	26.9	208.8	7.9	3.71E-03	5.00E-01	3.88E+03
222	13320	60.7	56.2	175.0	127.0	28.8	131.4	0.0	2.34E-03	2.98E-01	1.67E+04

*
 *EVE 131 04:39 52 33.87 131 29.94 ! Sequence synchronization
 *

*EVE 132 04:58 52 32.24 131 26.69 ! Change from GPS to LORAN
 *

*EVE 133 05:10 52 31.14 131 24.35 ! Integrator fails

*TRA END ! Start of J5
 *

*EVE 134 05:36 52 32.15 131 19.69 ! Restart integrator

*IDA HHERR08.D89

*TRA END ! Near beginning of J5/J4
 *

*EVE 135 05:40 52 32.27 131 20.34 ! Integrator fails again

*TRA END ! Start of J4
 *

*EVE 136 05:44 52 32.10 131 21.30 ! Sequence synchronization
 *

*EVE 137 06:19 52 33.65 131 28.28 ! Restart integrator again

*IDA HHERR09.D89

*TRA J3 1 5 420 1.665 306.917 0.183 9.081

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
7	420	3.1	2.9	119.5	108.5	80.9	17.7	0.7	9.23E-04	1.00E-01	2.86E+02
229	13740	63.8	59.1	172.3	126.1	29.7	129.5	0.0	2.29E-03	2.88E-01	1.70E+04

*
 *EVE 138 06:25 52 34.16 131 29.52 !
 *

*EVE 139 06:30 52 34.65 131 30.47 !

*TRA J2 6 33 1680 3.850 321.677 0.467 8.249

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
28	1680	7.1	6.6	120.7	113.8	29.7	84.2	5.1	7.88E-03	8.97E-01	5.92E+03
257	15420	70.9	65.7	167.2	124.9	29.7	117.8	0.0	2.80E-03	3.49E-01	2.29E+04

*
 *EVE 140 06:34 52 35.01 131 30.98 ! Sequence synchronization
 *

*EVE 141 06:58 52 37.67 131 34.40 !

*TRA END
 *

*EVE 142 07:05 52 37.74 131 33.70 !

*TRA J1 40 65 1560 4.019 139.368 0.433 9.275

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
26	1560	7.4	6.9	124.3	116.5	36.9	87.8	1.4	1.48E-03	1.73E-01	1.19E+03
283	16980	78.4	72.6	163.1	124.1	30.0	116.3	0.0	2.68E-03	3.33E-01	<u>2.41E+04</u>

*EVE 143 07:31 52 34.69 131 29.39 !

*TRA END

*

*EVE 144 13:37 not avail not avail ! Start-up, 20 m. bottom window

*IDA HHERR10.D89 ! Tape # 8

*

*EVE 145 14:09 52 34.90 131 29.40 ! JUAN PEREZ GRID - DUSK COVERAGE 1

*!

*! Tra T-name Seq1 Seq2 Pit Dis Bea TimeD Speed
*! # # # nm o hrs kn

*!

*TRA J1 34 58 1500 3.992 319.603 0.417 9.580

*ZER

N #	P #	Len km	Area km ²	Rang m	Col m	Dcs m	Dcb m	Lcb km	Vol D kg/m ³	Surf D kg/m ²	Biomass t
25	1500	7.4	6.8	89.8	84.8	49.4	40.7	0.9	1.91E-03	1.62E-01	1.11E+03
25	1500	7.4	6.8	89.8	84.8	49.4	40.7	0.0	1.91E-03	1.62E-01	1.11E+03

*

*EVE 146 14:25 52 36.81 131 32.07 ! Sequence synchronization

*

*EVE 147 14:34 52 37.94 131 33.66 !

*TRA END

*

*EVE 148 14:38 52 37.63 131 34.15 !

*TRA J2 63 84 1320 3.664 141.320 0.383 9.558

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
22	1320	6.8	6.3	109.5	104.5	49.4	56.8	2.6	4.15E-03	4.34E-01	2.72E+03
47	2820	14.2	13.1	99.2	94.2	49.4	52.1	0.0	3.10E-03	2.92E-01	3.84E+03

*

*EVE 149 15:01 52 34.77 131 30.38 !

*TRA J3 85 115 1860 4.936 128.310 0.500 9.872

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
31	1860	9.1	8.5	129.0	122.4	49.6	83.6	5.2	3.06E-03	3.75E-01	3.17E+03
78	4680	23.3	21.6	110.9	105.3	49.5	66.4	0.0	3.08E-03	3.25E-01	7.01E+03

*

*EVE 150 15:08 52 34.06 131 28.87 ! Manual bottom from 100 m. to 150 m.

*

*EVE 151 15:31 52 31.71 131 24.01 !

*TRA J4 116 132 1020 2.642 75.756 0.283 9.324

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
17	1020	4.9	4.5	121.3	116.3	89.9	8.6	1.1	1.21E-04	1.41E-02	6.38E+01
95	5700	28.2	26.1	112.7	107.2	49.8	65.9	0.0	2.53E-03	2.71E-01	7.07E+03

*

*EVE 152 15:48 52 32.36 131 19.80 !

*TRA END

*EVE 153 15:53 52 31.83 131 19.99 !

*TRA J5 138 154 1020 2.723 256.408 0.283 9.611

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
17	1020	5.0	4.7	139.3	134.3	79.8	59.5	3.7	1.15E-04	1.54E-02	7.19E+01
112	6720	33.3	30.8	116.8	111.3	50.1	65.8	0.0	2.08E-03	2.32E-01	7.15E+03

*

*EVE 154 16:10 52 31.19 131 24.34 !

*TRA J6 155 182 1680 4.642 308.662 0.483 9.604

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
28	1680	8.6	8.0	139.3	134.3	57.0	82.1	2.1	4.33E-04	5.82E-02	4.63E+02
140	8400	41.9	38.8	121.4	116.0	50.5	66.8	0.0	1.69E-03	1.96E-01	7.61E+03

*

*EVE 155 16:39 52 34.09 131 30.30 !

*TRA END

*

*EVE 156 16:45 52 33.65 131 30.63 !

*TRA J7 189 218 1800 4.762 128.121 0.483 9.853

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
30	1800	8.8	8.2	139.6	134.6	69.0	70.6	5.4	1.34E-04	1.81E-02	1.48E+02
170	10200	50.7	46.9	124.6	119.3	50.9	66.9	0.0	1.39E-03	1.65E-01	7.76E+03

*

*EVE 157 17:14 52 30.71 131 24.47 !

*TRA J8 219 237 1140 2.966 78.132 0.333 8.898

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
19	1140	5.5	5.1	138.8	133.8	86.0	53.1	2.0	8.26E-05	1.11E-02	5.62E+01
189	11340	56.2	52.0	126.0	120.7	51.1	66.8	0.0	1.24E-03	1.50E-01	7.81E+03

*

*EVE 158 17:34 52 31.32 131 19.70 !

*TRA END

*

*EVE 159 17:38 52 30.79 131 19.70 !

*TRA J9 243 261 1140 3.231 258.392 0.333 9.692

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
19	1140	6.0	5.5	135.7	130.7	38.8	78.2	5.4	1.12E-03	1.47E-01	8.13E+02
208	12480	62.1	57.6	126.9	121.7	50.0	67.8	0.0	1.23E-03	1.50E-01	8.63E+03

*

*EVE 160 17:58 52 30.14 131 24.90 !

*TRA J10 262 295 2040 5.501 307.120 0.567 9.708

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
34	2040	10.2	9.4	138.5	133.5	32.0	106.7	1.7	6.87E-03	9.17E-01	8.65E+03
242	14520	72.3	67.0	128.5	123.3	41.0	87.3	0.0	2.09E-03	2.58E-01	1.73E+04

*EVE 161 18:32 52 33.46 131 32.11 !
 *TRA J11 296 310 900 1.387 300.789 0.233 5.944

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
15	900	2.6	2.4	139.0	134.0	49.1	89.9	1.3	8.43E-04	1.13E-01	2.69E+02
257	15420	74.9	69.4	128.9	123.7	41.1	87.3	0.0	2.05E-03	2.53E-01	1.75E+04

*
 *EVE 162 18:46 52 34.17 131 34.07 ! Latitude corrected
 *TRA END
 *

*EVE 163 18:52 52 33.60 131 35.47 !
 *TRA J12 316 329 840 2.135 106.325 0.217 9.854

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
14	840	4.0	3.7	109.5	104.5	46.5	63.9	2.3	3.15E-04	3.29E-02	1.20E+02
271	16260	78.9	73.0	127.9	122.7	41.2	87.2	0.0	1.97E-03	2.42E-01	1.77E+04

*
 *EVE 164 19:05 52 33.00 131 32.10 !
 *TRA J13 330 364 2100 5.697 126.768 0.583 9.766

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
35	2100	10.6	9.8	125.1	120.1	42.0	81.0	6.1	3.12E-04	3.74E-02	3.66E+02
306	18360	89.4	82.8	127.6	122.4	41.2	87.0	0.0	1.78E-03	2.18E-01	1.80E+04

*
 *EVE 165 19:40 52 29.59 131 24.60 ! Tape # 9
 *TRA J14 365 382 1080 2.855 77.047 0.317 9.016

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
18	1080	5.3	4.9	107.7	102.7	68.5	20.2	2.0	1.14E-04	1.17E-02	5.74E+01
324	19440	94.7	87.7	126.5	121.3	41.3	86.8	0.0	1.70E-03	2.06E-01	<u>1.81E+04</u>

*
 *EVE 166 19:59 52 30.23 131 20.03 !
 *TRA END
 *

*EVE 167 02:09 52 36.70 131 31.92 ! Start-up integrator
 *DAT 11-DEC-90
 *IDA HHERR11.D89
 *

*EVE 168 02:15 not avail not avail ! Turning back to restart transect
 *

*EVE 169 02:37 52 34.14 131 29.40 ! Sequence synchronization

*EVE 170 02:45 52 34.94 131 29.58 ! JUAN PEREZ GRID - DAWN COVERAGE 2

```

*! -----
*! Tra T-name Seq1 Seq2 Pit Dis Bea TimeD Speed
*! # # # nm o hrs kn
*! -----
*TRA J1 37 61 1500 3.969 321.821 0.417 9.526
*ZER

```

N #	P #	Len km	Area km ²	Rang m	Col m	Dcs m	Dcb m	Lcb km	Vol D kg/m ³	Surf D kg/m ²	Biomass t
25	1500	7.4	6.8	110.0	105.0	31.4	84.3	6.2	5.72E-03	6.01E-01	4.09E+03
25	1500	7.4	6.8	110.0	105.0	31.4	84.3	0.0	5.72E-03	6.01E-01	4.09E+03

*
*EVE 171 03:10 52 38.06 131 33.62 !

*TRA END

*

*EVE 172 03:15 52 37.65 131 34.11 !

*TRA J2 68 91 1440 3.660 141.641 0.417 8.784

N #	P #	Len km	Area km ²	Rang m	Col m	Dcs m	Dcb m	Lcb km	Vol D kg/m ³	Surf D kg/m ²	Biomass t
24	1440	6.8	6.3	103.2	98.2	29.3	74.0	1.6	6.96E-03	6.83E-01	4.29E+03
49	2940	14.1	13.1	106.7	101.7	30.3	79.1	0.0	6.29E-03	6.40E-01	8.38E+03

*

*EVE 173 03:40 52 34.78 131 30.37 !

*TRA J3 92 126 2100 5.015 126.739 0.583 8.597

N #	P #	Len km	Area km ²	Rang m	Col m	Dcs m	Dcb m	Lcb km	Vol D kg/m ³	Surf D kg/m ²	Biomass t
35	2100	9.3	8.6	124.8	119.8	41.9	73.4	2.5	1.07E-03	1.28E-01	1.10E+03
84	5040	23.4	21.7	113.9	108.9	31.7	78.4	0.0	4.01E-03	4.37E-01	9.48E+03

*

*EVE 174 04:15 52 31.78 131 23.76 !

*TRA J4 127 142 960 2.526 77.190 0.267 9.473

N #	P #	Len km	Area km ²	Rang m	Col m	Dcs m	Dcb m	Lcb km	Vol D kg/m ³	Surf D kg/m ²	Biomass t
16	960	4.7	4.3	117.1	112.1	21.9	58.3	1.4	1.54E-03	1.73E-01	7.49E+02
100	6000	28.1	26.0	114.4	109.4	31.0	76.9	0.0	3.59E-03	3.93E-01	1.02E+04

*

*EVE 175 04:31 52 32.34 131 19.71 !

*TRA END

*

*EVE 176 04:38 52 31.80 131 20.09 !

*TRA J5 150 167 1080 2.810 258.091 0.300 9.368

N #	P #	Len km	Area km ²	Rang m	Col m	Dcs m	Dcb m	Lcb km	Vol D kg/m ³	Surf D kg/m ²	Biomass t
18	1080	5.2	4.8	139.0	134.0	89.2	49.8	3.2	9.84E-05	1.32E-02	6.36E+01
118	7080	33.3	30.8	118.3	113.3	31.3	76.8	0.0	2.95E-03	3.34E-01	1.03E+04

*EVE 177 04:56 52 31.22 131 24.61 !

*TRA J6 168 197 1800 4.565 306.419 0.500 9.129

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
30	1800	8.5	7.8	139.0	134.0	30.7	108.2	5.6	5.71E-03	7.65E-01	5.99E+03
148	8880	41.8	38.7	122.5	117.5	31.1	88.3	0.0	3.58E-03	4.21E-01	1.63E+04

*

*EVE 178 05:26 52 33.93 131 30.65 !

*TRA END

*

*EVE 179 05:30 52 33.63 131 30.82 !

*TRA J7 203 235 1980 4.903 126.260 0.567 8.653

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
33	1980	9.1	8.4	139.0	134.0	34.9	104.1	3.9	5.03E-03	6.74E-01	5.67E+03
181	10860	50.8	47.1	125.4	120.4	32.1	92.4	0.0	3.87E-03	4.66E-01	2.19E+04

*

*EVE 180 06:04 52 30.73 131 24.32 !

*TRA J8 236 255 1200 2.811 78.717 0.317 8.877

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
20	1200	5.2	4.8	138.8	133.8	84.7	54.2	2.2	4.86E-05	6.49E-03	3.13E+01
201	12060	56.0	51.9	126.7	121.7	32.2	92.4	0.0	3.48E-03	4.24E-01	2.20E+04

*

*EVE 181 06:23 52 31.28 131 19.79 !

*TRA END

*

*EVE 182 06:28 52 30.94 131 20.00 ! Entered 5 min late AND corrected

*TRA J9 261 282 1320 3.057 252.879 0.383 7.975

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
22	1320	5.7	5.2	134.5	129.5	80.4	38.0	3.8	2.08E-04	2.70E-02	1.41E+02
223	13380	61.7	57.1	127.4	122.4	32.5	92.0	0.0	3.16E-03	3.87E-01	2.21E+04

*

*EVE 183 06:51 52 30.04 131 24.80 ! Corrected, entered late

*TRA J10 283 317 2100 5.587 307.871 0.583 9.578

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
35	2100	10.3	9.6	138.7	133.7	46.0	92.9	5.8	5.68E-04	7.60E-02	7.28E+02
258	15480	72.0	66.7	129.0	124.0	32.9	92.0	0.0	2.76E-03	3.42E-01	2.28E+04

*

*EVE 184 07:26 52 33.47 131 32.05 !

*TRA J11 318 332 900 2.165 285.542 0.250 8.658

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
15	900	4.0	3.7	136.4	131.4	36.8	96.3	1.3	7.35E-03	9.66E-01	3.59E+03
273	16380	76.1	70.4	129.4	124.4	33.4	92.6	0.0	3.02E-03	3.75E-01	2.64E+04

*

*EVE 185 07:41 52 34.05 131 35.48 !

*TRA END

*EVE 186 07:47 52 33.62 131 35.41 !
 *TRA J12 339 354 960 2.403 108.432 0.267 9.013

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
16	960	4.5	4.1	119.1	114.1	58.0	66.5	2.0	6.38E-04	7.28E-02	3.00E+02
289	17340	80.5	74.6	128.8	123.8	33.7	92.3	0.0	2.90E-03	3.59E-01	2.67E+04

*
 *EVE 187 07:53 52 33.33 131 34.02 ! Tape # 10
 *

*EVE 188 08:03 52 32.86 131 31.66 !
 *TRA J13 355 390 2160 5.230 128.566 0.600 8.716

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
36	2160	9.7	9.0	127.0	122.0	95.0	15.8	6.9	2.63E-04	3.21E-02	2.88E+02
325	19500	90.2	83.5	128.6	123.6	34.4	91.5	0.0	2.62E-03	3.24E-01	2.70E+04

*
 *EVE 189 08:39 52 29.60 131 24.94 ! Longitude corrected
 *TRA J14 391 411 1260 3.208 77.762 0.350 9.166

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
21	1260	5.9	5.5	111.2	106.2	90.4	11.9	2.6	1.05E-04	1.12E-02	6.15E+01
346	20760	96.1	89.0	127.5	122.5	34.5	91.3	0.0	2.48E-03	3.04E-01	<u>2.71E+04</u>

*
 *EVE 190 09:00 52 30.28 131 19.79 !
 *TRA END
 *

*EVE 191 13:56 52 34.47 131 29.18 ! Start-up integrator
 *IDA HHERR12.D89
 *

*EVE 192 13:58 52 34.79 131 29.44 ! JUAN PEREZ GRID - DUSK COVERAGE 2
 *!

*! Tra	T-name	Seq1	Seq2	Pit	Dis	Bea	TimeD	Speed
*!		#	#	#	nm	o	hrs	kn

*!	J1	3	28	1560	4.185	321.172	0.417	10.043
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*ZER

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
#	#	km	km^2	m	m	m	m	km	kg/m^3	kg/m^2	t
26	1560	7.8	7.2	111.4	106.4	50.0	72.1	6.7	5.77E-03	6.14E-01	4.41E+03
26	1560	7.8	7.2	111.4	106.4	50.0	72.1	0.0	5.77E-03	6.14E-01	4.41E+03

*
 *EVE 193 14:23 52 38.05 131 33.76 !
 *TRA END
 *

*EVE 194 14:28 52 37.60 131 34.08 !
 *TRA J2 33 56 1440 3.571 141.384 0.400 8.927

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
24	1440	6.6	6.1	106.3	101.3	50.7	56.4	2.3	5.23E-03	5.30E-01	3.24E+03
50	3000	14.4	13.3	109.1	104.1	50.3	65.4	0.0	5.53E-03	5.75E-01	7.65E+03

*EVE 195 14:52 52 34.81 131 30.41 !

*TRA J3 57 89 1980 4.974 128.406 0.550 9.043

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
33	1980	9.2	8.5	126.9	121.9	66.9	68.4	7.5	4.37E-03	5.32E-01	4.54E+03
83	4980	23.6	21.8	116.1	111.1	56.5	66.5	0.0	5.03E-03	5.59E-01	1.22E+04

*

*EVE 196 14:54 52 34.58 131 29.94 ! Sequence synchronization

*

*EVE 197 15:25 52 31.72 131 24.00 !

*TRA J4 90 106 1020 2.573 76.288 0.283 9.082

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
17	1020	4.8	4.4	118.9	113.9	102.5	32.6	0.4	2.48E-03	2.82E-01	1.24E+03
100	6000	28.3	26.2	116.5	111.5	60.7	63.4	0.0	4.59E-03	5.12E-01	1.34E+04

*

*EVE 198 15:42 52 32.33 131 19.89 !

*TRA END

*

*EVE 199 15:48 52 31.80 131 20.09 !

*TRA J5 113 130 1080 2.691 256.461 0.300 8.969

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
18	1080	5.0	4.6	139.0	134.0	92.3	46.8	3.3	3.60E-05	4.83E-03	2.23E+01
118	7080	33.3	30.9	119.9	114.9	60.8	63.4	0.0	3.80E-03	4.36E-01	1.35E+04

*

*EVE 200 16:06 52 31.17 131 24.39 !

*TRA J6 131 159 1740 4.578 308.505 0.483 9.471

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
29	1740	8.5	7.9	139.0	134.0	98.9	40.1	2.0	4.14E-03	5.54E-01	4.35E+03
147	8820	41.8	38.7	123.8	118.8	70.1	57.7	0.0	3.87E-03	4.60E-01	1.78E+04

*

*EVE 201 16:35 52 34.02 131 30.28 !

*TRA END

*

*EVE 202 16:41 52 33.66 131 30.73 !

*TRA J7 166 198 1980 4.917 129.690 0.550 8.940

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
33	1980	9.1	8.4	139.1	134.1	88.6	50.5	3.8	5.89E-03	7.90E-01	6.66E+03
180	10800	50.9	47.1	126.5	121.5	75.1	55.7	0.0	4.27E-03	5.19E-01	2.45E+04

*

*EVE 203 17:14 52 30.52 131 24.51 !

*TRA J8 199 219 1260 2.891 74.555 0.350 8.261

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
21	1260	5.4	5.0	138.9	133.9	55.9	83.2	2.3	4.53E-04	6.06E-02	3.01E+02
201	12060	56.3	52.1	127.7	122.7	74.9	56.1	0.0	3.88E-03	4.76E-01	2.48E+04

*

*EVE 204 17:35 52 31.29 131 19.93 !

*TRA END

*EVE 205 17:43 52 30.73 131 20.16 !

*TRA J9 228 246 1140 2.972 256.579 0.317 9.386

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
19	1140	5.5	5.1	134.7	129.7	88.0	34.2	3.8	1.37E-04	1.77E-02	9.03E+01
220	13200	61.8	57.2	128.3	123.3	75.0	56.0	0.0	3.53E-03	4.35E-01	2.49E+04

*

*EVE 206 18:02 52 30.04 131 24.91 !

*TRA J10 247 282 2160 5.484 309.655 0.600 9.140

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
36	2160	10.2	9.4	138.1	133.1	27.5	111.2	4.2	8.61E-04	1.15E-01	1.08E+03
256	15360	71.9	66.6	129.7	124.7	73.0	58.3	0.0	3.12E-03	3.90E-01	2.59E+04

*

*EVE 207 18:38 52 33.54 131 31.85 !

*TRA J11 283 297 900 2.315 283.743 0.233 9.922

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
15	900	4.3	4.0	137.2	132.2	26.6	111.7	0.7	9.41E-03	1.24E+00	4.94E+03
271	16260	76.2	70.6	130.1	125.1	65.6	66.8	0.0	3.50E-03	4.38E-01	3.09E+04

*

*EVE 208 18:52 52 34.09 131 35.55 !

*TRA END

*

*EVE 209 18:59 52 33.56 131 35.32 ! Tape # 11

*TRA J12 304 317 840 2.089 105.549 0.233 8.954

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
14	840	3.9	3.6	112.0	107.0	22.8	86.2	2.7	2.18E-03	2.34E-01	8.38E+02
285	17100	80.1	74.2	129.3	124.3	64.4	67.3	0.0	3.44E-03	4.28E-01	3.17E+04

*

*EVE 210 19:13 52 33.00 131 32.01 !

*TRA J13 318 356 2340 5.594 129.255 0.650 8.607

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
39	2340	10.4	9.6	122.2	117.2	48.9	68.7	2.7	1.79E-04	2.10E-02	2.01E+02
324	19440	90.4	83.7	128.4	123.4	64.3	67.3	0.0	3.09E-03	3.81E-01	3.19E+04

*

*EVE 211 19:52 52 29.46 131 24.89 !

*TRA J14 357 380 1440 3.090 75.377 0.400 7.725

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
24	1440	5.7	5.3	107.7	102.7	73.6	23.7	2.4	1.63E-04	1.67E-02	8.85E+01
348	20880	96.2	89.0	127.2	122.2	64.4	67.2	0.0	2.94E-03	3.59E-01	<u>3.20E+04</u>

*

*EVE 212 20:16 52 30.24 131 19.98 !

*TRA END

*

*EVE 213 01:52 52 30.00 131 22.25 ! Start-up integrator

*DAT 12-DEC-90

*IDA HHERR13.D89

*EVE 214 02:06 52 29.15 131 19.90 ! PEREZ ENTRANCE GRID - DAWN COVERAGE 1

*!

*! Tra T-name Seq1 Seq2 Pit Dis Bea TimeD Speed
*! # # # nm o hrs kn

*!

*TRA P9 16 46 1860 4.954 99.997 0.533 9.288

*ZER

N #	P #	Len km	Area km ²	Rang m	Col m	Dcs m	Dcb m	Lcb km	Vol D kg/m ³	Surf D kg/m ²	Biomass t
31	1860	9.2	8.5	64.1	59.1	39.4	34.9	3.0	2.98E-05	1.76E-03	1.50E+01
31	1860	9.2	8.5	64.1	59.1	39.4	34.9	0.0	2.98E-05	1.76E-03	1.50E+01

*

*EVE 215 02:10 52 29.05 131 18.96 ! Sequence synchronization

*

*EVE 216 02:38 52 28.29 131 11.89 !

*TRA END

*

*EVE 217 02:43 52 28.79 131 12.07 !

*TRA P8 53 89 2220 4.943 281.672 0.617 8.015

N #	P #	Len km	Area km ²	Rang m	Col m	Dcs m	Dcb m	Lcb km	Vol D kg/m ³	Surf D kg/m ²	Biomass t
37	2220	9.2	8.5	80.0	75.0	54.1	33.2	5.3	3.23E-05	2.43E-03	2.06E+01
68	4080	18.3	17.0	72.1	67.1	47.9	33.9	0.0	3.12E-05	2.09E-03	3.55E+01

*

*EVE 218 03:06 52 29.41 131 16.91 ! Waypoint

*

*EVE 219 03:20 52 29.79 131 20.02 !

*TRA END

*

*EVE 220 03:28 52 30.22 131 20.03 !

*TRA P7 98 128 1860 5.045 100.045 0.517 9.765

N #	P #	Len km	Area km ²	Rang m	Col m	Dcs m	Dcb m	Lcb km	Vol D kg/m ³	Surf D kg/m ²	Biomass t
31	1860	9.3	8.7	100.3	95.3	73.1	37.3	3.6	4.85E-05	4.62E-03	4.00E+01
99	5940	27.7	25.6	81.6	76.6	61.2	35.7	0.0	3.85E-05	2.95E-03	7.55E+01

*

*EVE 221 03:59 52 29.34 131 11.87 !

*TRA END

*

*EVE 222 04:06 52 29.87 131 12.25 !

*TRA P6 136 172 2220 5.010 280.583 0.617 8.124

N #	P #	Len km	Area km ²	Rang m	Col m	Dcs m	Dcb m	Lcb km	Vol D kg/m ³	Surf D kg/m ²	Biomass t
37	2220	9.3	8.6	98.4	93.4	78.7	33.4	5.6	3.82E-05	3.57E-03	3.07E+01
136	8160	37.0	34.2	85.8	80.8	66.3	35.1	0.0	3.84E-05	3.10E-03	1.06E+02

*

*EVE 223 04:43 52 30.79 131 20.34 !

*TRA END

```

*EVE 224 04:50 52 31.23 131 19.93 !
*TRA P5      179  210  1920  4.991  99.456  0.533  9.359

  N    P    Len Area Rang  Col  Dcs  Dcb  Lcb  Vol D  Surf D  Biomass
  32  1920   9.2  8.6 128.9 123.9 88.8 40.7  4.7 4.64E-05 5.75E-03 4.92E+01
 168 10080  46.2  42.8  94.4  89.4 73.4 36.8  0.0 4.06E-05 3.63E-03 1.55E+02
*
*EVE 225 05:22 52 30.41 131 11.84 !
*TRA END
*
*EVE 226 05:29 52 30.92 131 12.15 !
*TRA P4      219  254  2160  5.163 280.602  0.600  8.605

  N    P    Len Area Rang  Col  Dcs  Dcb  Lcb  Vol D  Surf D  Biomass
  36  2160   9.6  8.9 136.1 131.1 91.3 44.8  5.0 2.48E-05 3.26E-03 2.88E+01
 204 12240  55.8  51.6 101.6  96.6 76.2 38.1  0.0 3.69E-05 3.57E-03 1.84E+02
*
*EVE 227 06:05 52 31.87 131 20.49 !
*TRA END
*
*EVE 228 06:11 52 32.41 131 19.95 !
*TRA P3      260  290  1860  4.931 101.226  0.517  9.543

  N    P    Len Area Rang  Col  Dcs  Dcb  Lcb  Vol D  Surf D  Biomass
  31  1860   9.1  8.5 138.3 133.3 83.8 54.6  3.1 3.76E-05 5.01E-03 4.24E+01
 235 14100  64.9  60.1 106.8 101.8 77.6 41.2  0.0 3.71E-05 3.77E-03 2.27E+02
*
*EVE 229 06:36 52 31.66 131 13.90 ! Tape # 12
*
*EVE 230 06:42 52 31.45 131 12.00 ! Entered 5 min late AND corrected
*TRA END
*
*EVE 231 06:47 52 31.96 131 12.00 ! Entered 8 min late AND corrected
*TRA P2      296  328  1980  4.334 281.581  0.550  7.879

  N    P    Len Area Rang  Col  Dcs  Dcb  Lcb  Vol D  Surf D  Biomass
  33  1980   8.0  7.4 138.7 133.7 91.4 47.1  3.5 3.60E-05 4.81E-03 3.58E+01
 268 16080  72.9  67.5 110.3 105.3 79.5 42.0  0.0 3.69E-05 3.89E-03 2.62E+02
*
*EVE 232 07:20 52 32.83 131 18.98 !
*TRA END
*
*EVE 233 07:25 52 33.32 131 18.57 !
*TRA P1      334  360  1620  4.042 101.268  0.450  8.983

  N    P    Len Area Rang  Col  Dcs  Dcb  Lcb  Vol D  Surf D  Biomass
  27  1620   7.5  6.9 109.1 104.1 82.4 27.5  4.0 7.38E-05 7.68E-03 5.32E+01
 295 17700  80.4  74.5 110.2 105.2 80.0 39.6  0.0 4.03E-05 4.24E-03 3.16E+02
*
*EVE 234 07:52 52 32.53 131 12.05 !
*TRA END

```

*EVE 235 13:31 52 30.02 131 20.85 ! Start-up integrator

*IDA HHERR14.D89

*

*EVE 236 13:42 52 30.24 131 19.59 ! JUAN PEREZ GRID - DUSK COVERAGE 3

*!

*! Tra T-name Seq1 Seq2 Pit Dis Bea TimeD Speed
*! # # # nm o hrs kn

*! -----
*TRA J14 12 31 1200 3.306 257.420 0.350 9.446
*ZER

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
#	#	km	km ²	m	m	m	m	km	kg/m ³	kg/m ²	t
20	1200	6.1	5.7	114.2	109.2	103.7	8.4	3.2	1.62E-04	1.77E-02	1.00E+02
20	1200	6.1	5.7	114.2	109.2	103.7	8.4	0.0	1.62E-04	1.77E-02	1.00E+02

*

*EVE 237 14:03 52 29.52 131 24.89 !

*TRA J13 32 69 2280 5.666 308.279 0.617 9.188

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
#	#	km	km ²	m	m	m	m	km	kg/m ³	kg/m ²	t
38	2280	10.5	9.7	120.4	115.4	46.4	44.8	10.0	1.86E-03	2.15E-01	2.09E+03
58	3480	16.6	15.4	118.1	113.1	49.0	43.1	0.0	1.26E-03	1.42E-01	2.19E+03

*

*EVE 238 14:10 52 30.13 131 26.38 ! Sequence synchronization

*

*EVE 239 14:40 52 33.03 131 32.20 !

*TRA J12 70 82 780 2.060 285.199 0.233 8.830

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
#	#	km	km ²	m	m	m	m	km	kg/m ³	kg/m ²	t
13	780	3.8	3.5	104.5	99.5	48.2	49.8	1.1	3.65E-03	3.63E-01	1.28E+03
71	4260	20.4	18.9	115.6	110.6	48.7	45.6	0.0	1.66E-03	1.83E-01	3.47E+03

*

*EVE 240 14:54 52 33.57 131 35.47 !

*TRA END

*

*EVE 241 14:59 52 34.08 131 35.31 !

*TRA J11 88 102 900 2.438 105.218 0.250 9.752

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
#	#	km	km ²	m	m	m	m	km	kg/m ³	kg/m ²	t
15	900	4.5	4.2	131.6	126.6	104.3	21.2	3.2	6.10E-04	7.72E-02	3.23E+02
86	5160	24.9	23.1	118.5	113.5	53.4	43.5	0.0	1.45E-03	1.64E-01	3.79E+03

*

*EVE 242 15:14 52 33.44 131 31.44 !

*TRA J10 103 134 1920 5.357 129.539 0.533 10.044

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
#	#	km	km ²	m	m	m	m	km	kg/m ³	kg/m ²	t
32	1920	9.9	9.2	138.9	133.9	100.1	38.9	3.2	4.40E-05	5.89E-03	5.41E+01
118	7080	34.9	32.3	124.3	119.3	54.1	43.4	0.0	9.99E-04	1.19E-01	3.85E+03

*EVE 243 15:46 52 30.03 131 24.65 !

*TRA J9 135 153 1140 2.964 75.744 0.317 9.360

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
19	1140	5.5	5.1	133.9	128.9	104.8	30.5	2.9	1.71E-05	2.21E-03	1.12E+01
137	8220	40.4	37.4	125.6	120.6	54.2	43.4	0.0	8.56E-04	1.03E-01	3.86E+03

*

*EVE 244 16:05 52 30.76 131 19.93 !

*TRA END

*

*EVE 245 16:11 52 31.26 131 20.08 !

*TRA J8 160 177 1080 2.884 256.568 0.300 9.614

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
18	1080	5.3	4.9	136.3	131.3	118.0	12.7	2.2	6.95E-05	9.13E-03	4.52E+01
155	9300	45.7	42.3	126.9	121.9	55.0	43.0	0.0	7.57E-04	9.22E-02	3.90E+03

*

*EVE 246 16:29 52 30.59 131 24.69 !

*TRA J7 178 207 1800 4.847 309.600 0.500 9.695

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
30	1800	9.0	8.3	139.3	134.3	74.4	65.0	6.2	1.21E-04	1.62E-02	1.35E+02
185	11100	54.7	50.6	128.9	123.9	55.6	43.8	0.0	6.44E-04	7.98E-02	4.04E+03

*

*EVE 247 16:59 52 33.68 131 30.83 !

*TRA END

*

*EVE 248 17:03 52 33.94 131 30.18 !

*TRA J6 212 239 1680 4.522 129.225 0.467 9.691

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
28	1680	8.4	7.8	138.2	133.2	82.3	56.4	3.4	1.91E-04	2.55E-02	1.98E+02
213	12780	63.0	58.4	130.1	125.1	56.9	44.4	0.0	5.80E-04	7.26E-02	4.24E+03

*

*EVE 249 17:31 52 31.08 131 24.42 !

*TRA J5 240 257 1080 2.893 73.951 0.300 9.645

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
18	1080	5.4	5.0	139.6	134.6	91.1	48.5	1.8	9.82E-05	1.32E-02	6.56E+01
231	13860	68.4	63.3	130.9	125.9	57.4	44.4	0.0	5.39E-04	6.79E-02	4.30E+03

*

*EVE 250 17:49 52 31.88 131 19.85 !

*TRA END

*

*EVE 251 17:54 52 32.29 131 20.14 !

*TRA J4 263 277 900 2.527 257.193 0.250 10.107

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
15	900	4.7	4.3	119.0	114.0	101.4	-3.8	3.2	1.72E-04	1.96E-02	8.48E+01
246	14760	73.1	67.7	130.1	125.1	58.2	43.5	0.0	5.18E-04	6.48E-02	4.39E+03

*EVE 252 18:09 52 31.73 131 24.19 !

*TRA J3 278 307 1800 4.917 308.489 0.500 9.834

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
30	1800	9.1	8.4	128.9	123.9	25.7	85.9	6.2	1.31E-02	1.62E+00	1.37E+04
276	16560	82.2	76.1	130.0	125.0	33.6	75.6	0.0	1.90E-03	2.37E-01	1.80E+04

*

*EVE 253 18:28 52 33.68 131 28.26 ! Tape # 13

*

*EVE 254 18:39 52 34.79 131 30.52 !

*TRA J2 308 330 1380 3.703 322.291 0.383 9.661

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
23	1380	6.9	6.4	108.8	103.8	26.6	74.0	5.5	1.38E-02	1.43E+00	9.10E+03
299	17940	89.1	82.5	128.4	123.4	31.3	75.1	0.0	2.67E-03	3.29E-01	2.71E+04

*

*EVE 255 19:02 52 37.72 131 34.25 !

*TRA END

*

*EVE 256 19:07 52 37.96 131 33.54 !

*TRA J1 336 360 1500 4.073 140.887 0.417 9.774

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
25	1500	7.5	7.0	114.4	109.4	30.7	83.2	0.9	1.78E-02	1.95E+00	1.36E+04
324	19440	96.6	89.4	127.3	122.3	31.1	77.8	0.0	3.73E-03	4.56E-01	4.08E+04

*

*EVE 257 19:32 52 34.80 131 29.31 !

*TRA END

*

*EVE 258 00:19 52 30.41 131 22.21 ! Start cal: -20 dB, pulse,

*DAT 13-DEC-90 ! 3 m. separation, rx gain -12dB

*IDA HHERR15.D89

*

*EVE 259 00:27 52 30.40 131 24.23 ! Cont. cal: switch from pulse to CW

*

*EVE 260 00:37 52 31.42 131 26.13 ! End calibration

*

*EVE 261 01:40 52 33.88 131 29.03 ! Start up integrator

*IDA HHERR16.D89

*

*EVE 262 01:46 52 34.83 131 29.47 ! JUAN PEREZ GRID - DAWN COVERAGE 3

*!

*!	Tra	T-name	Seq1	Seq2	Pit	Dis	Bea	TimeD	Speed
*!			#	#	#	nm	o	hrs	kn

*!

*TRA	J1		7	32	1560	4.069	321.398	0.433	9.390
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*ZER

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
#	#	km	km^2	m	m	m	m	km	kg/m^3	kg/m^2	t
26	1560	7.5	7.0	109.2	104.2	32.6	89.1	6.7	3.47E-03	3.62E-01	2.52E+03
26	1560	7.5	7.0	109.2	104.2	32.6	89.1	0.0	3.47E-03	3.62E-01	2.52E+03

*EVE 263 01:49 52 35.11 131 29.83 ! Sequence synchronization

*

*EVE 264 02:12 52 38.01 131 33.65 !

*TRA END

*

*EVE 265 02:15 52 38.00 131 34.13 ! Set to manual bottom track = 150 m.

*

*EVE 266 02:16 52 37.75 131 34.21 ! Set back to auto/manual bot track

*

*EVE 267 02:17 52 37.69 131 34.22 ! Entered 4 min late AND corrected

*TRA J2 38 61 1440 3.783 141.245 0.400 9.457

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
24	1440	7.0	6.5	101.0	96.0	43.2	58.0	3.5	1.28E-03	1.23E-01	8.00E+02
50	3000	14.5	13.5	105.3	100.3	35.1	81.6	0.0	2.46E-03	2.47E-01	3.32E+03

*

*EVE 268 02:41 52 34.74 131 30.32 !

*TRA J3 62 92 1860 4.943 127.952 0.533 9.268

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
31	1860	9.2	8.5	120.3	115.3	24.5	72.9	2.8	1.72E-02	1.98E+00	1.68E+04
81	4860	23.7	21.9	111.1	106.1	26.2	74.4	0.0	8.64E-03	9.16E-01	2.01E+04

*

*EVE 269 03:13 52 31.70 131 23.91 !

*TRA J4 93 109 1020 2.605 74.640 0.267 9.770

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
17	1020	4.8	4.5	121.8	116.8	90.4	22.2	1.4	1.79E-04	2.09E-02	9.32E+01
98	5880	28.5	26.4	112.9	107.9	26.5	74.1	0.0	7.09E-03	7.65E-01	2.02E+04

*

*EVE 270 03:29 52 32.39 131 19.78 !

*TRA END

*

*EVE 271 03:34 52 31.85 131 20.00 ! Entered 4 min late AND corrected

*TRA J5 115 135 1260 2.817 255.402 0.350 8.049

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
21	1260	5.2	4.8	139.3	134.3	63.7	75.6	2.4	7.10E-05	9.54E-03	4.61E+01
119	7140	33.7	31.2	117.0	112.0	26.6	74.1	0.0	5.79E-03	6.48E-01	2.02E+04

*

*EVE 272 03:55 52 31.14 131 24.48 !

*TRA J6 136 166 1860 4.647 309.569 0.517 8.993

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
31	1860	8.6	8.0	139.3	134.3	26.9	112.4	7.0	1.10E-03	1.47E-01	1.18E+03
150	9000	42.3	39.2	121.5	116.5	26.6	76.2	0.0	4.69E-03	5.46E-01	2.14E+04

*

*EVE 273 04:26 52 34.10 131 30.37 !

*TRA END

*EVE 274 04:32 52 33.69 131 30.69 !

*TRA J7 173 202 1800 4.827 127.677 0.500 9.653

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
30	1800	8.9	8.3	139.3	134.3	26.7	112.5	1.4	6.70E-03	9.00E-01	7.45E+03
180	10800	51.3	47.5	124.6	119.6	26.7	85.6	0.0	5.08E-03	6.08E-01	2.89E+04

*

*EVE 275 05:02 52 30.74 131 24.41 !

*TRA J8 203 221 1140 3.079 78.004 0.333 9.237

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
19	1140	5.7	5.3	139.3	134.3	82.5	56.8	2.7	3.46E-05	4.64E-03	2.45E+01
199	11940	57.0	52.8	126.1	121.1	26.7	85.6	0.0	4.52E-03	5.48E-01	2.89E+04

*

*EVE 276 05:22 52 31.38 131 19.46 !

*TRA END

*

*EVE 277 05:28 52 30.71 131 20.11 !

*TRA J9 229 249 1260 2.935 257.609 0.350 8.387

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
21	1260	5.4	5.0	133.7	128.7	100.2	29.4	3.7	1.16E-04	1.50E-02	7.54E+01
220	13200	62.4	57.8	126.7	121.7	26.9	85.4	0.0	4.12E-03	5.01E-01	2.90E+04

*

*EVE 278 05:49 52 30.08 131 24.82 !

*TRA J10 250 286 2220 5.444 308.642 0.617 8.829

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
37	2220	10.1	9.3	138.3	133.3	46.2	92.0	6.2	1.94E-04	2.59E-02	2.42E+02
257	15420	72.5	67.1	128.4	123.4	27.1	85.5	0.0	3.53E-03	4.35E-01	2.92E+04

*

*EVE 279 06:26 52 33.48 131 31.81 !

*TRA J11 287 301 900 2.195 284.245 0.250 8.781

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
15	900	4.1	3.8	135.3	130.3	46.5	88.2	1.5	1.73E-03	2.25E-01	8.47E+02
272	16320	76.6	70.9	128.7	123.7	27.6	85.5	0.0	3.43E-03	4.24E-01	3.01E+04

*

*EVE 280 06:28 52 33.57 131 32.25 ! Tape # 14

*

*EVE 281 06:41 52 34.02 131 35.31 !

*TRA END

*

*EVE 282 06:47 52 33.56 131 35.23 !

*TRA J12 307 320 840 2.197 105.579 0.217 10.140

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
14	840	4.1	3.8	116.4	111.4	61.0	56.2	2.0	3.16E-04	3.53E-02	1.33E+02
286	17160	80.6	74.7	128.1	123.1	27.8	85.4	0.0	3.28E-03	4.04E-01	3.02E+04

*EVE 283 07:00 52 32.97 131 31.75 !

*TRA J13 321 354 2040 5.469 128.037 0.567 9.652

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
34	2040	10.1	9.4	127.1	122.1	65.2	66.8	3.3	1.40E-04	1.71E-02	1.60E+02
320	19200	90.8	84.0	128.0	123.0	28.0	85.3	0.0	2.94E-03	3.61E-01	3.04E+04

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*EVE 284 07:34 52 29.60 131 24.67 !

*TRA J14 355 373 1140 3.013 77.928 0.333 9.038

N	P	Len	Area	Rang	Col	Dcs	Dcb	Lcb	Vol D	Surf D	Biomass
19	1140	5.6	5.2	103.6	98.6	71.5	22.9	1.6	1.68E-04	1.66E-02	8.58E+01
339	20340	96.3	89.2	126.6	121.6	28.1	85.1	0.0	2.81E-03	3.41E-01	<u>3.04E+04</u>

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*EVE 285 07:54 52 30.23 131 19.83 ! End of Sounding grids

*TRA END

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*EVE END

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*ICO KE:

*EXI

