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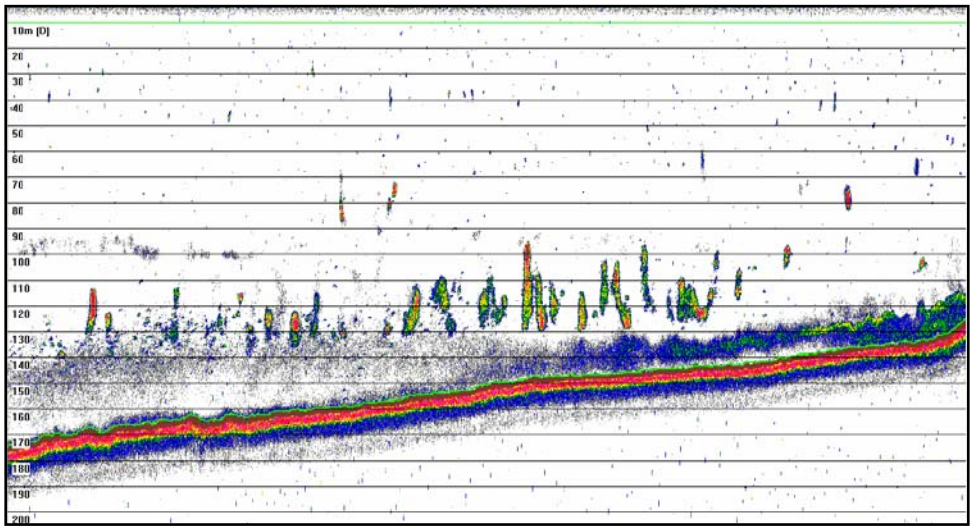
SEABIRD, FISH, MARINE MAMMAL AND OCEANOGRAPHY COORDINATED INVESTIGATIONS (SMMOCI) IN THE SEMIDI ISLANDS, ALASKA, JULY 2001 AND 2004



By
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EXECUTIVE SUMMARY

When President Herbert Hoover created the Semidi Islands Reservation in the early 1930s he included not only all of the islands within the Semidi group but also approximately 250,000 acres of the surrounding water column and seabed. This is one of the few areas where the Alaska Maritime National Wildlife Refuge (AMNWR) actually owns the waters and associated submerged lands surrounding an island seabird colony.

We conducted surveys of seabirds, fish, marine mammals and oceanographic conditions near the Semidi Islands from the *M/V Tiĝlax̂* during 19-24 July 2001 and 10-15 July 2004 as part of the Seabird, Fish, Marine Mammal and Oceanography Coordinated Investigations (SMMOCI) project. The objective was to characterize the marine environment in the vicinity of Chowiet Island, one of nine seabird colonies monitored annually by the AMNWR.

In addition to censusing seabirds and marine mammals encountered on transects, we characterized local oceanography by measuring surface temperature and salinity and by taking CTD profiles of the water column. We measured the relative abundance of zooplankton and fish biomass using a dual-frequency echosounder. We sampled with a mid-water trawl net, set long-lines to catch large demersal fish for diet analysis, used bottom trawls to describe the bottom fauna and sampled plankton at several sites each year.

In 2001 we counted a total of 62,175 birds on transects (including one flock of an estimated 50,000 shearwaters), resulting in a density of 476 birds/km^2. Removing the unusually large flock of non-breeding shearwaters from the calculation resulted in a total of 12,175 birds with a density of 93 birds/km^2. In 2004 we counted 8820 total birds on the same transects sampled in 2001, for a density of 68 birds/km^2. We also circumnavigated four islands at approximately one nautical mile offshore in 2004, yielding a total of 5265 birds and a density of 198 birds/km^2. Bird densities in the Semidi Islands (excluding the large shearwater flock in 2001) are somewhat lower than those from most other areas in the northern Gulf of Alaska and Aleutian Islands, especially in 2004. Fin whales and Dall's porpoises were the most common marine mammals we encountered during transects in both years.

Acoustic biomass was greatest in the relatively deeper waters to the east of the Semidi Islands in both 2001 and 2004. Mid-water trawl catches were dominated by jelly fauna and walleye pollock in both years regardless of the strength of the acoustic sign or the depth at which we fished. Yelloweye rockfish and Pacific halibut were the most common fishes caught on long-lines in both years. Brittle stars were the most numerous invertebrates caught in bottom trawls in both years. Southern rock sole was the most numerous fish captured in 2001 bottom trawls whereas we caught more Pacific cod than any other fish in 2004. Copepods were the numerically dominant animals captured during both neuston and vertical plankton tows in both years.

CTD profiles from both years indicate a stratified water column with generally warmer, less saline water at the surface and colder, more saline water at depth. A pocket of relatively cooler, saltier water occurred at or near the surface close to the islands, indicating upwelling of deep water to nearshore areas, especially in 2001. Maps of sea surface temperature and salinity did not show any obvious fronts in either year.

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INTRODUCTION

When President Herbert Hoover created the Semidi Islands Reservation in Alaska in the early 1930s he included not only all of the islands within the Semidi group but also approximately 250,000 acres of the surrounding water column and seabed (Fig.1). The area (including the waters) was incorporated into the Alaska Maritime National Wildlife Refuge (AMNWR) and designated as wilderness in 1980 under the Alaska National Interest Lands Conservation Act (ANILCA). This is one of the few areas where the AMNWR actually owns the waters and associated submerged lands surrounding an island seabird colony.

We conducted surveys of seabirds, fish, marine mammals and oceanographic conditions near the Semidi Islands, Alaska (Fig. 1) from the *M/V Tiĝlax̂* during 19-24 July 2001 and 10-15 July 2004 (Table 1, Fig. 2) as part of the Seabird, Fish, Marine Mammal and Oceanography Coordinated Investigations (SMMOCI) project. The objective was to characterize the marine environment in the vicinity of Chowiet Island, one of nine seabird colonies monitored annually by the AMNWR (Dragoo et al. 2004).

In addition to censusing seabirds and marine mammals encountered on transects, we characterized local oceanography by measuring water temperature and salinity continuously at the sea surface and by taking profiles of the water column on a series of CTD (conductivity, temperature and depth) transects. We measured the relative abundance of zooplankton and fish biomass using a dual-frequency echosounder. We sampled with a mid-water trawl net to help determine which species were associated with observed acoustic sign. We set long-lines to catch large demersal fish species and used stomach samples from them to characterize their diets. We used bottom trawls to describe the bottom fauna and we sampled plankton at several sites each year.

This report summarizes the data collected from SMMOCI cruises to the Semidi Islands in 2001 and 2004. We don't make comparisons between years here because we are in the process of evaluating the objectives, methods, etc. of the project. A post-doctoral position has been established for this purpose. The results from this synthesis will allow us to make more meaningful comparisons in the future.

Personnel

The following personnel participated in the cruises:

2001

Bird Crew: Vernon Byrd, Jeff Williams, Gary Drew, Bill Henry, Michelle Wada, Dave Pitkin
Fish Crew: Brenda Holladay, Catherine (Kitty) Mecklenburg, Barry Sampson, Mike Palmer
Hydroacoustics Crew: Don Dragoo, Doug Palmer
Tiĝlax̂ Crew: Billy Pepper, Dan Erickson, John Farris, Joe Isenhour, Charles McGee, Rhonda Ecker

2004

Bird Crew: Jeff Williams, Martin Renner, Heather Renner, Michelle St. Peters, Anne Morkill, Martin Robards
Fish Crew: Brenda Holladay, Catherine (Kitty) Mecklenburg , Jeff Anderson, Ken Gates
Hydroacoustics Crew: Don Dragoo
Tiĝlax̂ Crew: Billy Pepper, Dan Erickson, John Faris, Joe Isenhour, Dan McNulty, Rhonda Ecker

METHODS

Bird and Marine Mammal Observations

We counted birds in both years using strip transect methods described by Gould and Forsell (1989), and employed on previous SMMOCI cruises. Two observers, stationed on the flying bridge of the *M/V Tiĝlax̂* (one on each side of the ship), continuously recorded all birds observed on the water within 150 meters on either side of, and 300 meters in front of, the vessel. Distances were estimated based on the angle of view from the ship's flying bridge to the object on the water. We counted flying birds on 360° 'scans' every three minutes. We radioed observations to a data recorder who entered the data into a logging computer using dLOG2 (Ver2.1.4, R. G. Ford Consulting, Portland, OR) which assigned all records GPS positions in real time.

We conducted surveys on the same 14 linear transects both years, encompassing the entire Semidi Island group as well as surrounding offshore waters (Table 1, Fig. 2). We attempted to follow the exact same transect routes in both years. Deviations from this occurred due to winds, currents and/or navigation errors. In some cases it was necessary for us to stop surveying before reaching the end of the transect because of nightfall so the end points of some transects differed between years.

We also surveyed birds during circumnavigations of four islands in 2004, during which the ship traveled approximately one nautical mile (1.84 km) offshore (Table 1, Fig. 2). We counted marine mammals on the same transects as birds. We mapped bird and marine mammal distributions and estimated densities from these data. To facilitate comparisons of bird and marine mammal distributions between the two survey years, we did not include data from 2004 island circumnavigations in the 2004 density maps.

Hydroacoustic Surveys

We collected acoustics data along the same transects used for marine bird and mammal observations (Fig. 2). We determined relative prey abundance on all transects using a dual frequency (38 and 120 kHz) Simrad EK500 echosounder. In addition, we collected acoustic data during mid-water trawls. We set the threshold for data collection at -80 dB. We echo integrated acoustic data to a maximum depth of 200 m, excluding the top 10 m of the water column. We defined nineteen depth strata for analysis, beginning at 10 m below the hull-mounted transducers to a depth of 200 m, in 10 m increments. We summarized data as: 1) estimated water column biomass (relative density) by transect and 2) estimated relative biomass of prey by 10 m depth stratum over all transects. Only data from the 120 kHz transducer were integrated and summarized for this report because this frequency tends to highlight the size range of typical

seabird prey species. We grouped acoustic data into 3 minute by 200 meter (depth) bins before using them to generate prey density maps.

Fishing

Trawls and Tows.--We conducted mid-water and plankton trawls to enable relation of mid-water and neustonic community composition with the hydroacoustic record of biomass. Mid-water tows utilized a modified herring trawl (6 m by 6 m mouth opening with a PVC collecting bucket containing 1 mm mesh at the end), towed for about 10 to 15 minutes at 2-3 kts speed through the water. We attached a depth sounder to the foot rope of the mid-water trawl to give real-time feedback on fishing depth. We identified mid-water trawl collections to the lowest practical taxonomic level, counted invertebrates and fishes, and measured total length of fishes to the nearest mm (a subsample only).

To evaluate surface zooplankton we towed a neuston net (0.3 m by 0.5 m mouth opening; 505 micron mesh size) for 10 or 15 min at 2-3 kts. We also sampled plankton in the water column by deploying and recovering a plankton net vertically (not obliquely) while the vessel was drifting (usually to a depth of 50 m). During 2001, the vertical net was a 75 cm diameter hoop net with 100 micron mesh. During 2004, the vertical net was a paired 60 cm diameter bongo trawl with 505 micron mesh. We preserved plankton from the neuston and vertical nets for later identification. We recommend caution when interpreting abundance from the zooplankton data presented in this report, since the larger animals (e.g., shrimps, euphausiids) swim strongly enough that they are not expected to be caught quantitatively with the gear we used (Brenda Holladay, Institute of Marine Science/University of Alaska Fairbanks).

We conducted bottom trawls using a 3.05 m plumb staff beam trawl with 4 mm stretched mesh at the cod end. We towed this trawl for 5 to 11.3 minutes in the direction of the water current at approximately 1.5 kts. We identified samples to the lowest practical taxonomic level, counted them, measured fishes to the nearest mm (total length) and preserved some specimens for later use.

Long-line Sets.--For each long-line set, we deployed a single skate of about 100 hooks (sizes 3.0 and 5.0) baited with salted herring and soaked for about 2 hours. We identified fishes to species, measured them to the nearest mm (total length), weighed them to the nearest 0.1 kg and removed some of their stomachs for later diet analysis.

Oceanographic Data

Water Column Temperature and Salinity Profile.--We deployed a portable CTD (Sea-Bird Seacat SBE-19 Profiler) every three nautical miles along four transect lines (8E, 2, 5 and 7, Fig. 2) in 2001, on four transect lines (8W, 8E, 2 and 5, Fig. 2) in 2004 and at the end of each fishing event (trawl, tow or long-line set) in both years. In this way we obtained temperature and salinity data at depth for the water column to the maximum cable length of the deployment crane (about 97 m in 2001). Due to crane problems in 2004 we switched CTD deployments to the bottom trawl winch, which allowed us to sample down to a depth of about 200 meters. We used Ocean Data View® (Schlitzer 2004) to produce water column temperature and salinity profiles.

Sea Surface Temperature and Salinity.--We continuously recorded sea surface temperature and salinity during transects using a Sea-Bird Seacat SBE21 thermosalinograph. We used the data to generate temperature and salinity contour maps as a way of illustrating the occurrence of surface structures such as fronts. The thermosalinograph failed part way through the 2004 cruise. Consequently we were only able to sample the central portion of the transect area (Transects 1-5 and 8) in that year.

RESULTS

Bird and Marine Mammal Observations

In 2001 we counted a total of 62,175 birds (including one flock of an estimated 50,000 shearwaters) on 14 transects that covered 436 linear km of surveys (Table 2, Appendix A). This translated into a density of 476 birds/km^2 over an area of some 131 km^2. Removing the unusually large flock of shearwaters (non-breeders in the area) from the calculation resulted in a total of 12,175 birds counted and an estimated density of 93 birds/km^2. In 2004 we counted 8820 total birds on the same 14 linear transects sampled in 2001, for a density of 68 birds/km^2 over an area similar to that covered in 2001 (Table 2, Appendix B). In addition to the linear transects, we circumnavigated four islands at approximately one nautical mile (1.84 km) offshore in 2004 to assess these particularly high-density areas (Fig. 2). These counts yielded a total of 5265 birds and a density of 198 birds/km^2 over an area of about 27 km^2 (Table 3, Appendix C).

Procellariids.--We counted five Laysan albatrosses in 2001 and 2 black-footed albatrosses in 2004 (Table 2). Northern fulmars numbered in the low thousands and were widely distributed in both years (Fig. 3). The majority of shearwaters identified to species were short-tailed shearwaters (Tables 2 and 3). Typically we only encountered fork-tailed and Leach's storm-petrels during the offshore portions of transects (Fig. 4).

Cormorants.--Nearshore feeding red-faced cormorants were seen only in 2004. Most were observed during the island circumnavigations (Tables 2 and 3). We did not see any other cormorant species on transects in either year.

Shorebirds.--Phalaropes were the only shorebird we saw during our transects in the Semidi Islands (Tables 2 and 3). Red phalaropes were more numerous than red-necked in 2001 (numbering 15 and 2 respectively). We counted only one member of each species during surveys in 2004.

Jaegers and Gulls.--We saw a total of only seven jaegers in both years (Tables 2 and 3). Glaucous-winged gulls and black-legged kittiwakes numbered in the low hundreds in both years (Tables 2 and 3, Figs. 5 and 6) and were the only gull species we identified on transects in either year.

Murres.--Since murre distribution was similar for both species in both survey years and since a large proportion of murres were not identified to species in either year, we combined all murres for the distribution maps (Fig. 7). The vast majority of murres we identified to species were common murres in both years (Tables 2 and 3).

Murrelets and Auklets.--Ancient murrelet counts were in the high hundreds in 2001 and high tens in 2004 (Table 2). Conversely, we counted more than 600 Cassin's auklets on transects in 2001 but fewer than 100 in 2004. Both species exhibited their highest at sea densities in relatively deeper, offshore waters (Figs. 8 and 9) although both also were found near shore during island circumnavigations as well (Table 3). Parakeet auklets numbered in the low hundreds in both years (Tables 3 and 4, Fig. 10). We observed no other murrelet species and few other auklet species during our Semidi Island surveys (Tables 2 and 3).

Puffins.--We counted low to mid-hundreds of both horned and tufted puffins in both years (Table 2, Figs. 11 and 12).

Marine Mammals.--Fin whales and Dall's porpoises were the most common marine mammals we encountered during transects in both years (Table 4, Fig. 13, Appendices D and E). The only marine mammals observed during circumnavigations in 2004 were three Dall's porpoises near Chowiet Island (Table 3).

Prey

Acoustic Surveys.--In general, acoustic biomass was greatest in the relatively deeper waters to the east of the Semidi Islands in both 2001 and 2004 (Fig. 14). This was especially true along Transect 4E in 2001 where water column prey biomass (relative density) was several times higher than on any other transect that year (Fig. 15). No single transect dominated the acoustic signal to such a degree in 2004 (Fig. 15).

The estimated relative density of prey (excluding the surface stratum) appeared to be highest near the bottom in 2001 (180 m to 200 m depth, Fig. 16). The stratum with the highest relative density in 2004 occurred near the surface between 10 m and 20 m.

Mid-water Trawls.--We conducted six mid-water trawls in 2001 (Table 5, Fig.17) and three in 2004 (Table 6, Fig. 17). Catches were dominated by jelly fauna and walleye pollock in both years regardless of the strength of the acoustic sign or the depth at which we fished (Tables 7 and 8). Tables 9 and 10 show total lengths of fishes caught in mid-water trawls. See Appendix F for photographs of a sample of fish species we captured.

Long-line Sets.--We set the long-line gear twice in 2001 and three times in 2004 (Tables 5 and 6, Fig. 17). Yelloweye rockfish and Pacific halibut were the most numerous fishes we captured on long-lines in both years (Tables 11 and 12). Tables 13-16 show total lengths and weights of fishes caught on long-lines. Two large Pacific halibut (both estimated to weigh in excess of 68 kg) were released without being weighed or measured in 2004. See Appendix F for photographs of a sample of fish species we captured.

Stomachs of long-line caught fishes contained a wide variety of prey (Tables 17-23). Shrimp was an important food item for yelloweye rockfish in both years (Tables 17 and 18). Pacific halibut exhibited a varied diet in both 2001 and 2004 (Tables 19 and 20, Figs. 18 and 19). Dark rockfish, while relatively few numerically, dominated Pacific halibut stomach contents by weight in 2001 (Table 19, Fig. 18). This species of rockfish was not identified at all in stomach contents of halibut caught in 2004. In the latter year, fishery offal and mollusk remains contributed the highest proportions by weight of stomach contents (Table 20, Fig 19).

Bottom Trawls.--We conducted one bottom trawl in 2001 and 10 trawls in 2004 (Tables 5 and 6, Fig 17). We caught a wide variety of both invertebrate and fish species in both years (Tables 24 and 25). Brittle stars were the most numerous invertebrates caught in both 2001 and 2004. Southern rock sole was the most numerous fish captured in 2001 (Table 24) whereas we caught more Pacific cod than any other fish in 2004; most in a single tow (Tow #10, Table 25). Northern sculpin and southern rock sole also were caught in relatively high numbers in 2004. As was the case with Pacific cod, the majority of southern rock soles were caught during bottom trawl number 10 in 2004. Total lengths of fishes captured in bottom trawls are presented in Table 26. See Appendix F for photographs of a sample of fish species we captured.

Plankton Tows.--We conducted six vertical plankton tows in 2001 (all at CTD stations along Transect 5) and two in 2004 (Tables 5 and 6, Fig. 17). We also did two neuston tows in 2001 and one in 2004. Copepods were the numerically dominant animals captured during both neuston and vertical plankton tows in the Semidis (Tables 27 and 28). Arrowworms also were caught in relatively large numbers in the vertical tows in both years.

Oceanography

Water Column Profile.--Twenty-eight CTD casts were conducted in 2001 and 35 in 2004 (Tables 29 and 30, Fig. 20). Temperature and salinity water column profiles are presented generally north to south in the corresponding figures (Figs. 21-25). As I mentioned in the methods, we were able to deploy the instrument deeper in 2004 so I have presented data from that year in two formats, one to the same depth as those from 2001 (e.g., Fig. 22 middle) and one at the greater depth achieved in 2004 (e.g., Fig. 22 bottom).

Profiles from both years indicate a stratified water column with generally warmer, less saline water at the surface and colder, more saline water at depth (Figs. 21-25). A pocket of relatively cooler, saltier water occurred at or near the surface between about 156.6° W and 156.8° W on Transects 2 and 5, especially in 2001 (Figs. 23 and 24), corresponding to the relatively shallower waters near the islands and indicating upwelling of deep water to nearshore areas. This upwelling appeared to be more pronounced in 2001 (Figs. 23-25).

Sea Surface Temperature and Salinity.--Maps of sea surface temperature and salinity did not show any obvious fronts in either year (Figs. 26 and 27). Areas of relatively higher salinity in the shallower nearshore waters indicate active upwelling of deep water.

DISCUSSION

Disregarding the 50,000 bird shearwater flock seen in 2001, common murres and northern fulmars were the most common species on transects in both 2001 and 2004 (Table 2). Other numerically dominant species included Cassin's auklet (in 2001), ancient murrelet (in 2004), tufted and horned puffins, parakeet auklet, black-legged kittiwake and glaucous-winged gull. Murres make up the highest percentage of resident seabirds in the Semidi Islands, followed by northern fulmars, horned puffins, storm-petrels, tufted puffins and black-legged kittiwakes (Hatch and Hatch 1983). Storm-petrels constitute a much higher percentage of the total resident seabird population in the Semidi Islands (each about 5%, Hatch and Hatch 1983) than we found

to be the case on transects (both species <1% of the total in both years, Table 2). Storm-petrels obviously are feeding farther offshore than our transects extend.

Murres and fulmars were seen in higher numbers than other species during island circumnavigations in 2004 as well, followed by puffins, parakeet auklets and kittiwakes (Table 3). Reflecting their nearshore shallow water habitat, pigeon guillemots were seen only during circumnavigation surveys whereas other species that tend to feed mainly offshore (e.g., albatrosses, phalaropes, Cassin's auklets) were not observed in the nearshore surveys.

Bird densities in the Semidi Islands (linear transect counts only, excluding the large shearwater flock in 2001) are somewhat lower than those from most other areas in the northern Gulf of Alaska and Aleutian Islands, especially in 2004 (Table 31). Comparisons that exclude the flock of an estimated 50,000 shearwaters are appropriate because such large concentrations of shearwaters (which do not breed in Alaska) are ephemeral and are not likely to be encountered during routine surveys near seabird breeding colonies.

Although in 2004 we found similar dense acoustic sign at the same depths in the area where the large shearwater flock was seen in 2001 (near the west end of Transect 2, Fig. 2), we did not see a similar concentration of foraging birds there in 2004. This was probably due, at least in part, to the fact that there was stronger acoustic sign in the water column in that area in 2001, whereas there was relatively little sign above about 75 meters in 2004 (Fig. 28); a depth that is probably beyond the effective diving range of shearwaters (Weimerskirch and Sagar 1996, Weimerskirch and Cherel 1998).

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Table 1. Locations (decimal degrees) and times[a] of surveys of linear transects used for bird and marine mammal observations, and hydroacoustics surveys in the Semidi Islands, Alaska in 2001 and 2004.

					2001			2004		
Transect	Start Latitude (N)	Start Longitude (W)	Stop Latitude (N)	Stop Longitude (W)	Date	Start Time	Stop Time	Date	Start Time	Stop Time
1E	56.1677°	156.7442°	56.1675°	156.3494°	7/20	14:42	16:04	7/11	13:12	17:05[b]
1W	56.1660°	157.0673°	56.1648°	156.8205°	7/20	13:19	14:05	7/11	17:51	18:45
2	56.1208°	157.0650°	56.1168°	156.3367°	7/19	14:12	17:26	7/11	08:34	12:00
3E	56.0658°	156.3337°	56.0653°	156.6207°	7/19	18:08	19:08	7/10	16:14	17:12
3W	56.0513°	156.7345°	56.0833°	157.0715°	7/19	12:18	13:37	7/10	11:32	12:42
4E	56.0173°	156.3532°	56.0177°	156.6515°	7/20	08:29	09:33	7/10	14:52	15:54
4W	56.0117°	156.7175°	56.0165°	157.0643°	7/20	10:10	11:23	7/10	13:11	14:23
5	55.9738°	156.3965°	55.9670°	157.0610°	7/21	08:51	12:26	7/13	08:19	11:44
6	55.9187°	157.0673°	55.91632°	156.3348°	7/21	13:03	15:37	7/13	12:26	14:41
7	55.8708°	156.3318°	55.8659°	157.0694°	7/21	16:08	19:31	7/13	15:09	17:59
8E	56.2157°	156.7675°	56.2165°	156.3333°	7/22	11:08	13:06	7/11	21:09	23:06
8W	56.2075°	157.0715°	56.2168°	156.8156°	7/22	09:23	10:15	7/11	19:14	20:14
9	56.2637°	156.3354°	56.2663°	157.0660°	7/22	13:38	16:32	7/14	08:26	10:58
10	56.3040°	156.3488°	56.3177°	157.0710°	7/24	11:10	13:41	7/14	11:21	13:58
Aghiyuk I.[c]	56.2456°	156.7667°	56.2447°	156.7675°	--	--	--	7/14	15:46	17:42
Chowiet I.[c]	55.9807°	156.6831°	56.0562°	156.7545°	--	--	--	7/12	15:22	17:24
South I.[c]	55.9947°	156.7146°	55.9968°	156.7234°	--	--	--	7/12	12:34	13:18
Suklik I.[c]	56.0623°	156.6305°	56.0595°	156.6326°	--	--	--	7/10	17:21	17:56

[a]All times are Alaska Daylight (Universal Coordinated Time minus 8 hours).
[b]Transect stopped from 13:48 until 16:14 for Mid-water Trawl 01
[c]Circumnavigation of the named island.

Table 2. Species composition and numbers of seabirds observed on 14 linear transects in the Semidi Islands, Alaska during July 2001 and 2004.

		2001			2004		
Species	*Scientific Name*	No.	Density[a]	% Total	No.	Density[a]	% Total
All birds total		62,175	476.44[b]	100.0	8820	68.43	100.0
Laysan Albatross	*Phoebastria immutabilis*	5	0.04	<0.1	--	--	--
Black-footed Albatross	*Phoebastria nigripes*	--	--	--	2	0.02	<0.1
Northern fulmar	*Fulmarus glacialis*	1505	11.53	2.4	2429	18.84	27.5
Sooty Shearwater	*Puffinus griseus*	9	0.07	<0.1	--	--	--
Short-tailed Shearwater	*Puffinus tenuirostris*	248	1.90	0.4	34	0.26	0.4
Unidentified Shearwater	*Puffinus* spp.	50,476	386.79	81.2	11	0.09	0.1
Fork-tailed Storm-petrel	*Oceanodroma furcata*	63	0.48	0.1	33	0.26	0.4
Leach's Storm-petrel	*Oceanodroma leucorhoa*	7	0.05	<0.1	14	0.11	0.2
Unid. Storm-petrel	*Oceanodroma* spp.	1	0.01	<0.1	--	--	--
Red-faced Cormorant	*Phalacrocorax urile*	--	--	--	5	0.04	<0.1
Red-necked Phalarope	*Phalaropus lobatu*	2	0.02	<0.1	1	0.01	<0.1
Red Phalarope	*Phalaropus fulicarius*	15	0.12	<0.1	1	0.01	<0.1
Unidentified Phalarope	*Phalaropus* spp.	3	0.02	<0.1	--	--	--
Pomarine Jaeger	*Stercorarius pomarinus*	4	0.03	<0.1	--	--	--
Parasitic Jaeger	*Stercorarius parasiticus*	2	0.02	<0.1	1	0.01	<0.1
Glaucous-winged Gull	*Larus glaucescens*	186	1.43	0.3	127	0.99	1.4
Black-legged Kittiwake	*Rissa tridactyla*	290	2.22	0.5	128	0.99	1.5
Common Murre	*Uria aalge*	4067	31.17	6.5	3533	27.41	40.1
Thick-billed Murre	*Uria lomvia*	61	0.47	0.1	13	0.10	0.2
Unidentified Murre	*Uria* spp.	3205	24.56	5.2	575	4.46	6.5
Ancient Murrelet	*Synthliboramphus antiquus*	90	0.69	0.1	739	5.73	8.4
Cassin's Auklet	*Ptychoramphus aleuticus*	634	4.86	1.0	55	0.43	0.6
Parakeet Auklet	*Aethia psittacula*	236	1.81	0.4	243	1.89	2.8
Least Auklet	*Aethia pusilla*	2	0.02	<0.1	1	0.01	<0.1
Unidentified Auklet	*Aethia* spp.	1	0.01	<0.1	--	--	--
Unid. Small Dark Alcid	*Alcidae* spp.	41	0.31	<0.1	2	0.02	<0.1
Rhinoceros Auklet	*Cerorhinca monocerata*	23	0.18	<0.1	3	0.02	<0.1
Horned Puffin	*Fratercula corniculata*	429	3.29	0.7	335	2.60	3.8
Tufted Puffin	*Fratercula cirrhata*	569	4.36	0.9	535	4.15	6.1

[a]Individuals/km^2 A total of 130.5 km^2 was surveyed in 2001 and 128.9 km^2 in 2004.
[b]Density calculated without the 50,000 bird shearwater flock is 93.30 birds/km^2.

Table 3. Species composition and numbers of seabirds and marine mammals observed during circumnavigations of four islands in the Semidi Islands, Alaska during July 2004.

Species	*Scientific Name*	Number	Density[a]	% Total
All birds total		5265	197.93	100.0
Northern fulmar	*Fulmarus glacialis*	1272	47.82	24.2
Short-tailed Shearwater	*Puffinus tenuirostris*	6	0.23	0.1
Fork-tailed Storm-petrel	*Oceanodroma furcata*	2	0.08	<0.1
Red-faced Cormorant	*Phalacrocorax urile*	9	0.34	0.2
Glaucous-winged Gull	*Larus glaucescens*	18	0.68	0.3
Black-legged Kittiwake	*Rissa tridactyla*	58	2.18	1.1
Common Murre	*Uria aalge*	2477	93.12	47.1
Thick-billed Murre	*Uria lomvia*	17	0.64	0.3
Unidentified Murre	*Uria* spp.	208	7.82	4.0
Pigeon Guillemot	*Cepphus columba*	30	1.13	0.6
Ancient Murrelet	*Synthliboramphus antiquus*	72	2.71	1.4
Cassin's Auklet	*Ptychoramphus aleuticus*	5	0.19	0.1
Parakeet Auklet	*Aethia psittacula*	317	11.92	6.0
Unidentified Small Dark Alcid	*Alcidae* spp.	2	0.08	<0.1
Rhinoceros Auklet	*Cerorhinca monocerata*	2	0.08	<0.1
Horned Puffin	*Fratercula corniculata*	198	7.44	3.8
Tufted Puffin	*Fratercula cirrhata*	572	21.50	10.9
Dall's Porpoise	*Phocoenoides dalli*	3	0.11	100.0

[a]Individuals/km^2 A total of 26.6 km^2 was surveyed.

Table 4. Species composition and numbers of marine mammals observed on 14 linear transects in the Semidi Islands, Alaska during July 2001 and 2004.

		2001			2004		
Species	*Scientific Name*	No.	Density[a]	% Total	No.	Density[a]	% Total
Fin Whale	*Balaenoptera physalus*	4	0.03	11.4	3	0.02	14.3
Killer Whale	*Orcinus orca*	7	0.05	20.0	--	--	--
Unidentified Whale		2	0.02	5.7	--	--	--
Dall's Porpoise	*Phocoenoides dalli*	19	0.15	54.3	14	0.11	66.7
Northern Fur Seal	*Callorhinus ursinus*	2	0.02	5.7	2	0.02	9.5
Steller's Sea Lion	*Eumetopias jubatus*	--	--	--	2	0.02	9.5
River Otter	*Lutra canadensis*	1	0.01	2.9	--	--	--

[a] Individuals/km^2 A total of 130.5 km^2 was surveyed in 2001 and 128.9 km^2 in 2004.

Table 5. Locations (decimal degrees), times [a] and depths of fishing efforts in the Semidi Islands, Alaska in 2001.

Tow[b]	Date	Start Latitude (N)	Start Longitude (W)	Time	Depth Range (m)
MW01	7/19	56.1153°	156.7930°	20:16	0-51
MW02	7/19	56.1238°	156.8855°	22:12	0-67
MW03	7/21	55.8538°	157.0340°	20:16	0-96
MW04	7/21	55.9545°	156.8845°	22:39	0-103
MW05	7/22	56.0420°	156.8982°	00:06	0-33
MW06	7/24	56.2290°	156.5528°	02:06	0-52
BT01	7/20	55.9945°	156.7108°	00:48	0-88
VT01	7/21	55.9517°	156.3408°	08:40	0-50
VT02	7/21	55.9677°	156.5045°	09:24	0-50
VT03	7/21	55.9670°	156.6603°	10:13	0-50
VT04	7/21	55.9660°	156.8015°	11:10	0-50
VT05	7/21	55.9672°	156.9482°	12:00	0-50
VT06	7/21	55.9668°	157.0728°	12:34	0-50
NT01	7/24	56.3158°	156.3325°	10:45	0-3
NT02	7/24	56.3177°	157.0763°	13:454	0-3
LL01	7/18	56.0670°	156.7262°	06:26	53-62
LL02	7/20	55.9895°	156.7195°	18:23	60-69

[a]All times are Alaska Daylight (Universal Coordinated Time minus 8 hours).
[b]MW = Mid-water trawl, BT = Bottom trawl, VT = Vertical plankton tow, NT = Neuston tow, LL = Long-line set.

Table 6. Locations (decimal degrees), times [a] and depths of fishing efforts in the Semidi Islands, Alaska in 2004.

Tow[b]	Date	Start Latitude (N)	Start Longitude (W)	Time	Depth Range (m)
MW01	7/11	56.1589°	157.3964°	14:31	0-91
MW02	7/13	55.8617°	156.7688°	21:14	0-127
MW03	7/15	56.0826°	156.4979°	01:55	0-27
BT01	7/10	56.2807°	157.0762°	01:31	0-109
BT02	7/10	55.9515°	156.7865°	19:30	0-133
BT03	7/10	55.9375°	156.8750°	20:33	0-153
BT04	7/10	55.9100°	156.9355°	21:24	0-140
BT05	7/10	56.0200°	156.7842°	23:32	0-84
BT06	7/11	55.9988°	156.7227°	02:58	0-81
BT07	7/12	56.0762°	156.7045°	01:26	0-53
BT08	7/12	56.0803°	156.7037°	18:48	0-53
BT09	7/12	56.1868°	156.7577°	20:28	0-42
BT10	7/13	56.0520°	156.7096°	23:55	0-42
VT01	7/11	56.1163°	156.3365°	12:10	0-200
VT02	7/14	56.2180°	156.8171°	19:20	0-50
NT01	7/11	56.1163°	156.3365°	12:15	0-1
LL01	7/12	55.9835°	156.7156°	11:18	65-80
LL02	7/14	56.2243°	156.8038°	19:00	55-60
LL03	7/15	56.0322°	156.6240°	11:34	68-77

[a]All times are Alaska Daylight (Universal Coordinated Time minus 8 hours).
[b]MW = Mid-water trawl, BT = Bottom trawl, VT = Vertical plankton tow, NT = Neuston tow, LL = Long-line set.

Table 7. Species composition and numbers of individuals captured with mid-water trawls during SMMOCI sampling in the Semidi Islands, Alaska in July 2001.

	Tow Number					
Species	1	2	3	4	5	6
Comb jelly (Ctenophora)	6	5	--	--	--	--
Lion's mane jellyfish (*Cyanea capillata*)	56	78	48	113	156	100
Aequorea jellyfish (*Aequorea* spp.)	397	388	154	68	280	--
Moon jellyfish (*Aurelia* spp.)	--	--	52	216	30	--
Unidentified jellyfish (*Scyphozoa*)	--	--	5	28	43	--
Unidentified octopus (*Octopus* sp.)	--	--	--	--	1	--
Squid (*Loligo opalescens*)	--	1	2	--	--	--
Unidentified shelled pteropod (Thecosomata)	--	--	--	20	--	--
Euphausiid (*Thysanoessa spinifera*)	--	--	3	39	--	--
Euphausiid (*Thysanoessa inermis*)	--	--	--	59	--	--
Euphausiid (*Euphausia pacifica*)	--	--	--	1	--	--
Unidentified euphausiids (Euphausiacea)	--	1	--	--	1000	--
Sidestripe shrimp (*Pandalopsis disbar*)	--	--	3	1	--	--
Unidentified pandalid shrimp (Pandalidae)	--	1	--	--	25	--
Capelin (*Mallotus villosus*)	--	--	--	1	2	--
Walleye pollock (*Theragra chalcogramma*)	95	572	1128	588	551	15
Pacific cod (*Gadus macrocephalus*)	23	14	58	2	7	1
Gray starsnout (*Bathyagonus alascanus*)	--	--	1	--	--	--
Daubed shanny (*Leptoclinus maculatus*)	--	--	--	12	1	--
Prowfish (*Zaprora silenus*)	--	1	--	1	--	--
Pacific sand lance (*Ammodytes hexapterus*)	--	6	108	12	7	--
Flathead sole (*Hippoglossoides elassodon*)	5	--	4	33	25	--
Arrowtooth flounder (*Atheresthes stomias*)	1	--	15	4	13	--

Table 8. Species composition and numbers of individuals captured with mid-water trawls during SMMOCI sampling in the Semidi Islands, Alaska in July 2004.

	Tow Number		
Species	1	2	3
Jellyfishes (Scyphozoa, unid.)	43	--	--
Jellyfish (*Aequorea* sp.)	--	55	--
Moon jelly (*Aurelia* sp.)	--	25	--
Sea nettle (*Chrysaora melanaster*)	--	5	--
Lion's mane jellyfish (*Cyanea capillata*)	22	--	163
Jellyfish (*Staurophora mertensii*)	35	6	22
Comb jelly (*Hormiphora cucumis*)	8	5	--
Sea butterfly (Pteropoda) (*Clione limacina*)	2	2	5
Sea butterfly (Pteropoda) (*Limacina helicina*)	50	--	--
Pacific bobtailed squid (*Rossia pacifica*)	--	--	4
Euphausiid, unid. (Euphausiacea)	--	--	147
Euphausiid (*Thysanoessa* sp)	--	120	--
Hyperiid amphipod, unid.	--	--	1
Walleye pollock (*Theragra chalcogramma*)	401	20	449
Pacific cod (*Gadus macrocephalus*)	--	--	13
Prowfish (*Zaprora silenus*)	4	--	--
Pacific sand lance (*Ammodytes hexapterus*)	1	6	--
Flathead sole (*Hippoglossoides elassodon*)	43	--	37
Arrowtooth flounder (*Atheresthes stomias*)	13	2	--

Table 9. Total lengths (mm) of species captured with mid-water trawls during SMMOCI sampling in the Semidi Islands, Alaska in July 2001.

Species	Mean	SD[a]	Range	n[a]
Capelin	90.7	34.1	70-130	3
Walleye pollock	58.7	53.9	26-260	141
Pacific cod	47.5	9.7	22-70	73
Gray Starsnout	20.0	--	--	1
Daubed shanny	63.3	3.3	58-70	13
Prowfish	53.3	22.2	37.6-69	2
Pacific sand lance	68.8	4.8	60-86	52
Flathead sole	27.3	3.8	19-35	59
Arrowtooth flounder	47.2	3.8	38-53	33

[a]SD = Standard Deviation, n = Sample Size.

Table 10. Total lengths (mm) of species captured with mid-water trawls during SMMOCI sampling in the Semidi Islands, Alaska in July 2004.

Species	Mean	SD[a]	Range	n[a]
Walleye pollock	36.7	5.2	24-61	200
Pacific cod	41.8	5.5	34-51	13
Prowfish	22.3	6.3	15-29.5	4
Pacific sand lance	53.6	12.9	25.5-64	7
Flathead sole	24.2	3.7	17-34	69
Arrowtooth flounder	37.7	8.2	20-47	15

[a]SD = Standard Deviation, n = Sample Size.

Table 11. Species and numbers of individuals captured with long-line gear during SMMOCI sampling in the Semidi Islands, Alaska in July 2001.

	Set Number	
Species	1 (53-62 m)[a]	2 (60-69 m)
Twenty-arm sea star (*Pycnopodia helianthoides*)	1	--
Dark rockfish (*Sebastes ciliatus*)	--	2
Yelloweye rockfish (*Sebastes ruberrimus*)	--	21
Pacific halibut (*Hippoglossus stenolepis*)	12	9

[a]Numbers in parentheses represent gear depth in meters.

Table 12. Species and numbers of individuals captured with long-line gear during SMMOCI sampling in the Semidi Islands, Alaska in July 2004.

	Set Number		
Species	1 (65-80 m)[a]	2 (55-60 m)	3 (68-77 m)
Twenty-arm sea star (*Pycnopodia helianthoides*)	--	3	--
Alaska skate (*Bathyraja parmifera*)	--	1	--
Dark rockfish (*Sebastes ciliatus*)	--	--	4
Yelloweye rockfish (*Sebastes ruberrimus*)	10	--	6
Red Irish lord (*Hemilepidotus hemilepidotus*)	--	1	--
Yellow Irish lord (*Hemilepidotus jordani*)	--	4	--
Pacific halibut (*Hippoglossus stenolepis*)	18	8	5

[a]Numbers in parentheses represent gear depth in meters.

Table 13. Total lengths (mm) of species captured with long-line gear during SMMOCI sampling in the Semidi Islands, Alaska in July 2001.

Species	Sex	Mean	SD[a]	Range	n[a]
Dark rockfish	All	512.5	3.5	510-515	2
Yelloweye rockfish	All	620.2	92.4	405-765	21
	Female	644.4	112.1	405-765	8
	Male	596.0	43.8	540-650	5
Pacific halibut	All	1273.2	297.4	790-1740	21
	Female	1354.3	269.4	790-1740	17
	Male	955.0	82.6	860-1010	3

[a]SD = Standard Deviation, n = Sample Size.

Table 14. Total lengths (mm) of species captured with long-line gear during SMMOCI sampling in the Semidi Islands, Alaska in July 2004.

Species	Sex	Mean	SD[a]	Range	n[a]
Alaska skate	Male	960.0	--	--	1
Dark rockfish	All	552.5	38.0	515-605	4
	Female	540.0	--	--	1
	Male	556.7	45.4	515-605	3
Yelloweye rockfish	All	574.7	84.1	420-720	16
	Female	561.5	87.5	420-720	13
	Male	631.7	33.3	610-670	3
Yellow Irish lord	Male	410.0	34.6	360-440	4
Pacific halibut	All	945.3[b]	344.3	467-1530	29
	Female	982.5	343.3	490-1530	24
	Male	767.0	322.7	467-1315	5

[a]SD = Standard Deviation, n = Sample Size.

[b]Two large Pacific halibut (each estimated to weigh in excess of 68 kg) were allowed to escape prior to measurement and so are not included here.

Table 15. Weights (kg) of species captured with long-line gear during SMMOCI sampling in the Semidi Islands, Alaska in July 2001.

Species	Sex	Mean	SD[a]	Range	n[a]
Yelloweye rockfish	All	4.5	2.0	1.2-7.5	10
	Female	5.0	2.2	1.2-7.5	7
	Male	3.5	0.7	2.8-4.2	3
Pacific halibut	All	32.7	22.5	6.0-81.2	21
	Female	37.9	21.8	6.0-81.2	17
	Male	11.2	2.8	8.0-13.5	3

[a]SD = Standard Deviation, n = Sample Size.

Table 16. Weights (kg) of species captured with long-line gear during SMMOCI sampling in the Semidi Islands, Alaska in July 2004.

Species	Sex	Mean	SD[a]	Range	n[a]
Alaska skate	Male	5.5	--	--	1
Dark rockfish	All	2.0	0.4	1.5-2.5	4
	Female	2.0	--	--	1
	Male	2.0	0.5	1.5-2.5	3
Yelloweye rockfish	All	3.4	1.7	1.0-7.5	16
	Female	3.2	1.8	1.0-7.5	13
	Male	4.0	1.0	3.0-5.0	3
Yellow Irish lord	Male	0.9	0.3	0.5-1.0	4
Pacific halibut	All	12.8[b]	12.7	1.0-43.0	29
	Female	14.0	13.1	1.0-43.0	24
	Male	6.9	9.7	1.0-24.0	5

[a]SD = Standard Deviation, n = Sample Size.
[b]Two large Pacific halibut (each estimated to weigh in excess of 68 kg) were allowed to escape prior to measurement and so are not included here.

Table 17. Prey composition of stomach samples taken from yelloweye rockfish caught during long-line sets in the Semidi Islands, Alaska in 2001 (*n* = 19 non-empty stomachs).

Name	% Frequency	% Count	% Weight (g)
Caridea (shrimp)	33.33	20.00	10.20
Hippolytidae (shrimp)	33.33	40.00	72.01
Osteichthyes Teleostei (fish)	33.33	20.00	10.44
Non-gadoid fish remains	33.33	20.00	7.36

Table 18. Prey composition of stomach samples taken from yelloweye rockfish caught during long-line sets in the Semidi Islands, Alaska in 2004 (*n* = 2 non-empty stomachs).

Name	% Frequency	% Weight (g)
Hippolytidae (shrimp)	100	100

Table 19. Prey composition of stomach samples taken from Pacific halibut caught during long-line sets in the Semidi Islands, Alaska in 2001 (*n* = 19 non-empty stomachs).

Name	% Frequency	% Count	% Weight (g)
Polychaeta (worm)	5.26	1.22	0.05
Bivalvia (clam)	10.53	2.44	0.28
Octopoda (octopus)	10.53	1.83	0.43
Hyas lyratus (lyre crab)	5.26	6.71	12.55
Osteichthyes Teleostei (fish)	5.26	0.61	0.00
Non-gadoid fish remains	10.53	6.10	0.55
Gadidae (gadid fish)	10.53	1.22	0.30
Theragra chalcogramma (walleye pollock)	15.79	1.83	0.23
Sebastes ciliatus (dark rockfish)	5.26	0.61	61.03
Cottoidei (sculpin)	5.26	0.61	1.71
Ammodytes spp. (sandlance)	42.11	73.17	16.56
Pleuronectidae (flatfish)	10.53	1.22	2.14
Unidentified organic material	10.53	1.22	0.17
Fishery offal	5.26	1.22	4.01

Table 20. Prey composition of stomach samples taken from Pacific halibut caught during long-line sets in the Semidi Islands, Alaska in 2004 (*n* = 18 non-empty stomachs).

Name	% Frequency	% Weight (g)
Polychaeta (worm)	5.56	0.06
Gastropoda (snail)	5.56	0.06
Octopoda (octopus)	11.11	35.85
Hippolytidae (shrimp)	11.11	0.17
Paguridae (hermit crab)	27.78	1.91
Majidae legs (for *C. opilio*, *C. bairdi*, etc)	5.56	0.06
Oregonia gracilis (decorator crab)	11.11	2.10
Chionoecetes bairdi (Tanner crab)	5.56	1.10
Osteichthyes Teleostei (fish)	11.11	0.07
Non-gadoid fish remains	16.67	0.41
Mallotus villosus (capelin)	5.56	0.41
Theragra chalcogramma (walleye pollock)	5.56	4.68
Ammodytes sp. (sandlance)	11.11	5.00
Fishery offal	16.67	48.13

Table 21. Prey composition of stomach samples taken from Alaska skate caught during long-line sets in the Semidi Islands, Alaska in 2004 (*n* = 1 non-empty stomach).

Name	% Frequency	% Weight (g)
Octopoda (octopus)	100	0.38
Gammaridea (amphipod)	100	1.78
Cottidae (sculpin)	100	25.24
Ammodytes sp. (sandlance)	100	34.78
Pleuronectidae (flatfish)	100	37.83

Table 22. Prey composition of stomach samples taken from dark rockfish caught during long-line sets in the Semidi Islands, Alaska in 2004 (*n* = 2 non-empty stomachs).

Name	% Frequency	% Weight (g)
Gammaridea (amphipod)	50	31.62
Unidentified worm-like organism	50	68.38

Table 23. Prey composition of stomach samples taken from yellow Irish lord caught during long-line sets in the Semidi Islands, Alaska in 2004 (*n* = 3 non-empty stomachs).

Name	% Frequency	% Weight
Gastropoda (snail)	33.33	0.66
Paguridae (hermit crab)	33.33	21.87
Oregonia gracilis (decorator crab)	33.33	72.16
Cancer oregonensis (pygmy Cancer crab)	33.33	5.31

Table 24. Count of individuals captured in the single bottom trawl during SMMOCI sampling in the Semidi Islands, Alaska in July 2001.

Common Name	Scientific Name	Number
Unidentified sea anemone	Anthozoa (solitary Cnidarian)	1
Aequorea jellyfish	*Aequorea* spp.	18
Lion's mane jellyfish	*Cyanea capillata*	1
Polychaete worm	*Onuphis iridescens*	19
Octopus	*Octopus* spp.	1
Monoculodes amphipod	*Monoculodes* spp.	2
Anonyx amphipod	*Anonyx* spp.	8
Hyperiid amphipod	*Hyperia* spp.	1
Yellow-leg pandalid	*Pandalus tridens*	3
Sidestripe shrimp	*Pandalopsis disbar*	3
Rough argid	*Argis crassa*	1
Ridged crangon	*Crangon dalli*	11
Bryozoan	Bryozoa	1
Brittle star	*Ophiura sarsi*	48
Walleye pollock	*Theragra chalcogramma*	2
Roughspine sculpin	*Triglops macellus*	1
Sturgeon poacher	*Podothecus accipenserinus*	1
Variegated snailfish	*Liparis gibbus*	1
Careproctus snailfish	*Careproctus* spp.	1
Pacific sand lance	*Ammodytes hexapterus*	2
Pacific halibut	*Hippoglossus stenolepis*	1
Southern rock role	*Lepidopsetta bilineata*	6
Dover sole	*Microstomus pacificus*	1

Table 25. Count of individuals captured in bottom trawls during SMMOCI sampling in the Semidi Islands, Alaska in July 2004.

Common Name	Scientific Name	01	02	03	04	05	06	07	08	09	10
Sponges	Porifera	--	--	--	--	--	--	--	--	--	--
Sponges, unid.	Porifera	--	--	--	--	1	--	--	2	2	--
	Suberites spp. w/o hermit crab	--	--	--	--	--	--	--	1	9	--
	Suberites spp. w/ hermit crab (see Paguridae)	--	--	--	--	--	--	--	--	--	--
	Myxilla incrustans (see *Chlamys* spp.)	--	--	--	--	--	--	--	--	--	--
Flat worms, unid.	Platyhelminthes	--	1	--	--	--	--	--	--	--	--
Ribbon worms	Nemertea	--	--	--	--	--	2	--	--	--	--
Polychaete worms	Polychaeta	--	--	--	--	--	--	--	--	--	--
Sea mouse	*Aphrodita negligens*	5	--	--	--	--	--	--	--	--	--
Depressed scaleworm	*Eunoe depressa*	--	--	--	--	--	--	--	--	1	1
	Nereis spp.	--	--	--	--	--	--	4	1	1	--
	Onuphis spp.	--	--	--	--	--	1000	--	--	--	72
cf. Hard coral	Cnidaria	--	--	--	--	--	--	1	--	--	--
Sea anemones	Anthozoa	--	--	--	--	--	--	--	--	--	--
Sea anemone, unid.	Anthozoa	2	--	--	--	--	4	6	1	--	3
	Metridium spp.	1	--	--	--	--	--	--	--	--	1
	Tealia crassicornis	--	--	--	--	--	--	--	3	--	--
Jellyfishes	Scyphozoa	--	--	--	--	--	--	--	--	--	--
Jellyfish, unid.	Scyphozoa	--	--	--	1	--	--	--	1	--	--
	Aequorea spp.	--	--	--	8	--	--	--	--	--	--
	Chrysaora spp.	5	--	--	--	--	--	--	--	--	--
Lion's mane jellyfish	*Cyanea capillata*	--	--	--	--	--	--	--	1	--	--
Bivalves	Bivalvia	--	--	--	--	--	--	--	--	--	--
Astarte spp.	*Astarte* spp.	40	--	--	--	--	--	--	--	--	--
Lentil astarte	*Astarte crenata*	26	1	--	--	--	--	--	--	--	--
	Clinocardium spp.	5	--	--	--	--	--	--	--	--	--
	Cyclocardia spp.	9	--	--	--	--	--	--	--	--	--
Kennerley venus	*Humilaria kennerleyi*	--	--	--	--	--	--	--	2	1	--
	Limopsis vaginatus	5	4	--	--	1	--	--	--	--	--
Horse mussel	*Modiolus modiolus*	--	--	--	--	--	7	--	--	--	--
	Mya sp.	1	--	--	--	--	--	--	--	--	--
Greenland cockle	*Serripes groenlandicus*	45	--	2	--	--	3	2	--	--	2
Scallop, unid.	*Chlamys* spp.	14	8	--	--	2	26	2	--	7	106

Table 25. Count of individuals captured in the bottom trawls during SMMOCI sampling in the Semidi Islands, Alaska in July 2004 (continued).

Common Name	Scientific Name	01	02	03	04	05	06	07	08	09	10
Scallop, unid.	*Chlamys* spp. with *Myxilla incrustans*	--	--	--	--	--	25	--	--	--	37
Scallop, unid.	Pectinidae	--	--	1	--	--	--	--	--	--	--
Snails	Gastropoda	--	--	--	--	--	--	--	--	--	--
	Gastropoda, unid.	--	--	1	--	5	--	--	3	--	--
Keeled Aforia	*Aforia circinata*	2	--	--	--	--	--	--	--	--	--
Silky buccinum	*Buccinum scaliforme*	53	--	2	--	--	--	--	--	--	--
Purple-ring topsnail	*Calliostoma annulatum*	1	--	--	--	--	--	--	--	--	--
Hairy triton	*Fusitriton oregonensis*	1	1	--	--	22	1	12	1	6	5
Arctic moon snail	*Natica clausa*	--	--	--	--	3	--	--	--	--	--
Rusty moon snail	*Natica russa*	1	--	--	--	--	7	6	--	--	4
Beatic dwarf olive	*Olivella baetica*	--	--	--	--	--	--	--	--	--	4
Chitons, unid.	Polyplacophora	--	--	--	--	--	--	--	1	--	--
Sea slugs	Sea clown triopha	--	--	--	--	--	--	--	--	--	--
	Triopha catalinae	--	--	--	--	3	--	8	9	--	--
Sea butterflies	Pteropoda	--	--	--	--	--	--	--	--	--	--
	Clione limacina	--	--	--	6	--	--	--	--	--	--
Squids	Teuthoidea	--	--	--	--	--	--	--	--	--	--
Squid, unid.	Teuthoidea	--	--	--	1	--	--	--	--	--	--
Brachyuran crabs	Brachyura	--	--	--	--	--	--	--	--	--	--
Pygmy cancer crab	*Cancer oregonensis*	--	--	--	--	4	1	2	17	--	--
Tanner crab	*Chionoecetes bairdi*	204	2	36	4	--	39	--	--	--	24
Lyre crab	*Hyas lyratus*	1	1	--	--	--	--	--	--	1	7
Decorator crab	*Oregonia gracilis*	--	--	--	--	42	14	311	239	131	7
Kelp crab	*Pugettia gracilis*	--	--	--	--	--	--	--	--	1	1
Anomuran crabs	Anomura	--	--	--	--	--	--	--	--	--	--
Umbrella crab	*Cryptolithodes sitchensis*	--	--	--	--	--	--	--	--	1	--
Purple hermit crab	*Elassochirus cavimanus*	--	--	--	--	4	--	3	--	--	1
	Paguridae, unid.	--	6	--	--	25	2	2	8	--	--
	Paguridae, unid. with *Suberites* sp.	--	--	--	--	--	--	3	--	--	--
Red hermit crab	*Elassochirus gilli*	--	--	--	--	--	--	1	7	1	1
Widehand hermit crab	*Elassochirus tenuimanus*	--	--	--	--	8	1	9	20	1	45
	Pagurus spp.	32	--	3	--	--	--	--	--	11	--

Table 25. Count of individuals captured in the bottom trawls during SMMOCI sampling in the Semidi Islands, Alaska in July 2004 (continued).

Common Name	Scientific Name	01	02	03	04	05	06	07	08	09	10
Aleutian hermit crab	*Pagurus aleuticus*	--	2	1	1	--	--	--	--	--	--
Bluespined hermit crab	*Pagurus kennerlyi*	--	--	--	--	7	--	4	4	1	--
Alaskan hermit crab	*Pagurus ochotensis*	--	--	--	--	--	17	--	--	--	35
Setose hermit crab	*Pagurus setosus*	--	--	--	--	5	--	--	--	--	--
Crangonid shrimps	Crangonidae	--	--	--	--	--	--	--	--	--	--
Common argid	*Argis alaskensis*	1	--	--	--	--	3	--	--	--	--
Arctic argid	*Argis dentata*	1	--	--	--	--	--	--	--	--	--
Northern argid	*Argis lar*	101	--	--	--	--	--	--	--	--	--
Nelson's argid	*Argis levior*	--	--	--	--	--	2	--	--	--	--
	Crangon spp.	--	7	32	9	--	23	--	--	--	10
Northern crangon	*Crangon alaskensis*	--	--	--	--	--	1	--	--	--	--
Common two-spined crangon	*Crangon communis*	10	--	--	--	--	--	--	--	--	--
Tank shrimp	*Sclerocrangon boreas*	--	--	--	--	--	--	22	--	27	10
Hippolytid shrimps	Hippolytidae	--	--	--	--	--	--	--	--	--	--
	Hippolytidae, unid.	--	--	--	--	8	--	--	--	--	--
	Eualus spp.	9	--	--	--	--	--	--	--	--	--
	Heptacarpus spp.	24	--	--	--	--	--	--	--	--	--
Three-spined coastal shrimp	*Heptacarpus tridens*	--	--	--	--	--	--	--	--	17	--
Clown shrimp	*Lebbeus grandimanus*	--	--	--	--	--	1	6	4	--	--
Spiny lebbeid shrimp	*Lebbeus groenlandicus*	--	--	--	--	2	--	84	9	76	5
	Spirontocaris spp.	--	--	--	--	--	--	4	3	--	--
Rathbun's bladed shrimp	*Spirontocaris arcuata*	--	--	--	--	--	3	--	--	--	--
Oval bladed shrimp	*Spirontocaris ochotensis*	--	--	--	--	--	--	--	--	--	1
Pandalid shrimps	Pandalidae	--	--	--	--	--	--	--	--	--	--
	Pandalidae, unid.	9	--	9	2	--	28	--	--	--	--
	Pandalus spp.	--	17	--	--	--	--	--	--	--	--
Coonstripe shrimp	*Pandalus hypsinotus*	--	--	--	--	12	--	--	--	--	--
Prawn	*Pandalus platyceros*	--	--	--	--	--	--	--	--	17	--
Yellowleg pandalid	*Pandalus tridens*	--	--	--	--	88	--	254	31	27	--
Krill	Euphausiid	--	--	--	--	--	--	--	--	--	--
	Euphausiid, unid.	--	1	300	92	--	--	--	--	--	--
	Thysanoessa spp.	50	--	--	--	--	--	--	--	--	--

Table 25. Count of individuals captured in the bottom trawls during SMMOCI sampling in the Semidi Islands, Alaska in July 2004 (continued).

Common Name	Scientific Name	01	02	03	04	05	06	07	08	09	10
Gammarid amphipods	*Ampithoe* sp.	--	--	--	--	--	--	--	--	1	--
	Anonyx spp.	--	--	--	--	--	8	--	--	1	--
	Atylus bruggeni	--	--	--	--	--	--	--	--	3	1
Lampshells	Brachyopod	--	--	--	--	--	--	--	--	--	--
Lampshell unid.	Brachyopod, unid.	70	--	--	--	--	--	--	--	--	--
California lampshell	*Laqueas californianus*	--	--	--	--	6	2	--	--	--	--
Transverse lampshell	*Terebratalia transversa*	10	--	--	--	6	--	--	--	--	--
	Terebratulina unguiculata	1	--	--	--	--	--	--	--	--	--
Sea spider	Pycnogonidae	--	--	--	1	1	--	--	--	--	--
Peanut worm	Sipunculida	--	--	--	--	--	--	--	--	--	--
a peanut worm	*Golfingia margaritacea*	1	--	--	--	--	--	--	--	--	--
	Echinodermata	--	--	--	--	--	--	--	--	--	--
Sand dollar	*Dendraster excentricus*	--	4	--	--	--	7	--	--	--	26
Greenspined sand dollar	*Echinarachnius parma*	--	--	--	--	--	--	--	--	--	10
Sea cucumber, unid.	Holothuroidea	--	--	--	--	--	--	1	--	3	--
Green urchin	*Strongylocentrotus droebachiensis*	14	--	--	--	--	--	--	--	--	51
Sea stars	Echinodermata - Asteroidea	--	--	--	--	--	--	--	--	--	--
Bat sea star	*Ceramaster* spp.	105	--	28	--	6	1	1	--	--	2
Rose star	*Crossaster papposus*	1	1	--	--	5	--	1	--	--	1
Mud sea star	*Ctenodiscus crispatus*	--	--	--	--	--	--	--	--	--	1
Leather sea star	*Dermasterias imbricata*	--	--	--	--	--	--	--	--	1	--
Basket star	*Gorgonocephalus caryi*	5	--	--	--	--	--	--	--	--	--
	Henricia spp.	--	--	--	--	--	--	3	1	6	6
Blackspined sea star	*Lethasterias nanimensis*	3	--	--	--	1	--	--	--	--	--
Redbanded sea star	*Orthasterias koehleri*	--	--	--	--	1	--	2	--	1	9
Twentyarm sea star	*Pycnapodia helianthoides*	--	--	--	--	--	1	--	--	--	2
Sun sea star, unid.	*Solaster* sp.	--	--	--	--	1	--	--	--	--	--
Brittle stars	Echinodermata - Ophiuroidea	--	--	--	--	--	--	--	--	--	--
Ubiquitous brittle star	*Ophiopholis aculeata*	--	--	--	--	--	--	--	--	2	--
	Ophiura spp.	21	--	--	--	--	--	--	--	--	--
Notched brittle star	*Ophiura sarsi*	--	--	--	--	--	123	--	--	--	1361

Table 25. Count of individuals captured in the bottom trawls during SMMOCI sampling in the Semidi Islands, Alaska in July 2004 (continued).

Common Name	Scientific Name	01	02	03	04	05	06	07	08	09	10
Moss animals	Bryozoa	--	--	--	--	--	--	--	--	--	--
	Bryozoa, unid.	--	--	--	--	2	--	2	2	--	--
Feathery bryozoan	*Eucratea loricata*	--	--	--	--	1	--	--	--	--	--
Sea squirt, unid.	Ascidiacea	--	--	--	--	22	3	4	2	20	--
Pacific cod	*Gadus macrocephalus*	--	--	--	--	--	--	1	--	7	192
Walleye pollock	*Theragra chalcogramma*	--	--	--	--	--	--	--	--	--	1
Shortfin eelpout	*Lycodes brevipes*	1	--	--	--	--	--	--	--	--	--
Leister sculpin	*Enophrys lucasi*	--	--	--	--	--	--	--	--	1	--
Armorhead sculpin	*Gymnocanthus galeatus*	--	--	--	--	--	--	1	--	--	--
Yellow Irish lord	*Hemilepidotus jordani*	1	--	--	--	--	--	22	2	26	--
Northern sculpin	*Icelinus borealis*	14	1	--	--	46	18	78	6	1	2
Great sculpin	*Myoxocephalus polyacanthocephalus*	--	--	--	--	--	--	--	--	1	4
Tadpole sculpin	*Psychrolutes paradoxus*	1	1	--	--	--	--	--	--	--	--
Slim sculpin	*Radulinus asprellus*	15	--	--	--	--	4	--	--	--	--
Grunt sculpin	*Rhamphocottus richardsonii*	--	--	--	--	--	--	1	--	--	--
Gray starsnout	*Bathyagonus alascanus*	11	1	1	--	--	--	--	--	--	--
Fourhorn poacher	*Hypsagonus quadricornis*	--	--	--	--	--	--	1	--	--	--
Sturgeon poacher	*Podothecus accipenserinus*	--	--	--	--	--	1	--	--	--	4
Variegated snailfish	*Liparis gibbus*	--	--	--	--	1	1	--	--	--	--
Showy snailfish	*Liparis pulchellus*	--	--	--	--	--	5	--	--	--	1
Searcher	*Bathymaster signatus*	--	--	--	--	5	3	2	--	--	--
Northern ronquil	*Ronquilus jordani*	--	--	--	--	--	--	27	15	1	--
Slender cockscomb	*Anoplarchus insignis*	--	--	--	--	--	--	1	--	--	--
Whitebarred prickleback	*Poroclinus rothrocki*	1	--	--	--	--	--	--	--	--	--
Pacific sand lance	*Ammodytes hexapterus*	--	--	--	--	--	--	--	--	--	1
Arrowtooth flounder	*Atheresthes stomias*	3	--	1	--	3	11	--	--	--	--
Flathead sole	*Hippoglossoides elassodon*	3	1	1	--	--	--	--	--	--	--
Pacific halibut	*Hippoglossus stenolepis*	--	--	--	--	--	2	2	--	--	14
Dover sole	*Microstomus pacificus*	--	--	--	--	--	1	--	--	--	--
Southern rock sole	*Lepidopsetta bilineata*	--	--	--	--	3	40	1	--	--	115

Table 26. Total lengths (mm) of species captured with the bottom trawl during SMMOCI sampling in the Semidi Islands, Alaska in July 2001 and 2004.

Year	Species	Mean	SD[a]	Range	n[a]
2001	Walleye pollock	32.5	3.5	30.0-35.0	2
	Roughspine sculpin	124.0	--	--	1
	Sturgeon poacher	26.0	--	--	1
	Variegated snailfish	70.0	--	--	1
	Careproctus snailfish	20.0	--	--	1
	Pacific sand lance	53.0	4.2	50.0-56.0	2
	Pacific halibut	30.0	--	--	1
	Southern rock sole	47.2	57.3	21.0-164.0	6
	Dover sole	109.0	--	--	1
2004	Walleye pollock	37.0	--	--	1
	Pacific cod	46.2	5.0	31.0-54.0	53
	Grunt sculpin	40.0	--	--	1
	Yellow Irish lord	89.2	37.1	36.0-262.0	51
	Northern sculpin	50.8	11.6	21.0-100.0	138
	Slim sculpin	76.4	23.2	46.0-116.0	19
	Armorhead sculpin	140.0	--	--	1
	Leister sculpin	75.0	--	--	1
	Great sculpin	44.6	33.8	29.0-105.0	5
	Fourhorn poacher	67.0	--	--	1
	Sturgeon poacher	91.0	35.6	35.0-118.0	5
	Tadpole sculpin	52.0	2.8	50.0-54.0	2
	Gray starsnout	72.3	20.7	51.0-109.0	13
	Showy snailfish	79.3	11.2	66.0-96.0	6
	Variegated snailfish	28.5	0.7	28.0-29.0	2
	Northern ronquil	67.2	15.5	51.0-126.0	43
	Searcher	83.2	23.4	61.0-122.0	10
	Shortfin eelpout	107.0	--	--	1
	Whitebarred prickleback	55.5	--	--	1
	Slender cockscomb	59.0	--	--	1
	Pacific sand lance	118.0	--	--	1
	Pacific halibut	57.9	106.7	27.0-485.0	18
	Flathead sole	78.6	9.9	63.0-89.0	5
	Arrowtooth flounder	56.9	21.8	44.0-115.0	18
	Southern rock sole	67.1	70.3	19.0-462.0	159
	Dover sole	78.0	--	--	1

[a]SD = Standard Deviation, n = Sample Size.

Table 27. Count of individuals captured with plankton nets during SMMOCI sampling in the Semidi Islands, Alaska in July 2001.

	Tow[a]							
Species and comments	VT-1	VT-2	VT-3	VT-4	VT-5	VT-6	NT-1	NT-2
Unidentified arrowworm (Chaetognatha)	19	10	5	1	2	21	--	--
Arrowworm (*Eukrohnia hamatas*)	18	6	--	2	4	7	--	--
Arrowworm (*Sagitta* spp.)	--	--	1	--	4	2	--	--
Jellyfish (Leptomedusae)	--	20	--	26	4	14	--	--
Jellyfish (*Aequorea* spp.)	--	--	--	1	--	--	1	1
Jellyfish (Hydromedusae)	--	--	--	1	--	--	--	--
Jellyfish (Anthomedusae)	--	--	--	--	--	1	--	--
Unidentified cladoceran	--	1	--	--	--	--	--	--
Unidentified barnacle (cirrus fragment)	present	present	present	--	present	present	present	--
Larval (cyprid) barnacle	17	14	3	4	2	6	1	--
Larval (nauplii) barnacle	4	17	1	--	--	--	--	--
Hyperiid amphipod (juvenile)	--	7	6	14	7	7	1	--
Amphipod (*Parathemisto* spp. juvenile)	--	--	--	2	1	--	--	--
Gammarid amphipod	--	--	--	--	--	--	3	--
Larval (furcilia) euphausiid	--	--	--	2	--	--	--	--
Larval (furcilia) (*Thysanoessa* spp.)	5	--	15	--	--	1	1	1
Larval (furcilia) (*Thysanoessa longipes*)	1	--	2	--	--	--	--	--

Table 27. Count of individuals captured with plankton nets during SMMOCI sampling in the Semidi Islands, Alaska in July 2001 (continued).

Species and comments	Tow[a]							
	VT-1	VT-2	VT-3	VT-4	VT-5	VT-6	NT-1	NT-2
Euphausiid (*Thysanoessa raschii*)	--	--	1	--	--	--	--	--
Larval shrimp (zoea) (Hippolytidae)	1	--	--	--	--	2	--	--
Pandalus tridens	--	--	--	1	--	--	--	--
Larval crab (zoea) (*Brachyura*)	33	--	--	--	--	24	2	1
Larval crab (megalops) (*Brachyura*)	--	2	--	--	--	4	--	--
Larval crab (megalops) (*Telmessus cheiragonus*)	1	--	--	--	--	--	--	--
Larval crab (zoea) (*Oregoninae*)	--	--	--	17	8	--	--	--
Larval crab (megalops) (*Oregoninae*)	1	--	25	--	--	1	--	--
Larval crab (megalops) (*Cancridae*)	--	--	--	1	--	--	--	--
Larval crab (megalops) (*Hyas* spp.)	1	--	--	--	--	--	--	--
Larval crab (zoea) (*Paguridae*)	--	--	--	1	--	2	--	--
Unidentified small calanoid copepod	650	1300	524	412	302	558	5	25
Unidentified large calanoid copepod	62	57	36	65	13	29	31	2
Harpacticoid copepod	--	--	--	--	--	--	62	4
Insect	3	--	--	--	--	--	1	1
Unidentified gastropod juvenile	--	7	1	--	1	--	--	--
Gastropod (*Echinospira* sp.)	--	--	--	--	--	1	--	--
Larvacean (*Oikopleura* spp.)	2	--	--	--	1	--	--	--
Flathead sole (larval) (*Hippoglossoides elassodon*)	--	--	--	--	1	--	--	--

[a]VT = Vertical Plankton Tow, NT = Neuston (surface) Plankton Tow.

Table 28. Count of individuals captured with plankton nets during SMMOCI sampling in the Semidi Islands, Alaska in July 2004.

			Haul	NU-1[a]			VT-1					VT-2	
			Split (%)[b]	3.1	25	100	1.6	6.3	12.5	50	100	3.1	100
Phylum Cnidaria, Class Hydrozoa (jellyfishes)													
	Subclass Hydromedusae												
			Bouganvillea supercilliarus	--	--	--	--	--	--	--	1	--	--
			Aequorea sp.	--	--	--	--	--	--	1	--	--	--
			Melicertum sp.	--	--	--	--	--	--	--	--	--	1
			Aglantha digitale	--	--	--	--	--	--	12	--	--	--
	Subclass Siphonophorae			--	--	--	--	--	--	--	--	--	--
			Chrysaora sp.	--	--	--	--	--	--	--	--	--	1
			Subclass Siphonophorae (bract)	--	--	--	1	--	--	--	--	--	--
Phylum Mollusca, Class Gastropoda, Subclass Opisthobranchia (pteropods)													
			Clione limacina	--	17	--	--	2	--	14	--	--	10
			Limacina helicina	--	--	--	--	23	--	6	--	13	2
Phylum Arthropoda				--	--	--	--	--	--	--	--	--	--
	Class Insecta, Order Diptera												
			Family Cuclicidae (mosquito)	1	--	--	--	--	--	--	--	--	--
Phylum Arthropoda; Subphylum Crustacea													
	Class Copepoda, Order Calanoida (copepods)												
			Acartia longiremus	--	--	--	1	--	--	--	--	2	--
			Calanus marschallae	--	--	--	1	--	--	--	--	--	--
			Centropages abdominalis	155	--	--	--	--	--	--	--	--	--
			Eucalanus bungii	--	--	--	--	14	4	--	--	7	8
			Metridia ochotensis	--	--	--	196	--	--	--	--	--	--
			Metridia pacifica	--	--	--	147	--	--	--	--	3	--
			Neocalanus cristatus	--	--	--	--	--	7	2	--	--	2

Table 28. Count of individuals captured with plankton nets during SMMOCI sampling in the Semidi Islands, Alaska in July 2004 (continued).

			Haul	NU-1[a]			VT-1					VT-2	
			Split (%)[b]	3.1	25	100	1.6	6.3	12.5	50	100	3.1	100
			Neocalanus flemengeri	--	--	--	15	--	--	--	--	1	--
			Neocalanus plumchrus	--	4	--	24	--	--	--	--	1	--
			Neocalanus spp.	--	--	--	114	--	--	--	--	101	--
			Pseudocalanus spp.	--	--	--	82	--	--	--	--	34	--
			Family Aetididae	--	--	--	1	--	--	--	--	--	--
	Class Malacostraca												
		Order Amphipoda; Suborder Gammaridea											
			Cyphocarus challengeri	--	--	1	--	--	1	1	--	--	--
		Order Amphipoda; Suborder Hyperiidae											
			Hyperia spp. (juvenile)	1	--	--	--	1	--	--	--	--	--
			Parathemisto pacifica	--	--	1	--	--	3	2	--	--	4
			Primno macropa	--	--	--	1	1	--	--	--	--	--
		Order Decapoda; Infraorder Caridea (shrimps)											
			Family Pandalidae (zoea)	--	--	--	--	--	--	2	--	--	--
		Order Decapoda; Section Brachyura (crabs)											
			Superfamily Brachyryncha (zoea)	--	--	--	1	--	--	--	--	--	--
			Chionoecetes sp. (megalops)	--	--	--	--	--	--	--	--	1	--
		Order Decapoda; Section Anomura (crabs)											
			Family Paguridae (hermit crab zoea)	--	--	--	--	--	--	1	--	--	--
		Order Euphausiacea (euphausiids / krill)											
			Thysanoessa raschii	--	--	1	--	--	--	--	--	--	7
			Thysanoessa spinifera	--	--	--	--	--	--	--	--	--	2
		Order Mysidacea (mysids / opossum shrimps)											
			Meterythrops robusta	--	--	--	--	--	1	1	--	--	--

Table 28. Count of individuals captured with plankton nets during SMMOCI sampling in the Semidi Islands, Alaska in July 2004 (continued).

			Haul	NU-1[a]			VT-1					VT-2	
			Split (%)[b]	3.1	25	100	1.6	6.3	12.5	50	100	3.1	100
	Class Ostracoda (ostracods / seed shrimps)												
			Conchoecia sp.	--	--	--	1	--	--	--	--	--	--
Phylum Chaetognatha (arrowworms)													
			Eukhronia hamata	--	--	--	1	--	--	--	--	--	--
			Sagitta elegans	--	--	1	--	2	28	--	--	5	1
Phylum Chordata, Subphylum Vertebrata, Fishes													
			Hexagrammos lagocephalus (Rock greenling)	--	--	2	--	--	--	--	--	--	--

[a]VT = Vertical Plankton Tow, NT = Neuston (surface) Plankton Tow.

[b]After removing the noticeably larger or less common animals in the sample (100% and 25% splits), the remaining sample was split using a Folsom splitter to achieve a target of at least 100 individuals per haul. For Siphonophore bracts, "1" indicates presence rather than a count of fragments.

Table 29. Locations (decimal degrees), times and dates of CTD casts made at the Semidi Islands, Alaska, in 2001.

Station	Latitude (N)	Longitude (W)	Date	Time[a]	Depth[b] (m)	Notes[c]
1	56.1195°	157.0670°	19 July	14:01	82 (103)	West end of TX 02, Sta. 1
2	56.1175°	156.9308°	19 July	14:40	72 (82)	TX 02, Sta. 2
3	56.1171°	156.7850°	19 July	15:30	67 (76)	TX 02, Sta. 3
4	56.1177°	156.6371°	19 July	16:04	93 (134)	TX 02, Sta. 4
5	56.1172°	156.4847°	19 July	16:47	92 (232)	TX 02, Sta. 5
6	56.1167°	156.3334°	19 July	17:28	91 (218)	TX 02, Sta. 6
7	56.1457°	156.8716°	19 July	22:44	63 (84)	MWTR 02
8	55.9915°	156.7034°	20 July	01:05	77 (93)	BOTR 01
9	55.9668°	156.3346°	21 July	08:27	97 (217)	TX 05, Sta. 1
10	55.9677°	156.5045°	21 July	09:24	95 (195)	TX 05, Sta. 2
11	55.9670°	156.6604°	21 July	10:13	97 (181)	TX 05, Sta. 3
12	55.9961°	156.8015°	21 July	11:00	94 (112)	TX 05, Sta. 4
13	55.9672°	156.9482°	21 July	11:45	97 (120)	TX 05, Sta. 5
14	55.9668°	157.0728°	21 July	12:29	78 (91)	TX 05, Sta. 6
15	55.8707°	156.3296°	21 July	15:55	91 (239)	TX 07, Sta. 1
16	55.8684°	156.4630°	21 July	16:39	92 (247)	TX 07, Sta. 2
17	55.8690°	156.6137°	21 July	17:23	92 (216)	TX 07, Sta. 3
18	55.8672°	156.7629°	21 July	18:04	90 (183)	TX 07, Sta. 4
19	55.8647°	156.9318°	21 July	18:54	97 (129)	TX 07, Sta. 5
20	55.8648°	157.0797°	21 July	19:33	97 (108)	TX 07, Sta. 6 & MWTR 03
21	55.9719°	156.8899°	21 July	23:13	91 (124)	MWTR 04
22	56.0564°	156.9032°	22 July	00:29	76 (93)	MWTR 05
23	56.2090°	157.0694°	22 July	09:03	74 (86)	TX 08W, Sta. 1
24	56.2183°	156.7657°	22 July	11:08	19 (31)	TX 08E, Sta. 1
25	56.2178°	156.6349°	22 July	11:45	97 (146)	TX 08E, Sta. 2
26	56.2165°	156.4800°	22 July	12:25	96 (223)	TX 08E, Sta. 3
27	56.2161°	156.3308°	22 July	13:09	97 (268)	TX 08E, Sta. 4
28	56.2467°	156.5721°	24 July	02:44	91 (187)	MWTR 06

[a]All times are Alaska Daylight (Universal Coordinated Time minus 8 hours).
[b]Depth of cast. Values in parentheses are bottom depths at cast location.
[c]TX = Transect, MWTR = Mid-water Trawl, BOTR = Bottom Trawl

Table 30. Locations (decimal degrees), times and dates of CTD casts made at the Semidi Islands, Alaska, in 2004.

Station	Latitude (N)	Longitude (W)	Date	Time[a]	Depth[b] (m)	Notes[c]
1	56.2792°	157.0785°	10 July	02:15	103 (104)	BOTR 01
2	55.9333°	156.8667°	10 July	20:15	153 (155)	BOTR 02 & 03
3	55.9085°	156.9153°	10 July	21:44	113 (145)	BOTR 04
4	56.0143°	156.7805°	10 July	23:47	82 (82)	BOTR 05
5	55.9955°	156.7157°	11 July	03:15	69 (80)	BOTR 06
6	56.1207°	157.0640°	11 July	08:21	90 (100)	W. end of TX 02, Sta. 1
7	56.1198°	156.9257°	11July	09:05	67 (81)	TX 02, Sta. 2
8	56.1188°	156.7767°	11 July	09:53	62 (71)	TX 02, Sta. 3
9	56.1183°	156.5962°	11 July	10:42	179 (187)	TX 02, Sta. 4
10	56.1173°	156.4817°	11 July	11:20	199 (230)	TX 02, Sta. 5
11	56.1163°	156.3365°	11 July	12:07	194 (220)	E. end of TX 02, Sta. 6
12	56.1450°	156.3605°	11 July	15:30	200 (224)	MWTR 01
13	56.2093°	157.0733°	11 July	19:04	86 (86)	W. end of TX 08W, Sta. 1
14	56.2113°	156.9470°	11 July	19:39	70 (88)	TX 08W, Sta. 2
15	56.2173°	156.8122°	11 July	20:16	39 (56)	E. end of TX 08W, Sta. 3
16	56.2165°	156.7658°	11 July	20:55	29 (40)	W. end of TX 08E, Sta. 1
17	56.2163°	156.6130°	11 July	21:44	164 (164)	TX 08E, Sta. 2
18	56.2163°	156.4543°	11 July	22:35	200 (230)	TX 08E, Sta. 3
19	56.2172°	156.3877°	11 July	23:10	200 (256)	E. end of TX 08E, Sta. 4
20	56.0717°	156.7092°	12 July	01:38	50 (53)	BOTR 07
21	55.9738°	156.3972°	12 July	08:55	199 (202)	E. end of TX 05, Sta. 1
22	55.9878°	156.7165°	12 July	10:42	48 (65)	LOLI 01
23	56.0758°	156.7038°	12 July	18:31	51 (52)	BOTR 08
24	56.1845°	156.7525°	12 July	20:42	44 (44)	BOTR 09
25	55.9763°	157.0038°	13 July	07:55	88 (104)	TX 05, Sta. 2
26	55.9683°	156.8872°	13 July	09:01	95 (123)	TX 05, Sta. 3
27	55.9703°	156.7468°	13 July	09:56	78 (102)	TX 05, Sta. 4
28	55.9713°	156.5915°	13 July	10:45	189 (195)	TX 05, Sta. 5
29	55.9730°	156.3945°	13 July	11:47	186 (205)	E. end of TX 05, Sta. 1[d]
30	55.8707°	156.3298°	13 July	18:02	200 (235)	E. end of TX 07
31	55.8822°	156.7993°	13 July	21:55	97 (179)	MWTR 02
32	56.0507°	156.7178°	14 July	00:10	42 (45)	BOTR 10
33	56.2197°	156.8128°	14 July	19:10	45 (61)	LOLI 02, VERT 02
34	56.0898°	156.5302°	15 July	01:26	158 (209)	MWTR 03
35	56.0333°	156.6302°	15 July	11:34	49 (67)	LOLI 03

[a]All times are Alaska Daylight (Universal Coordinated Time minus 8 hours).
[b]Depth of cast. Values in parentheses are bottom depth at cast location.
[c]TX = Transect, MWTR = Mid-water Trawl, BOTR = Bottom Trawl, VERT = Vertical Plankton Tow.
[d]Station repeated.

Table 31. Estimates of at sea densities of seabirds near colonies at several Alaskan sites. Data are from other SMMOCI-like cruises and were gathered using similar procedures.

Colony Area	# birds/km^2	Reference
Cape Thompson / Chukchi Sea	54	Piatt et al. 1990
Norton Sound / Northeastern Bering Sea	13	D. Dragoo Unpubl. Data
Pribilof Islands / Southeast Bering Sea (1997)	51	Dragoo and Byrd 1998
Buldir Island / Western Aleutians	145	Dragoo and Byrd 1999
Kasatochi Island / Central Aleutians (1996)	110	Drew et al. 2003
Kasatochi Island / Central Aleutians (2003)	118	D. Dragoo Unpubl. Data
Aiktak Island / Unimak Pass, Eastern Aleutians	38	Byrd et al. 1997
Semidi Islands / Northern Gulf of Alaska (2001)	**93**[a]	**This study**
Semidi Islands / Northern Gulf of Alaska (2004)	**68**	**This study**
Barren Islands / Lower Cook Inlet (1992)	174	Piatt 1994
Barren Islands / Lower Cook Inlet (1996)	126	Piatt 2003
Glacier Bay/ Southeast Alaska	21	Robards et al. 2003
St. Lazaria/ Sitka Sound, Southeast Alaska	18	Piatt and Dragoo 2005

[a]This value does not include a flock of approximately 50,000 shearwaters observed on transect. Bird density including this large flock of shearwaters was 476 birds/km^2.

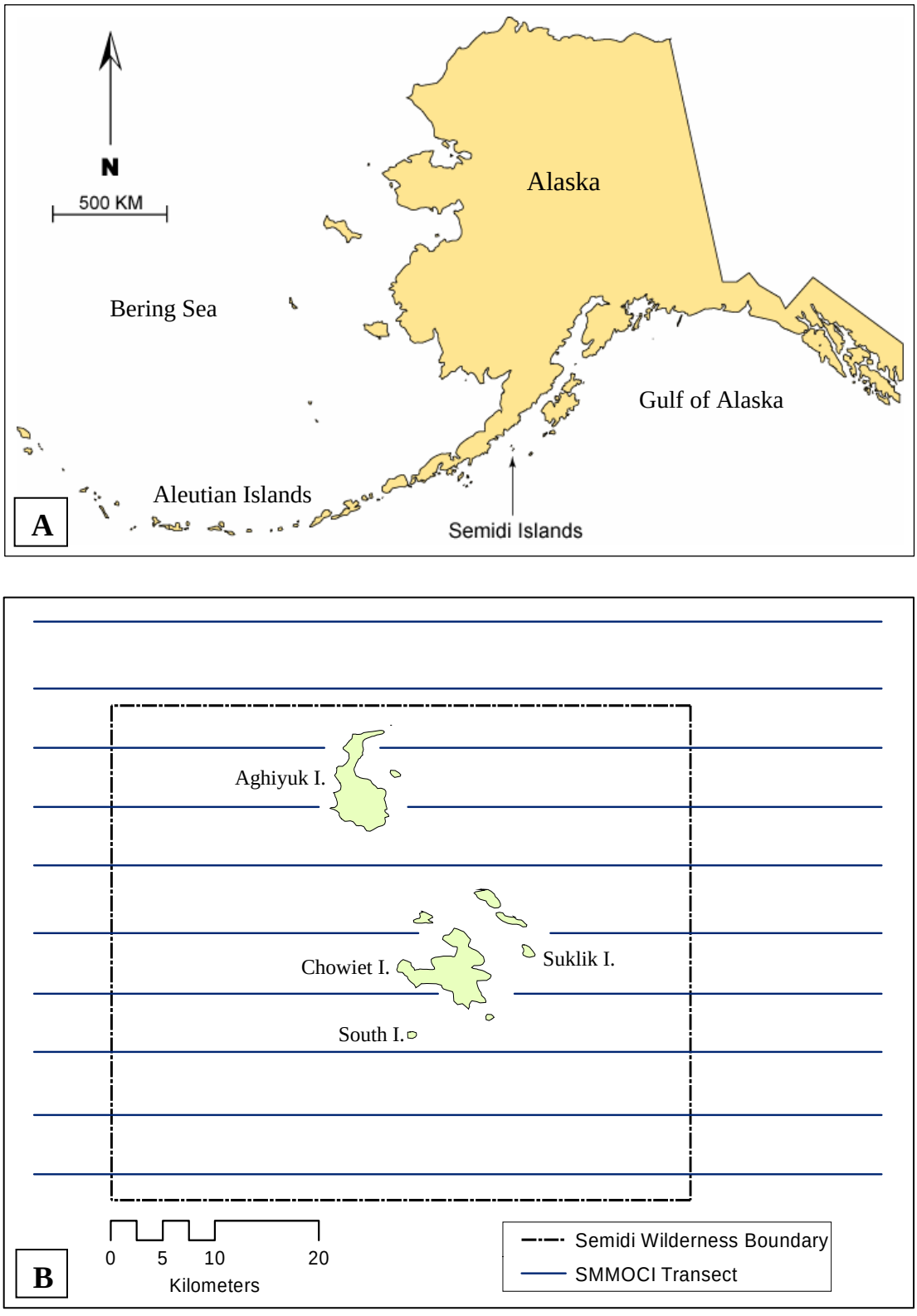


Figure 1. Map of Alaska showing the location of the Semidi Islands (A) and the extent of the Semidi Wilderness Area in relation to SMMOCI transects (B). The water column and associated submerged lands of the wilderness are part of the Alaska Maritime National Wildlife Refuge.

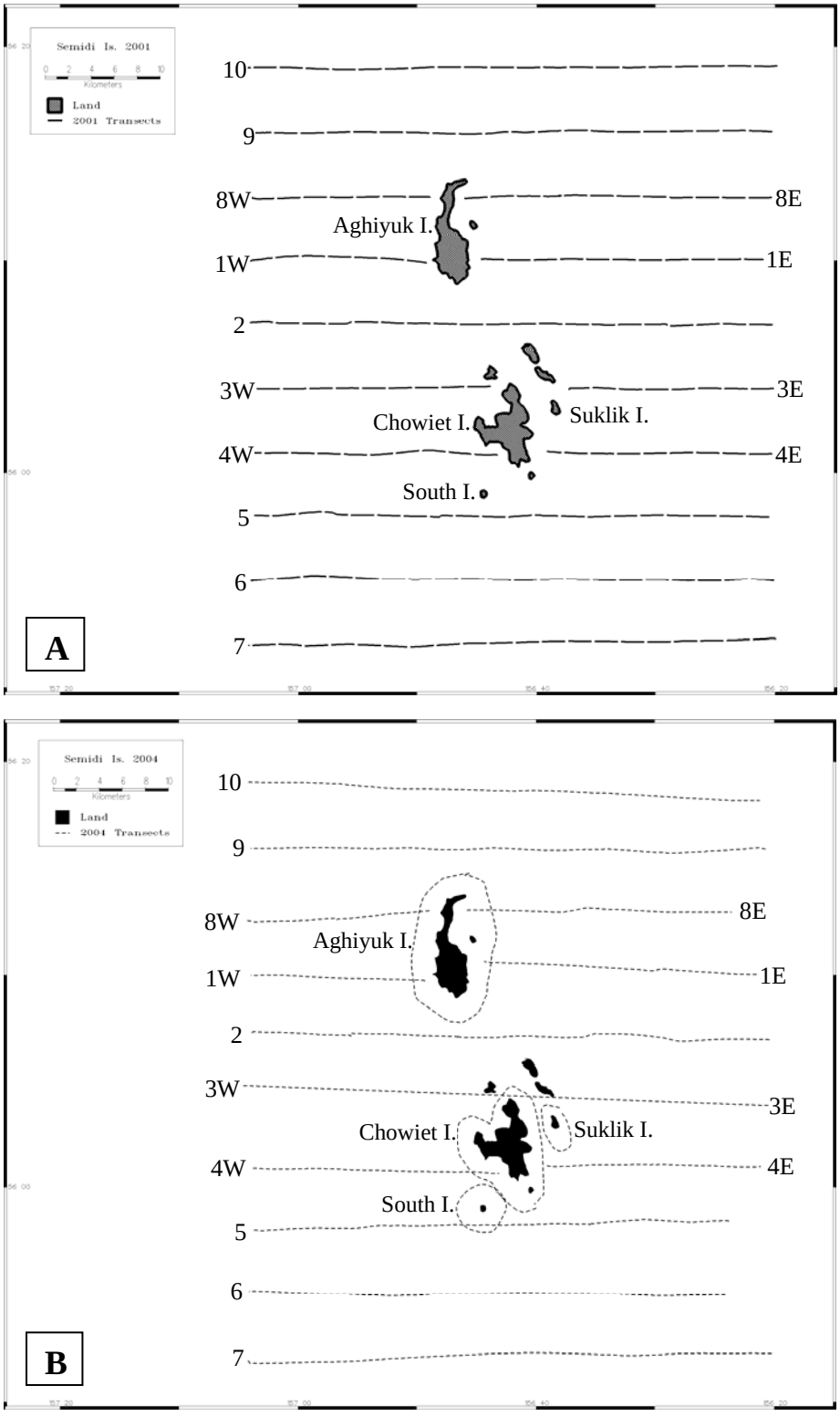


Figure 2. Map of transects surveyed in the Semidi Islands, Alaska in 2001 (A) and 2004 (B). Island circumnavigations were added in 2004. Transects shown were derived from GPS positions recorded during surveys.

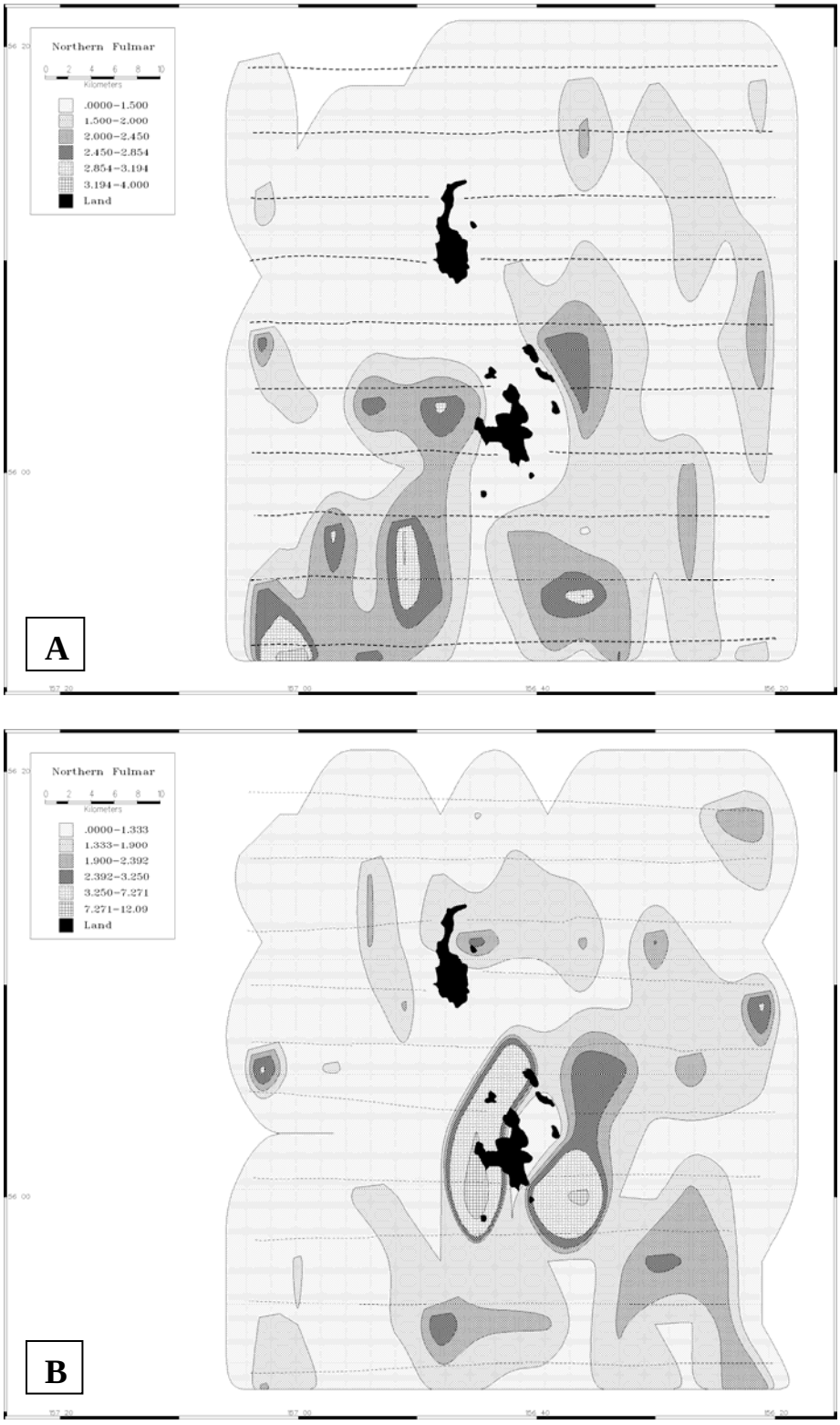


Figure 3. Distribution of northern fulmars on transects surveyed in the Semidi Islands, Alaska in 2001 (A) and 2004 (B). Includes birds on the water and flying. Does not include data from circumnavigations in 2004. Density scales vary by year.

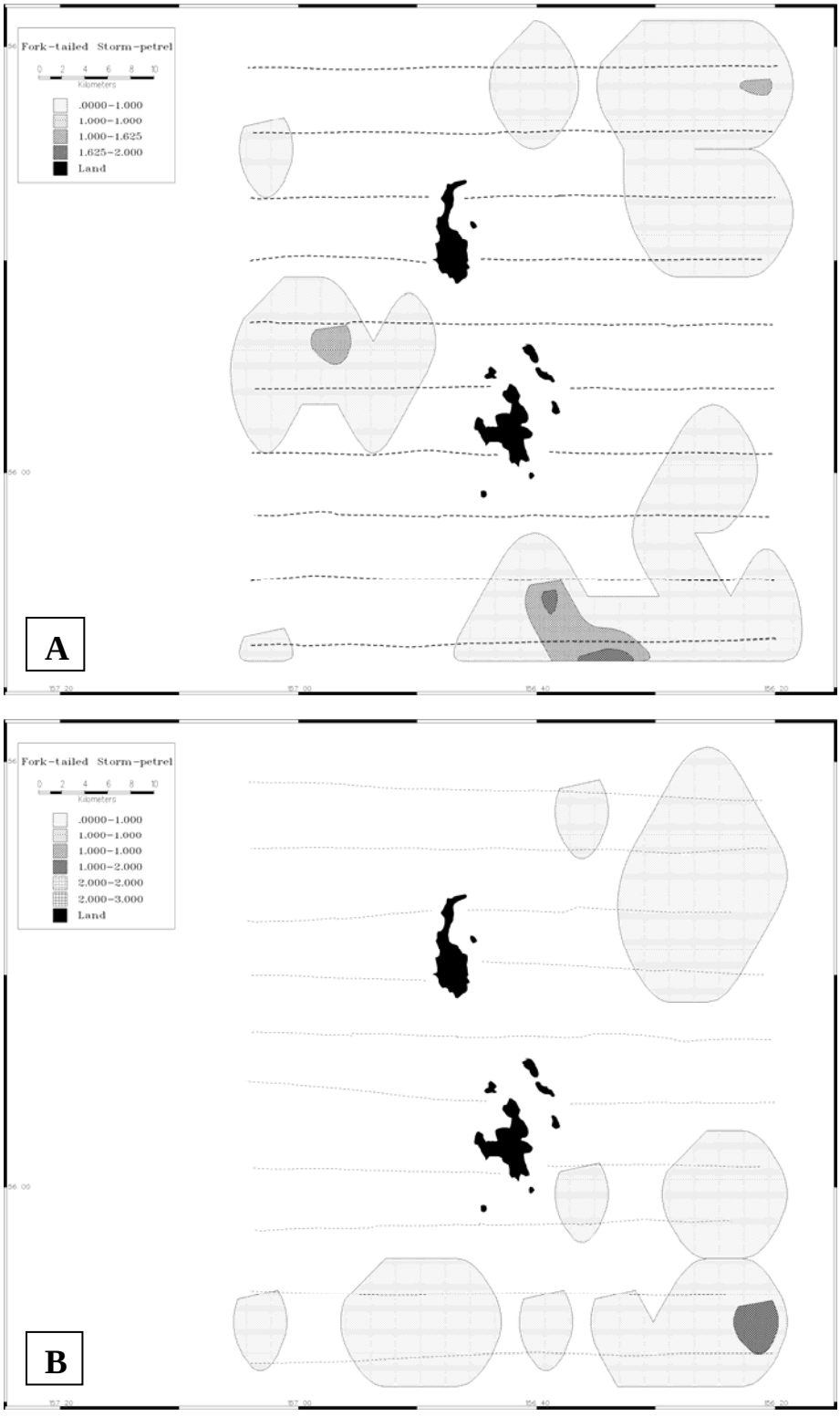


Figure 4. Distribution of fork-tailed storm-petrels on transects surveyed in the Semidi Islands, Alaska in 2001 (A) and 2004 (B). Includes birds on the water and flying. Does not include data from circumnavigations in 2004. Density scales vary by year.

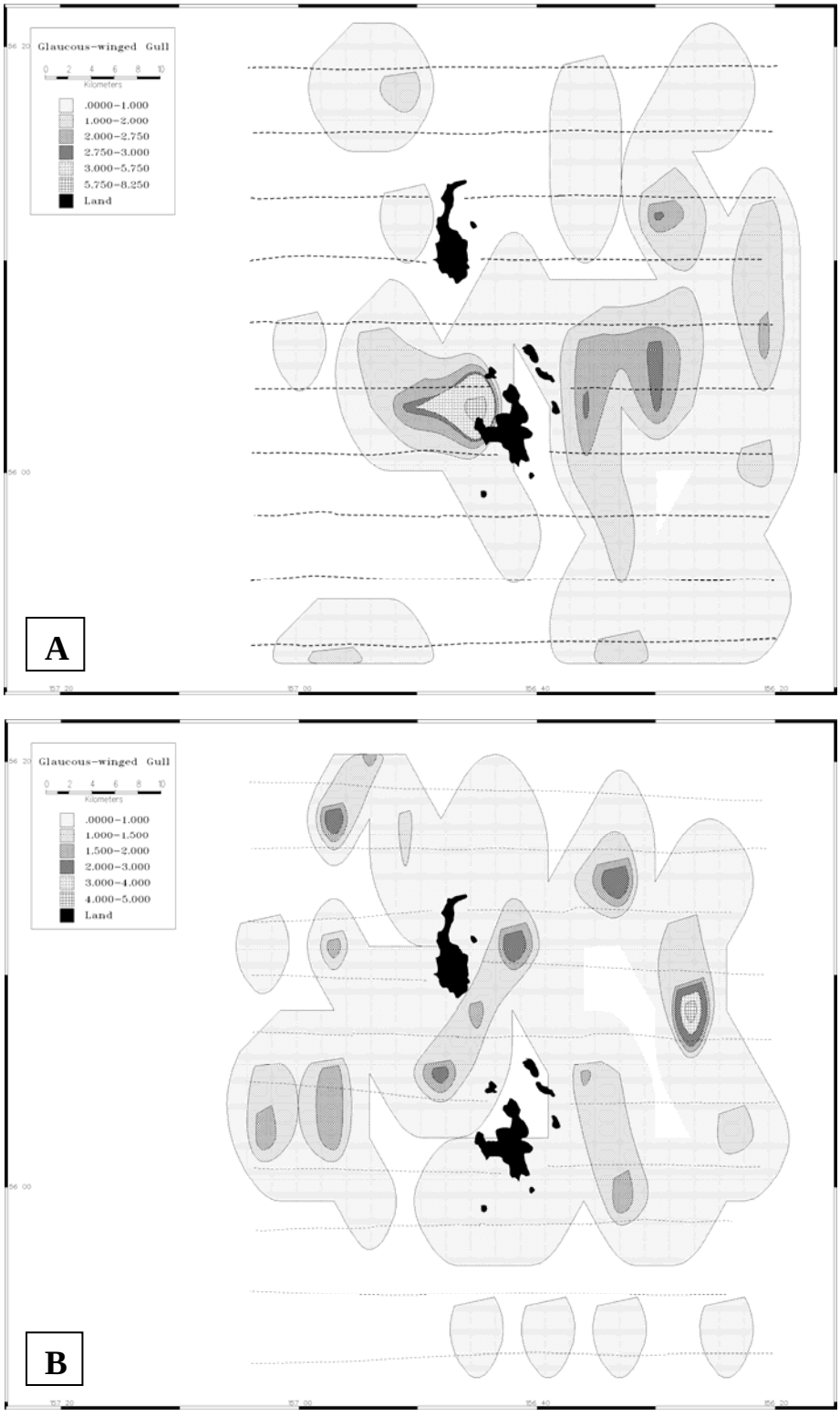


Figure 5. Distribution of glaucous-winged gulls on transects surveyed in the Semidi Islands, Alaska in 2001 (A) and 2004 (B). Includes birds on the water and flying. Does not include data from circumnavigations in 2004. Density scales vary by year.

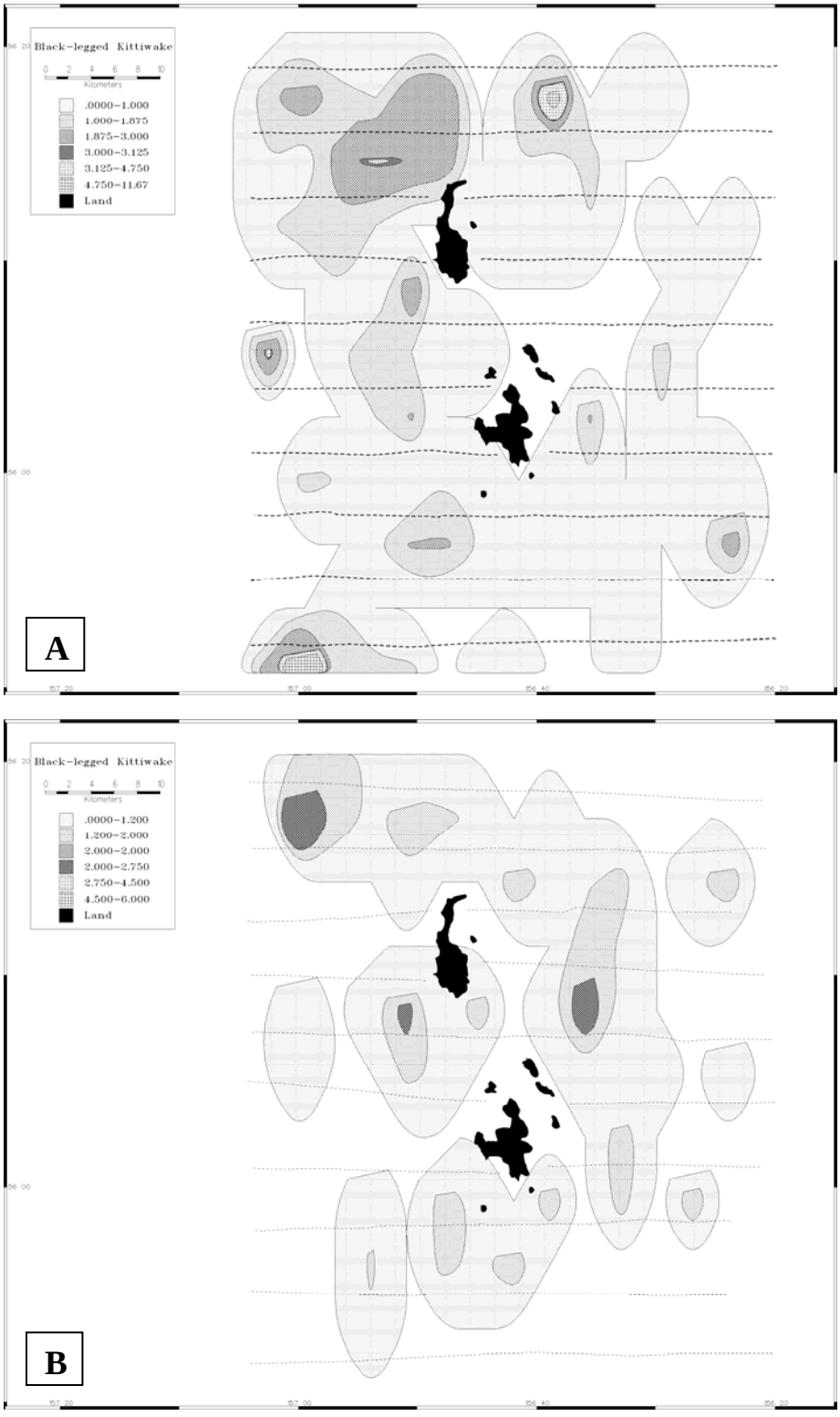


Figure 6. Distribution of black-legged kittiwakes on transects surveyed in the Semidi Islands, Alaska in 2001 (A) and 2004 (B). Includes birds on the water and flying. Does not include data from circumnavigations in 2004. Density scales vary by year.

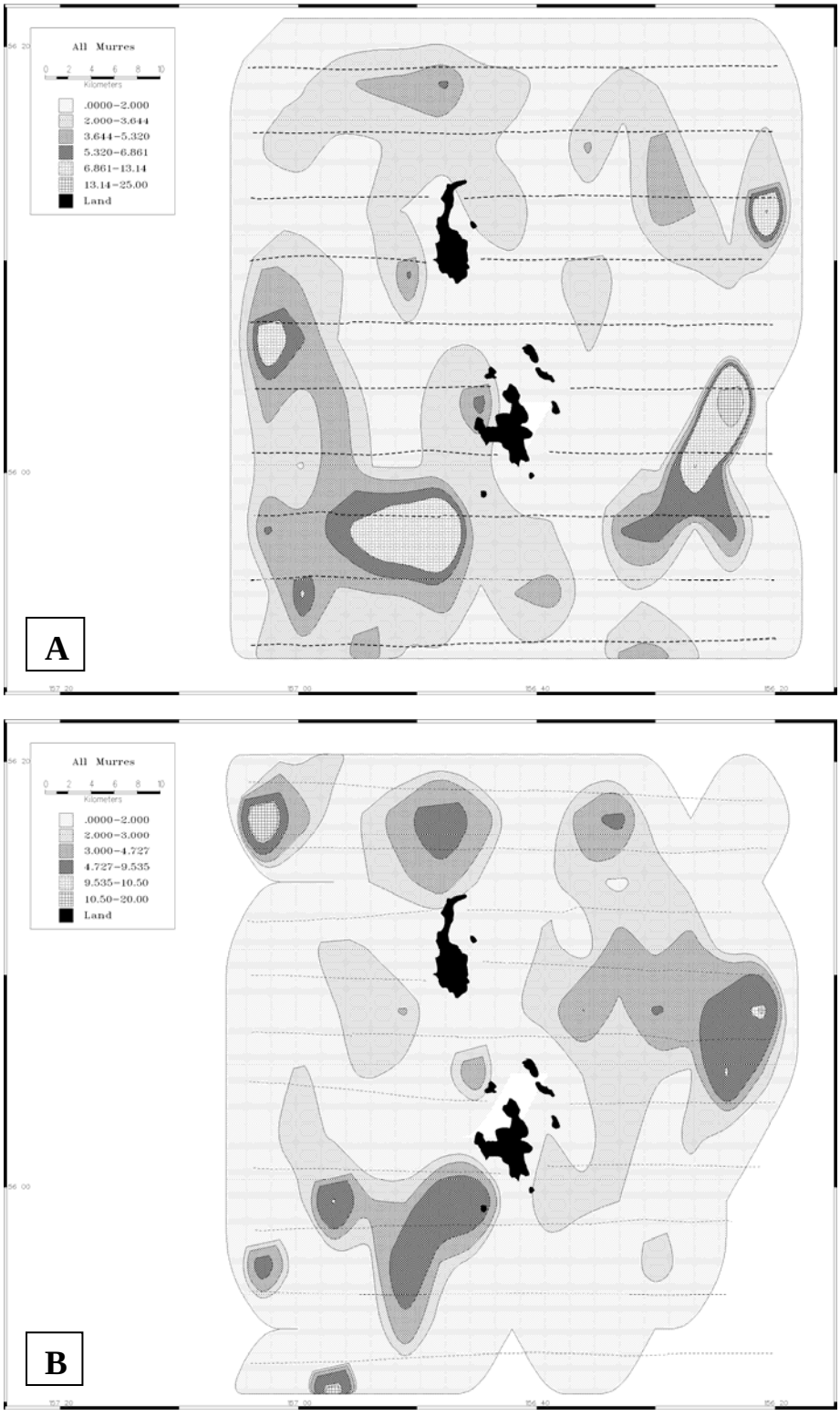


Figure 7. Distribution of murres on transects surveyed in the Semidi Islands, Alaska in 2001 (A) and 2004 (B). Includes birds on the water and flying. Does not include data from circumnavigations in 2004. Density scales vary by year.

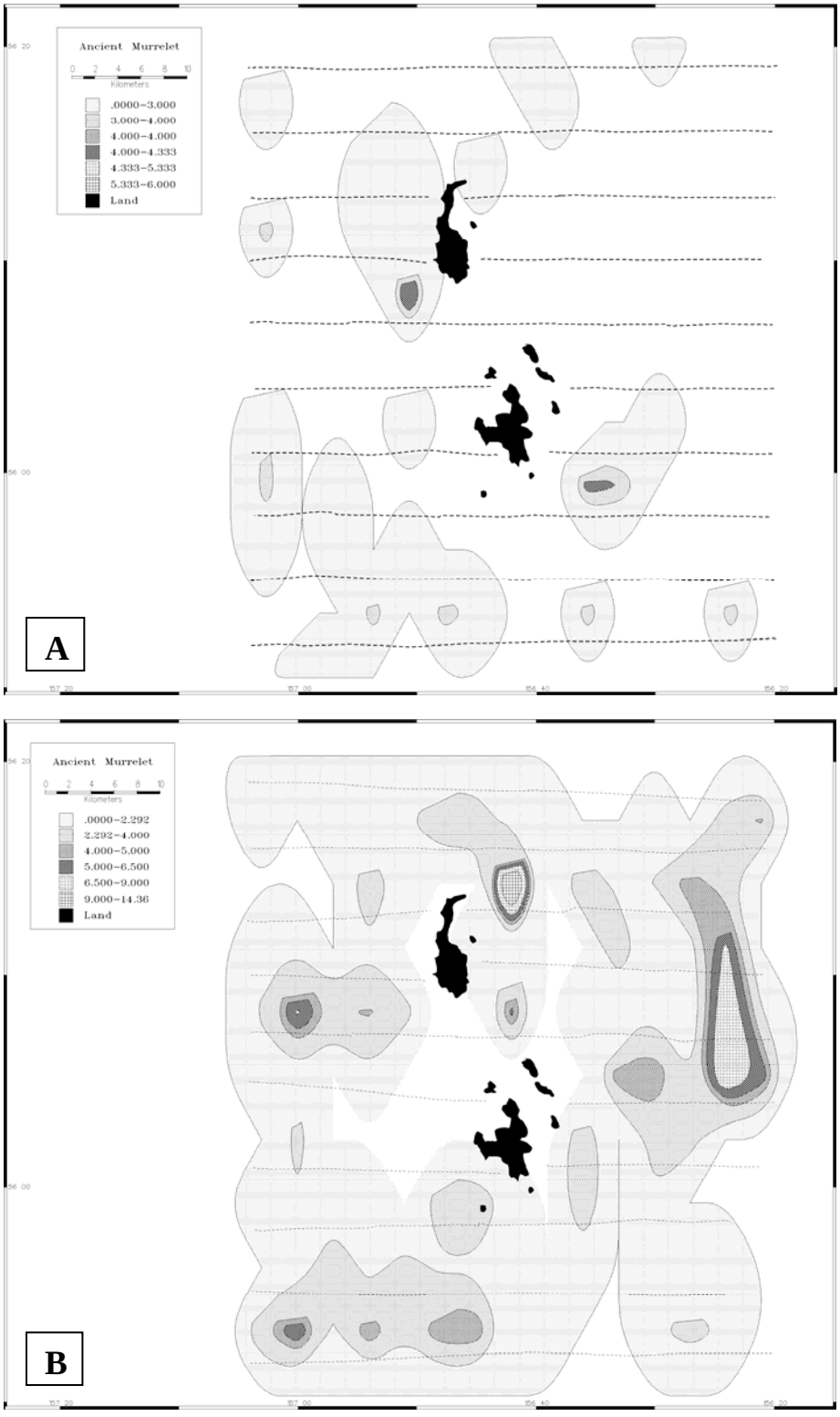


Figure 8. Distribution of ancient murrelets on transects surveyed in the Semidi Islands, Alaska in 2001 (A) and 2004 (B). Includes birds on the water and flying. Does not include data from circumnavigations in 2004. Density scales vary by year.

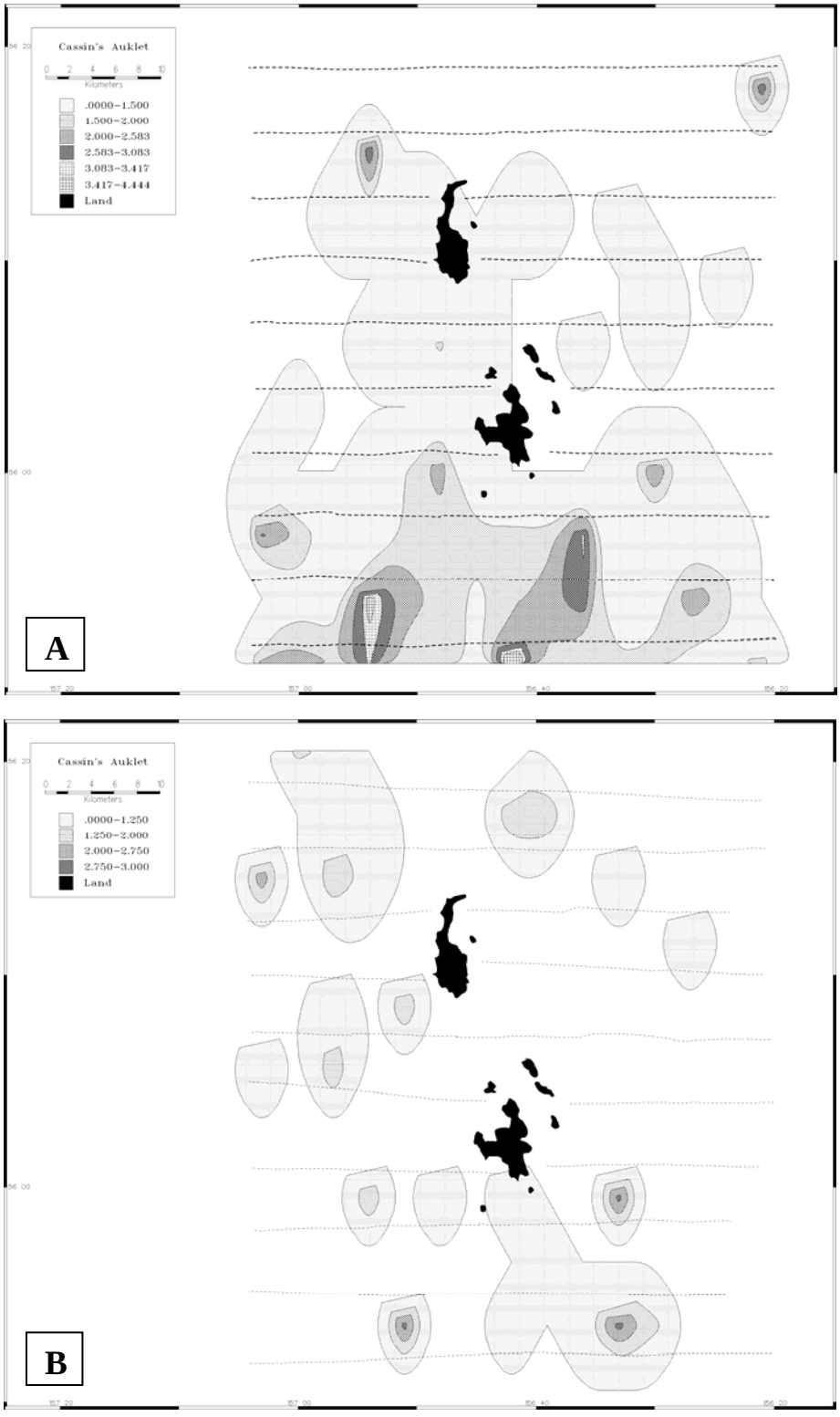


Figure 9. Distribution of Cassin's auklets on transects surveyed in the Semidi Islands, Alaska in 2001 (A) and 2004 (B). Includes birds on the water and flying. Does not include data from circumnavigations in 2004. Density scales vary by year.

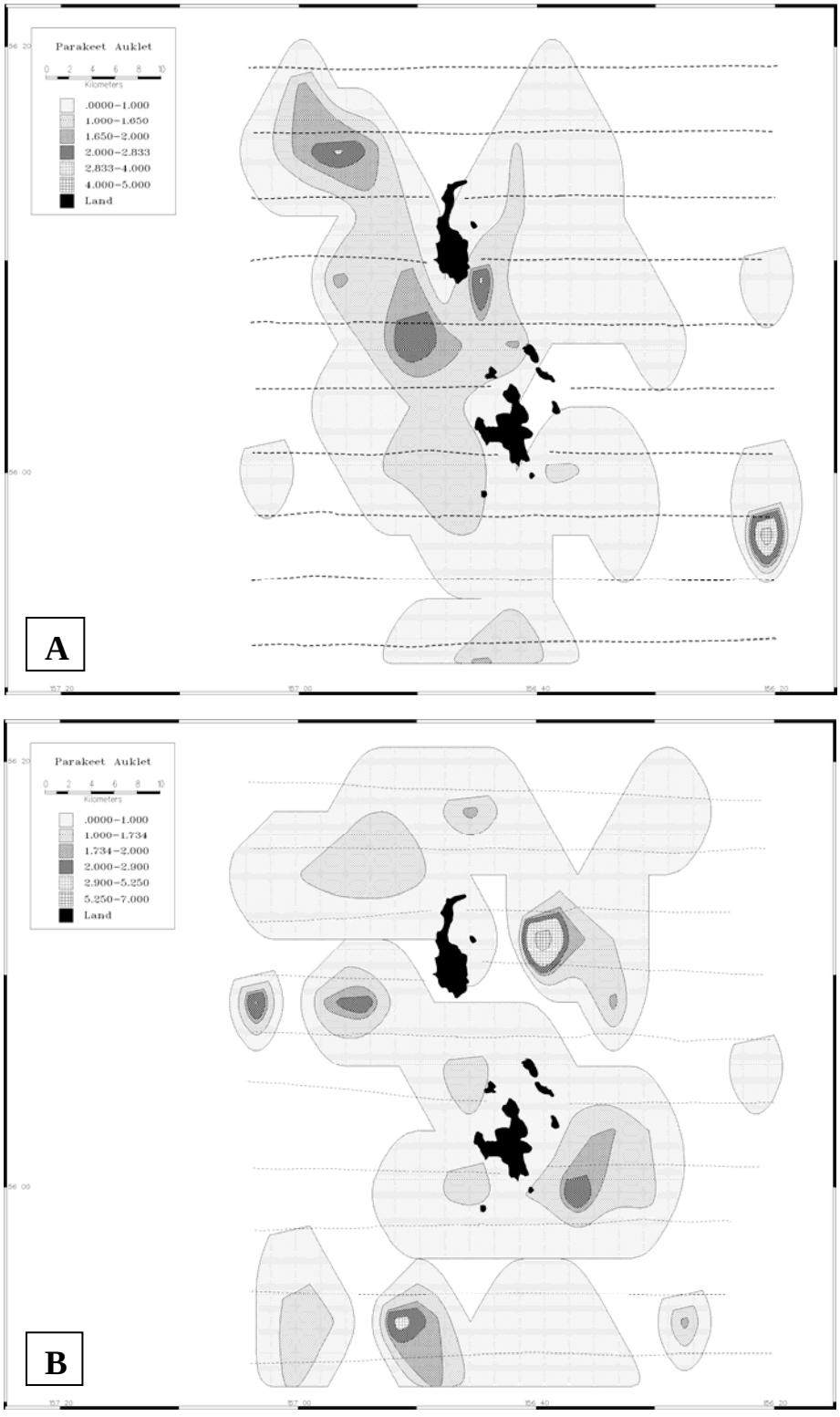


Figure 10. Distribution of parakeet auklets on transects surveyed in the Semidi Islands, Alaska in 2001 (A) and 2004 (B). Includes birds on the water and flying. Does not include data from circumnavigations in 2004. Density scales vary by year.

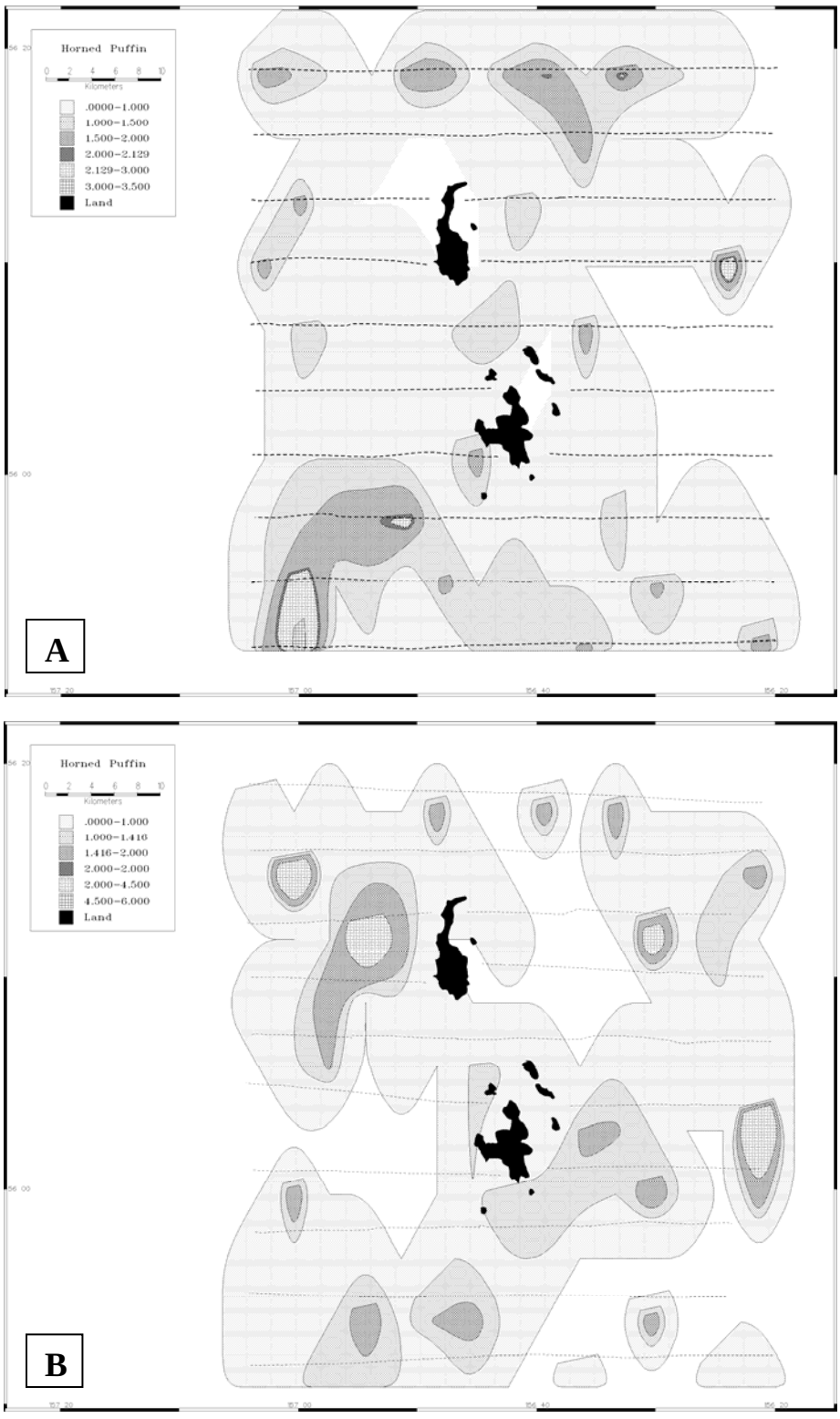


Figure 11. Distribution of horned puffins on transects surveyed in the Semidi Islands, Alaska in 2001 (A) and 2004 (B). Includes birds on the water and flying. Does not include data from circumnavigations in 2004. Density scales vary by year.

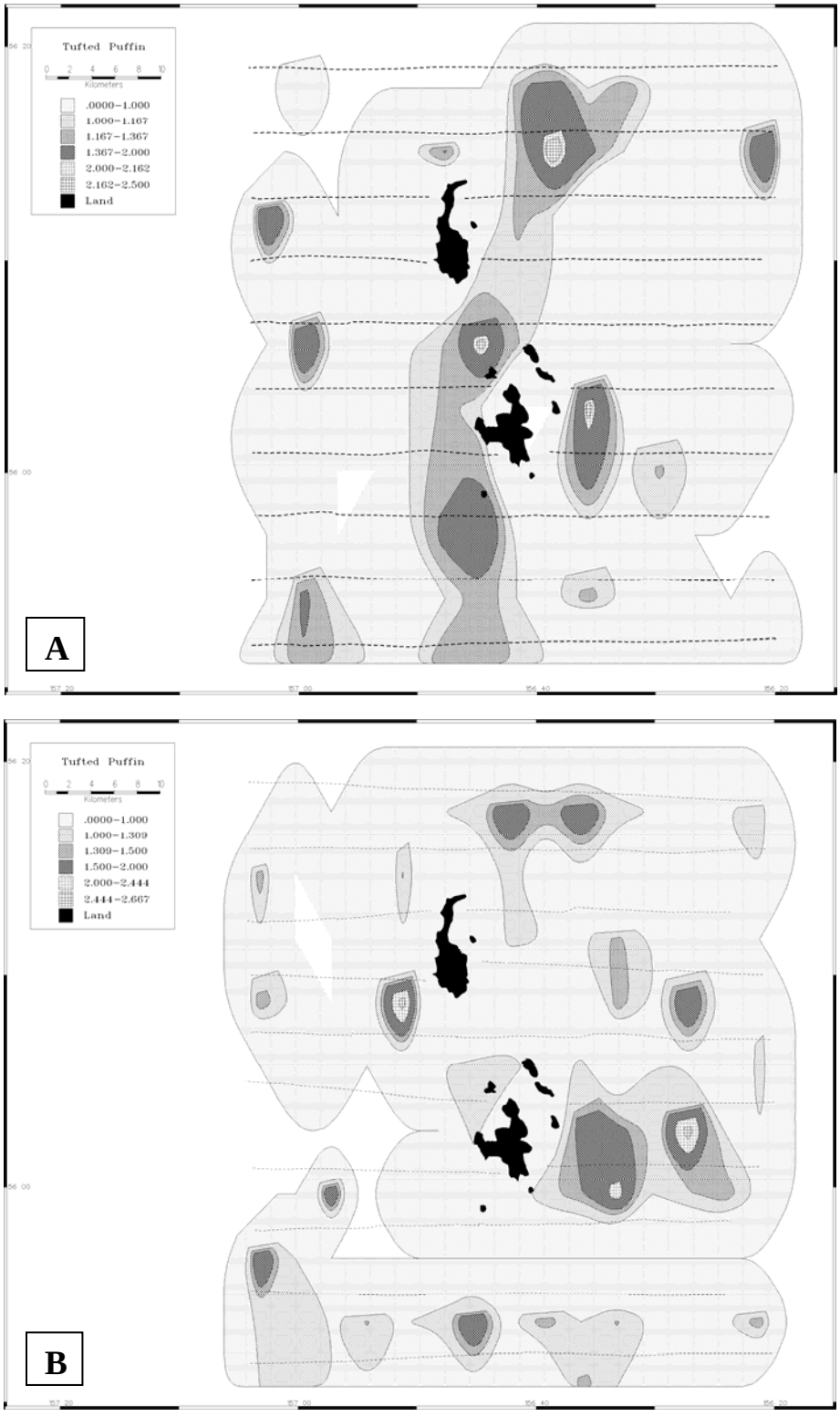


Figure 12. Distribution of tufted puffins on transects surveyed in the Semidi Islands, Alaska in 2001 (A) and 2004 (B). Includes birds on the water and flying. Does not include data from circumnavigations in 2004. Density scales vary by year.

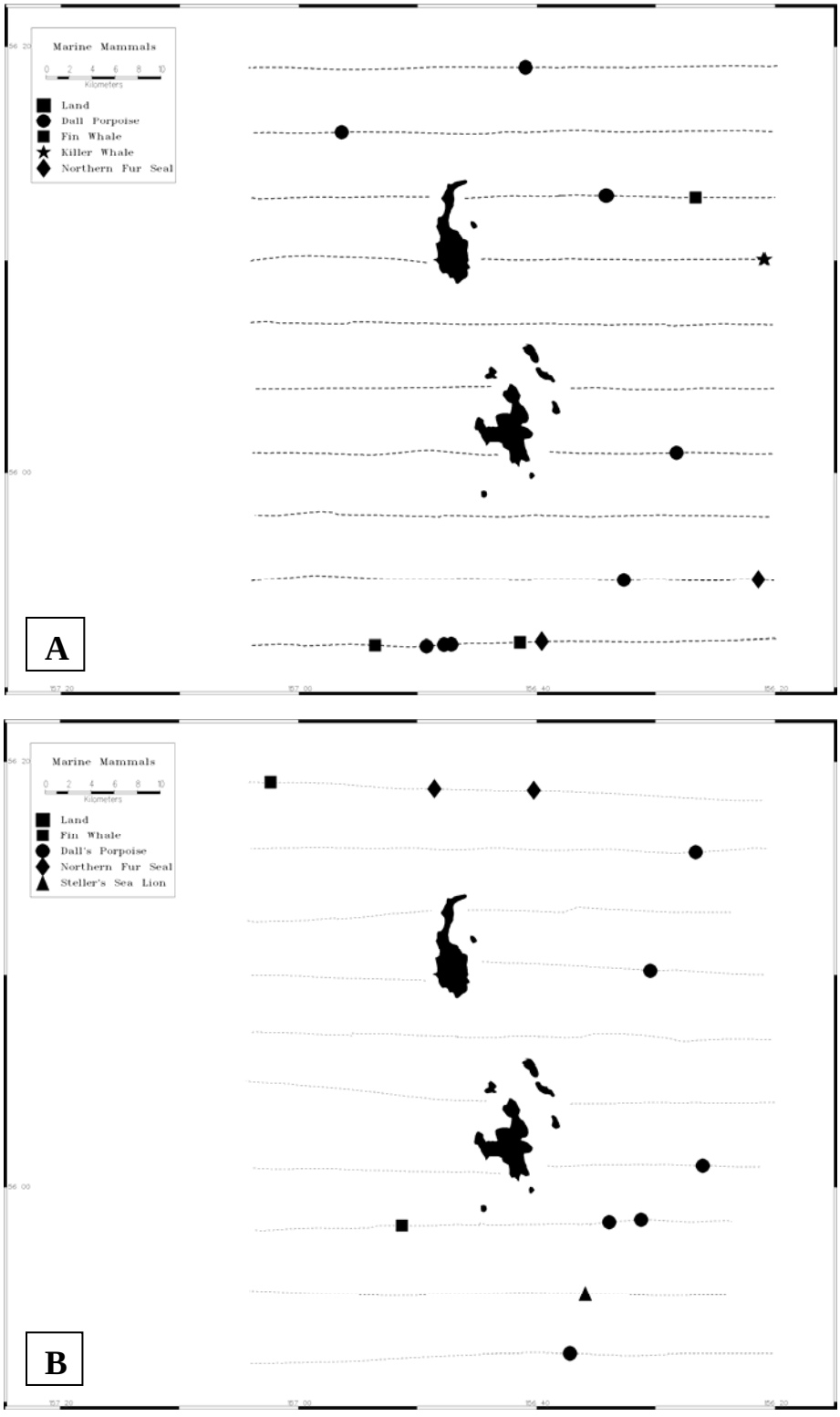


Figure 13. Distribution of marine mammals on transects surveyed in the Semidi Islands, Alaska in 2001 (A) and 2004 (B). Does not include data from circumnavigations in 2004.

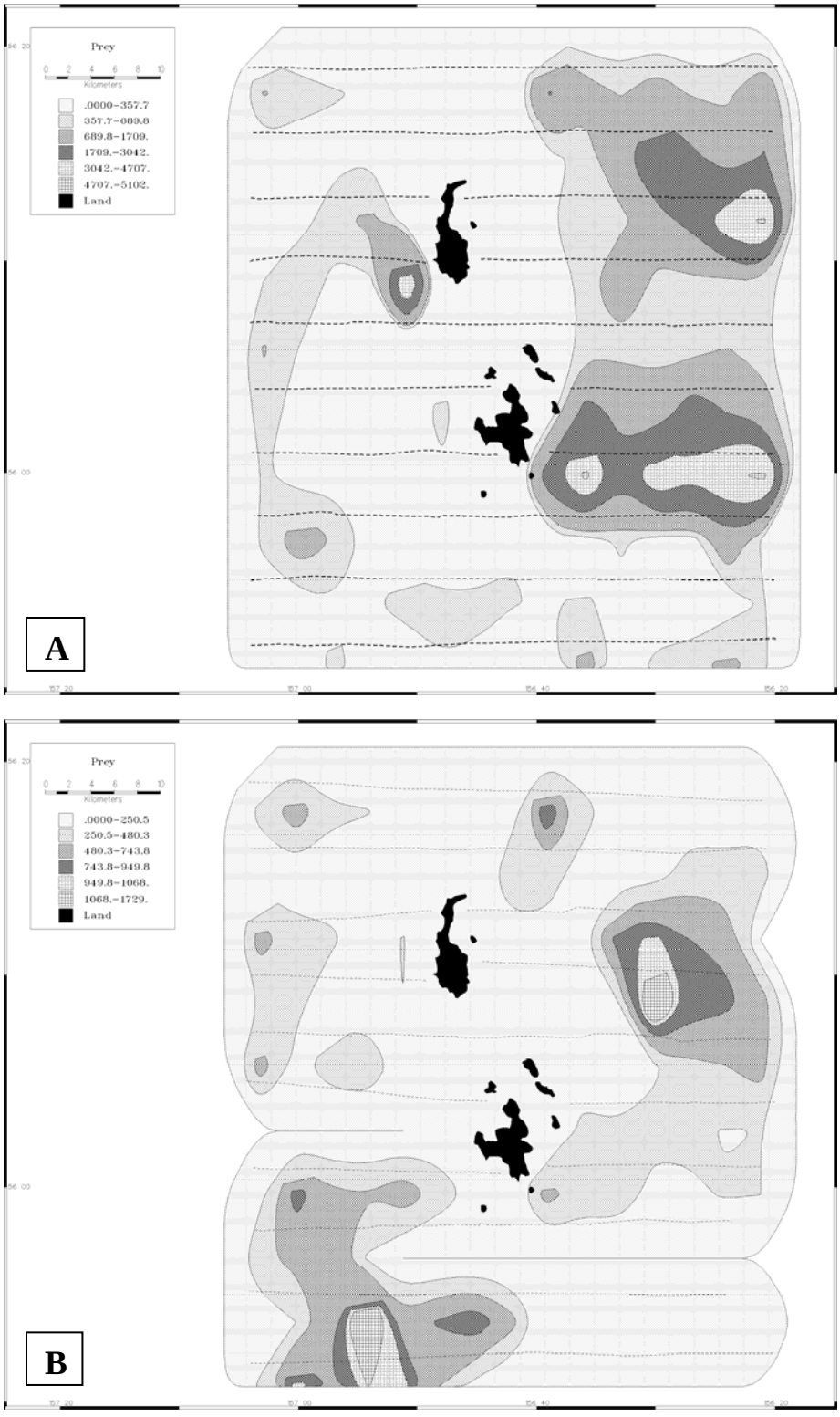


Figure 14. Distribution of prey in the water column (10-200m), based on acoustic surveys on transects in the Semidi Islands, Alaska in 2001 (A) and 2004 (B). Does not include data from circumnavigations in 2004. Density scales vary by year.

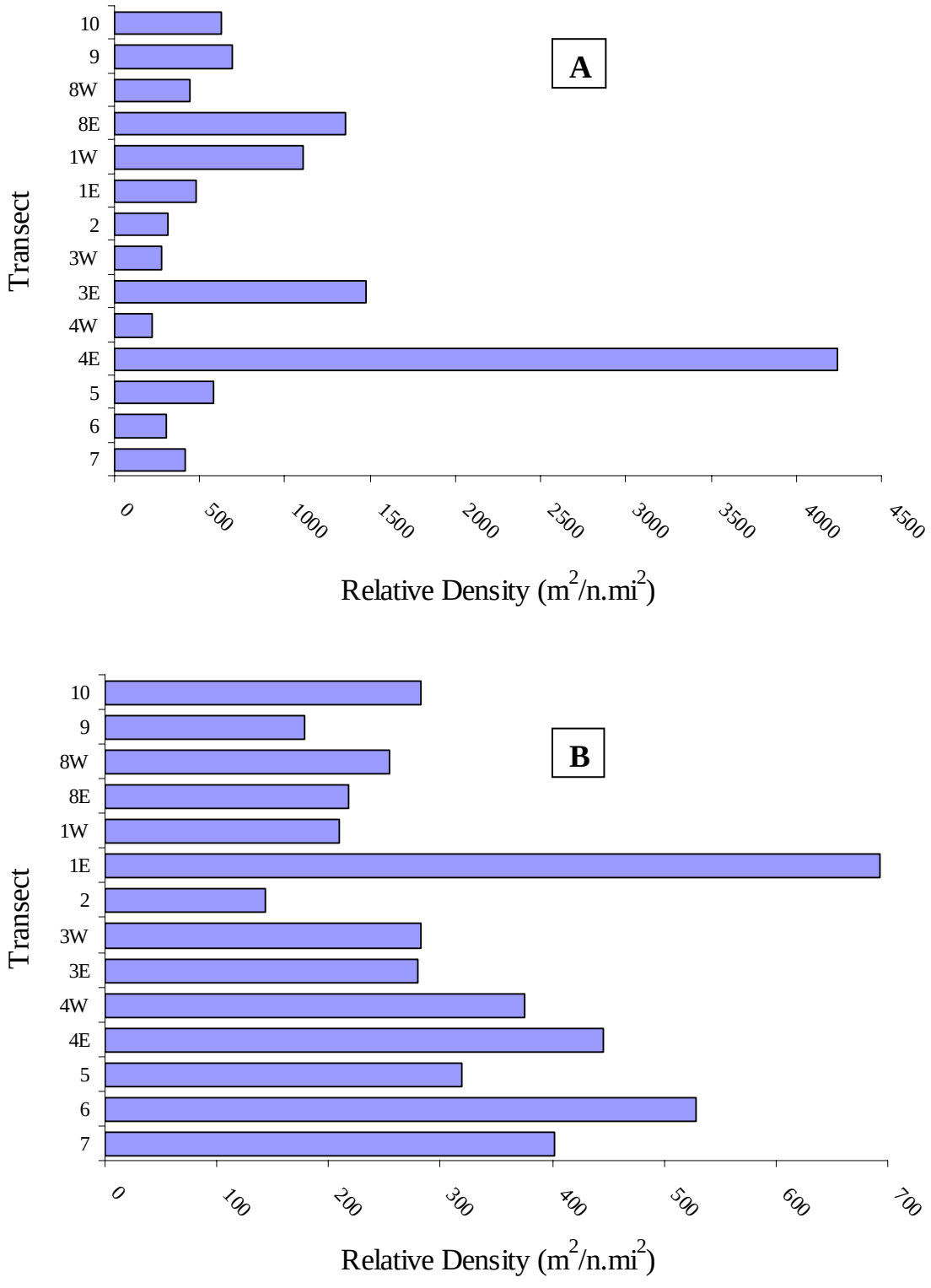


Figure 15. Water column relative prey densities measured during acoustic surveys on transects in the Semidi Islands, Alaska in 2001 (A) and 2004 (B). Relative density scale varies. Does not include data from circumnavigations in 2004.

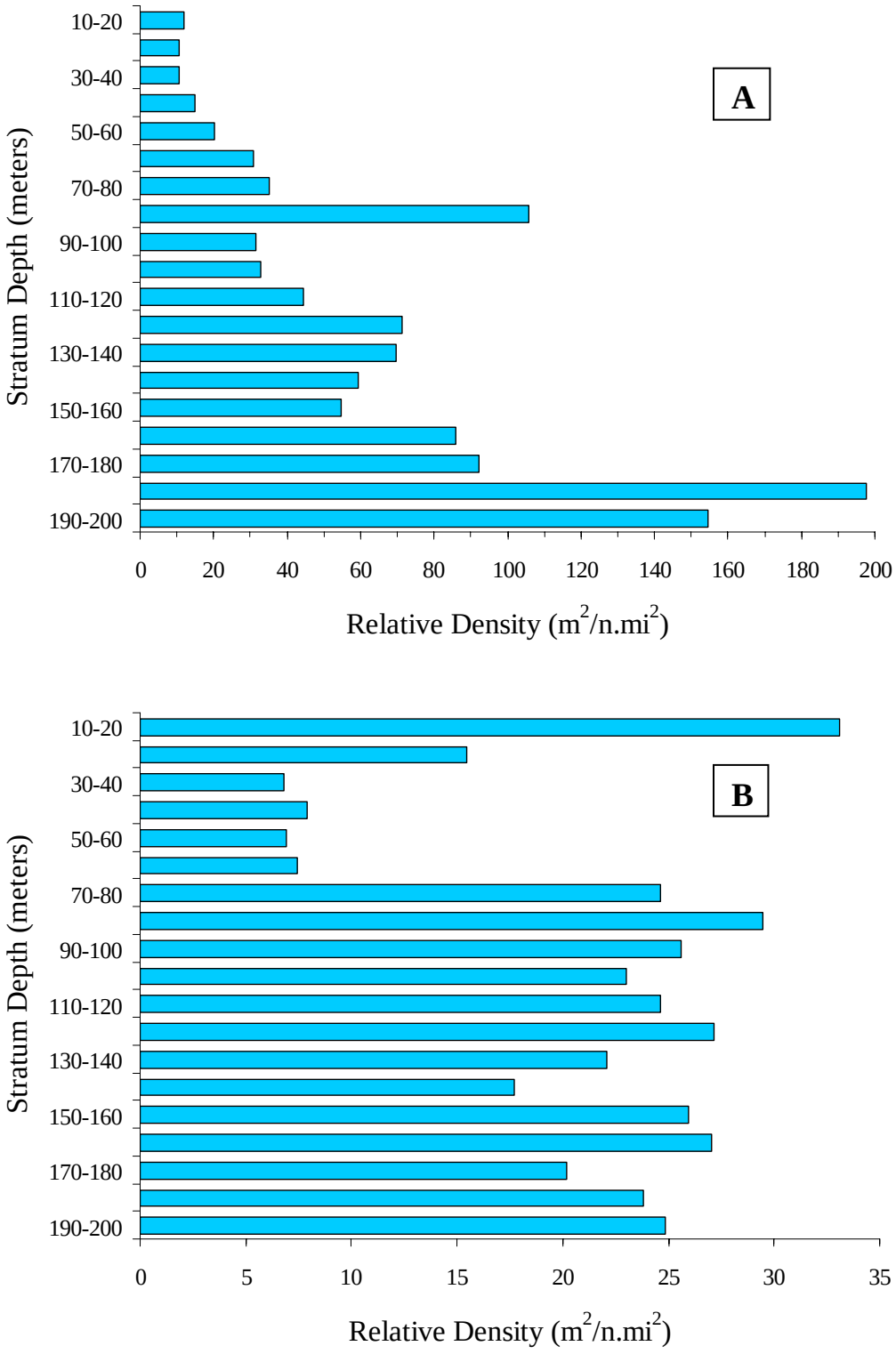


Figure 16. Relative density of prey by depth stratum (excluding surface stratum: 0-10m) measured during acoustic surveys on transects in the Semidi Islands, Alaska in 2001 (A) and 2004 (B). Relative density scale varies. Does not include data from circumnavigations in 2004.

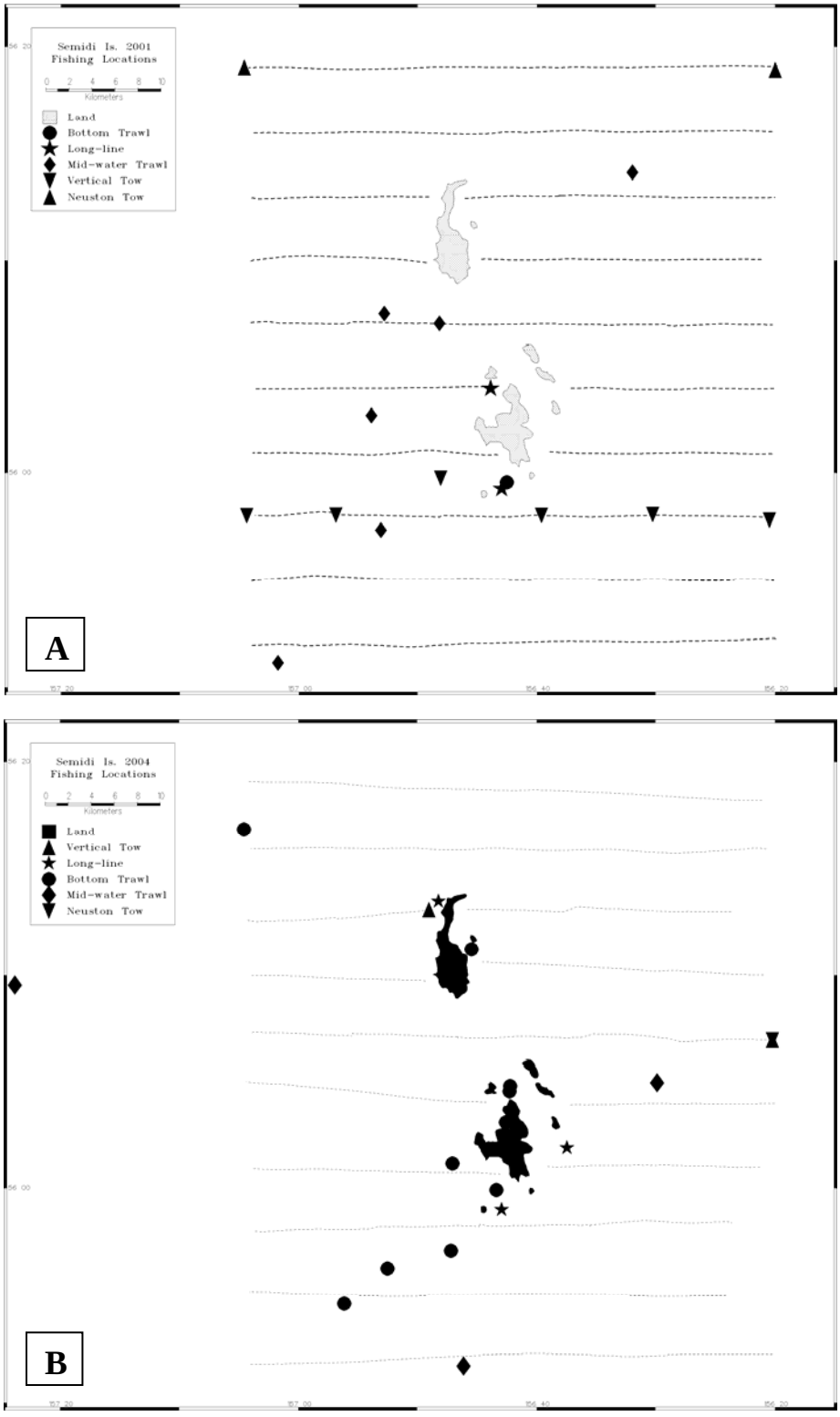


Figure 17. Locations of fishing efforts in the Semidi Islands, Alaska in 2001 (A) and 2004 (B).

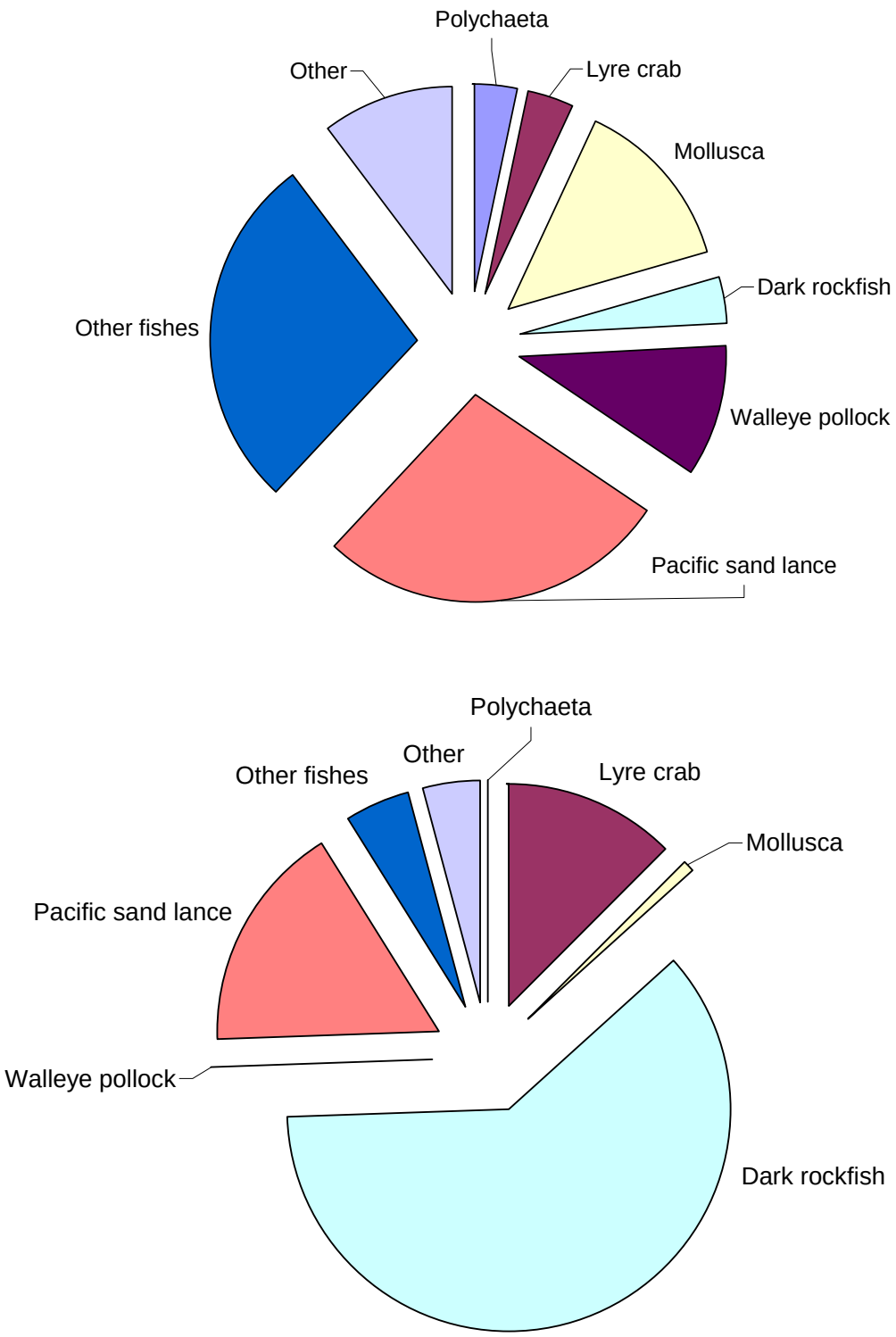


Figure 18. Percent frequency of occurrence (top) and percent total weight (bottom) of prey taken from stomach contents of Pacific halibut (*Hippoglossus stenolepis*) caught on long-line gear in the Semidi Islands, Alaska in 2001 (*n* = 19 non-empty stomachs).

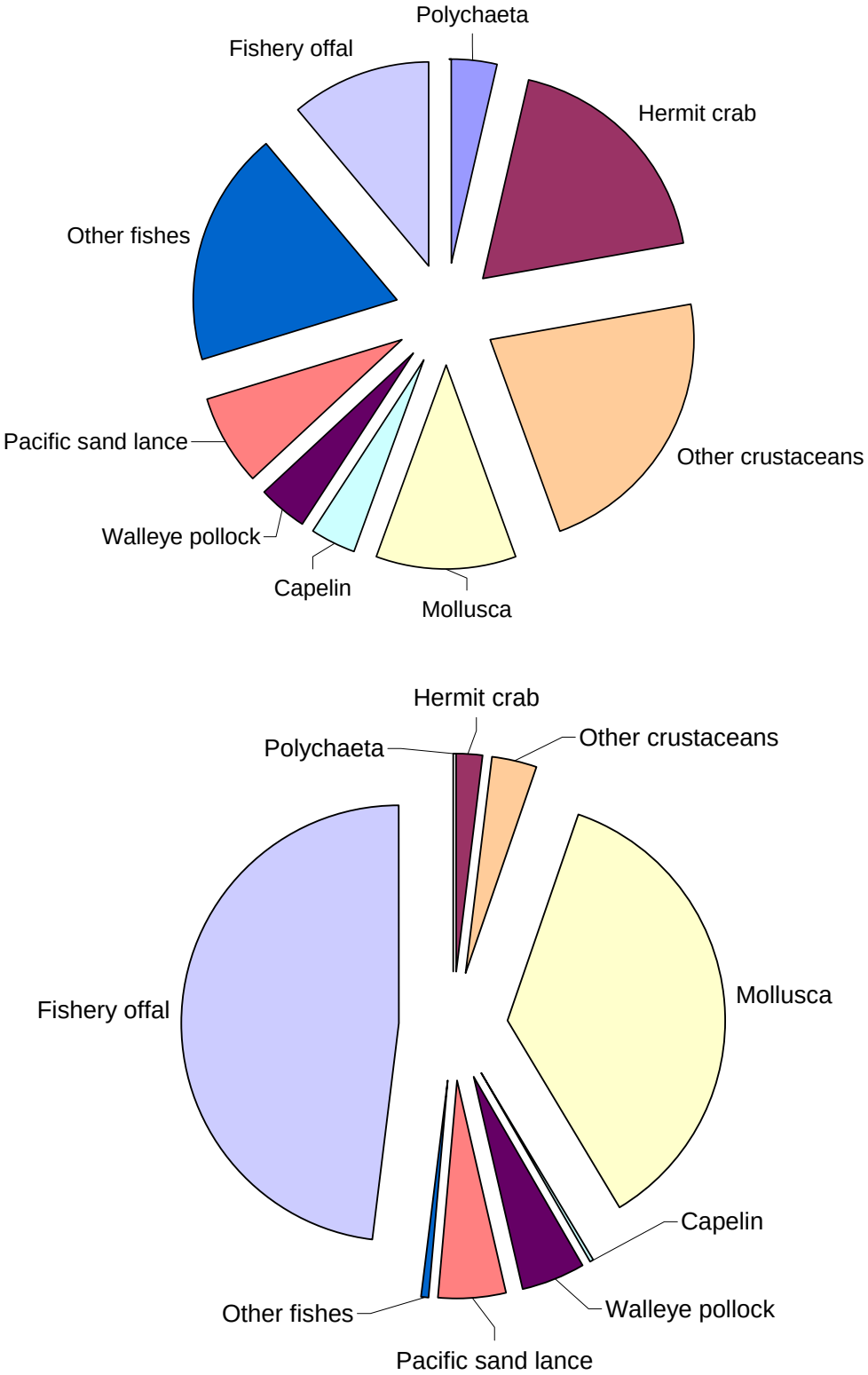


Figure 19. Percent frequency of occurrence (top) and percent total weight (bottom) of prey taken from stomach contents of Pacific halibut (*Hippoglossus stenolepis*) caught on long-line gear in the Semidi Islands, Alaska in 2004 (*n* = 18 non-empty stomachs).

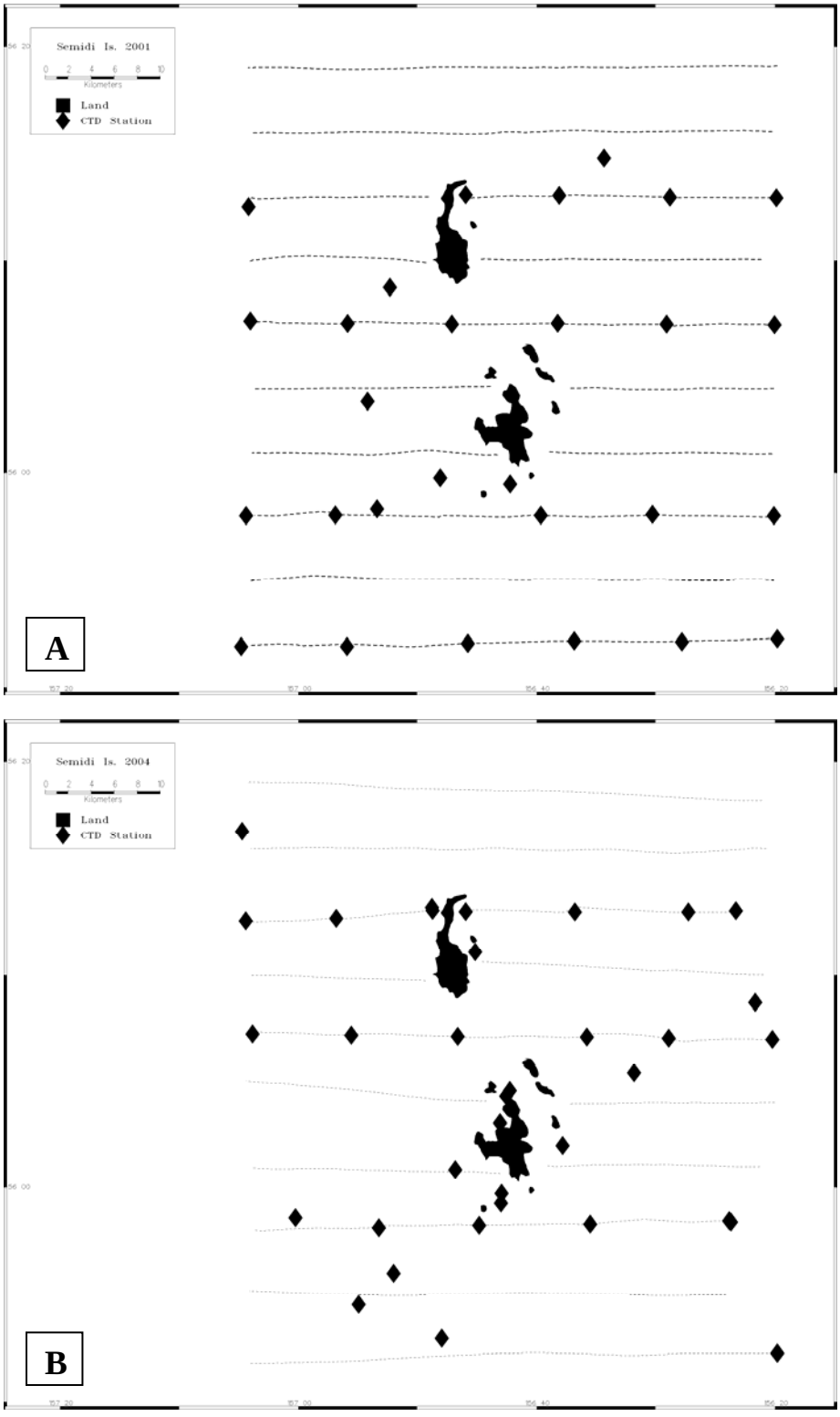


Figure 20. Locations of CTD stations sampled in the Semidi Islands, Alaska in 2001 (A) and 2004 (B).

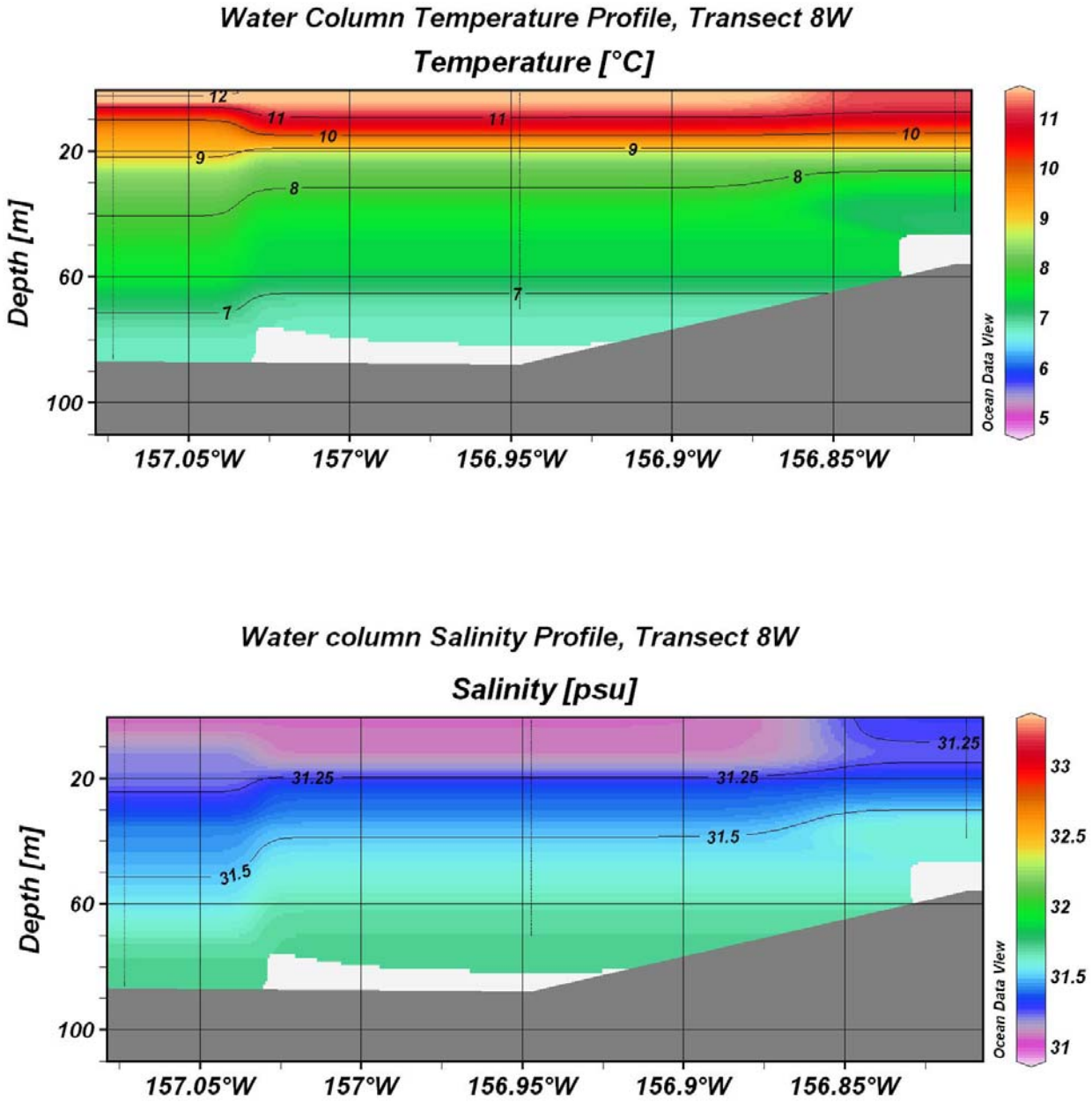


Figure 21. CTD profiles obtained from the Semidi Islands, Alaska transect number 8W in 2004. A CTD line was not done on this transect in 2001.

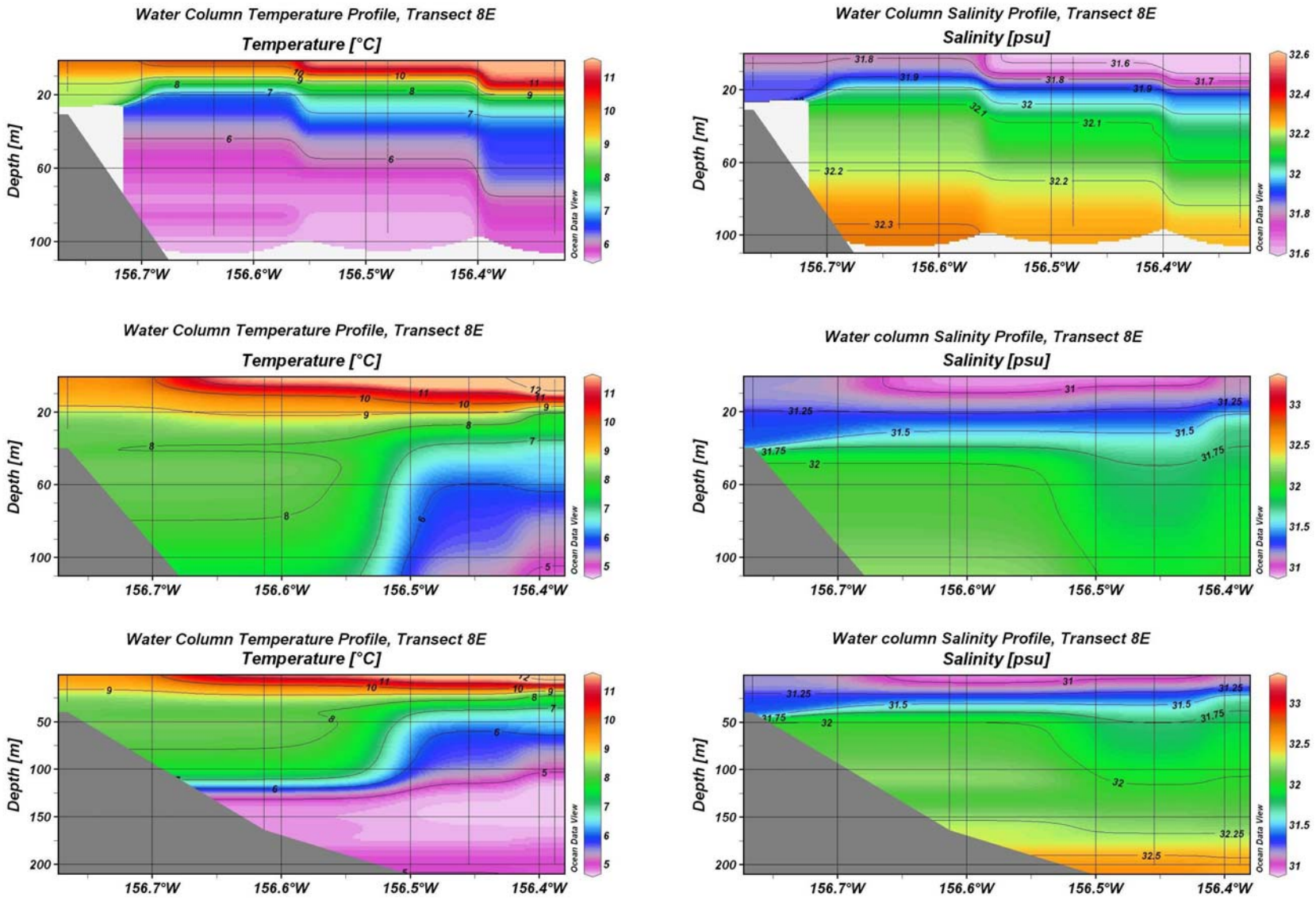


Figure 22. CTD profiles obtained from the Semidi Islands, Alaska transect number 8E in 2001 (top) and 2004 (middle and bottom). The bottom figures are based on deeper instrument deployments in 2004.

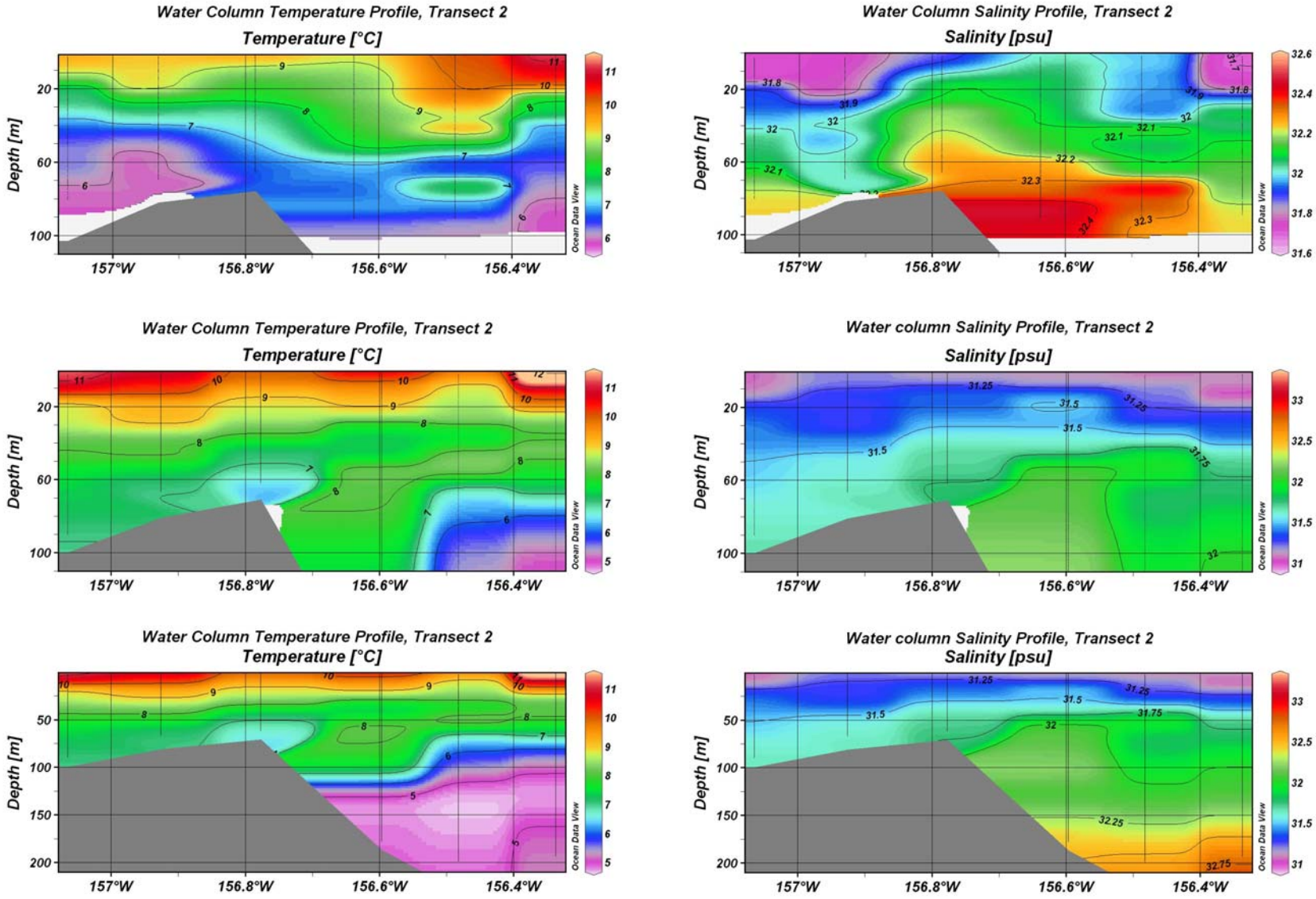


Figure 23. CTD profiles obtained from the Semidi Islands, Alaska transect number 2 in 2001 (top) and 2004 (middle and bottom). The bottom figures are based on deeper instrument deployments in 2004.

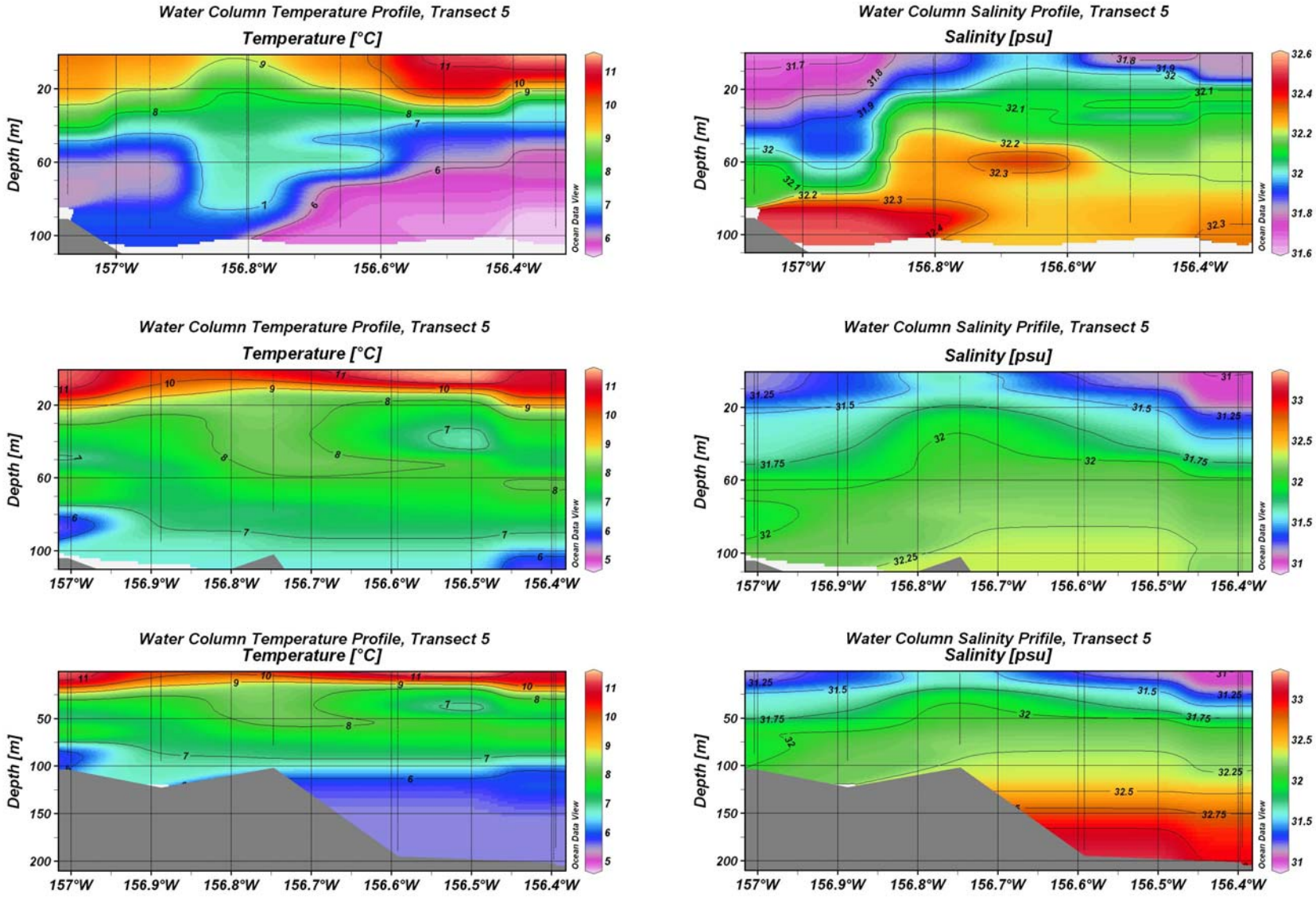


Figure 24. CTD profiles obtained from the Semidi Islands, Alaska transect number 5 in 2001 (top) and 2004 (middle and bottom). The bottom figures are based on deeper instrument deployments in 2004.

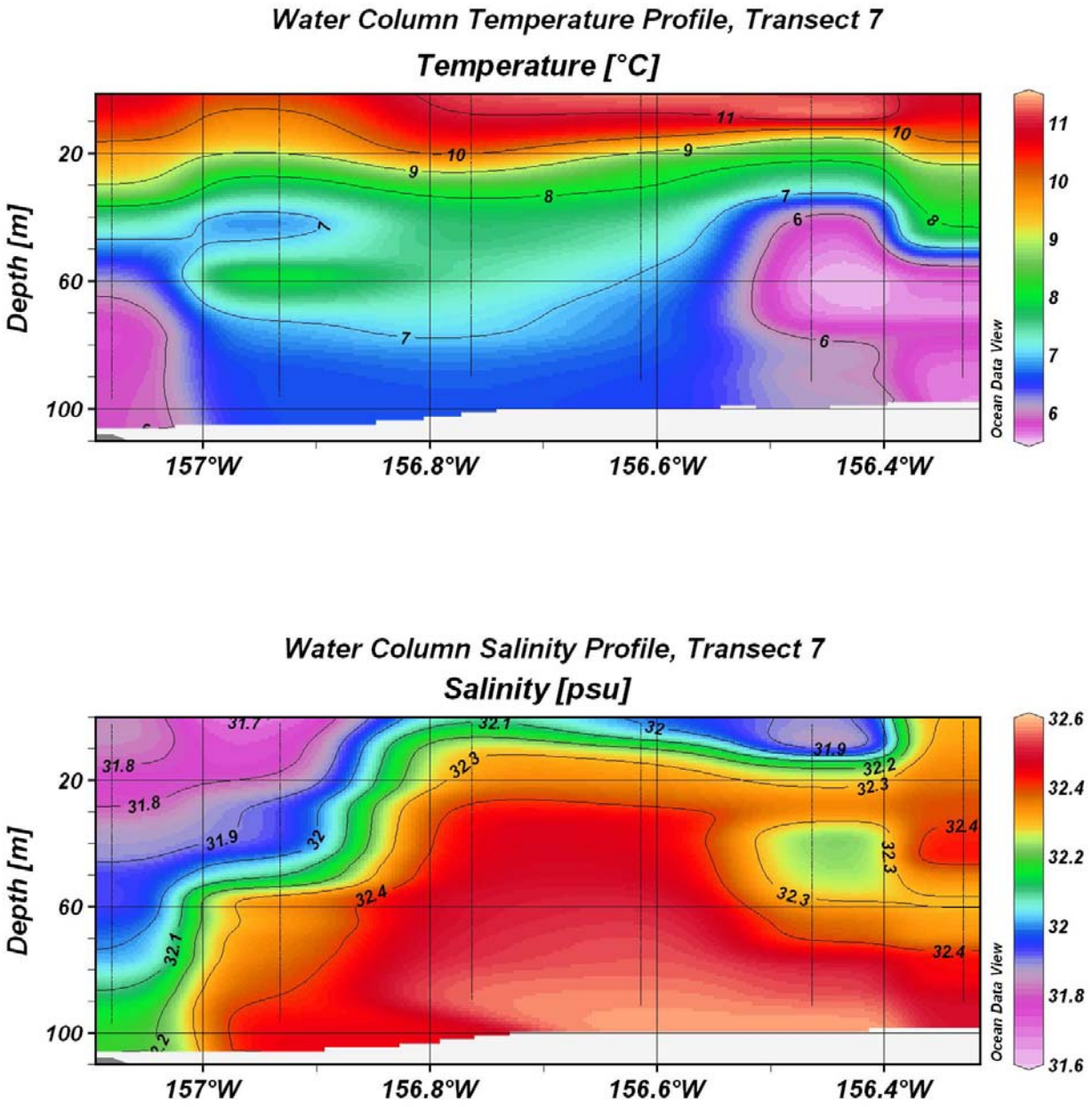


Figure 25. CTD profiles obtained from the Semidi Islands, Alaska transect number 7 in 2001. A CTD line was not done on this transect in 2004.

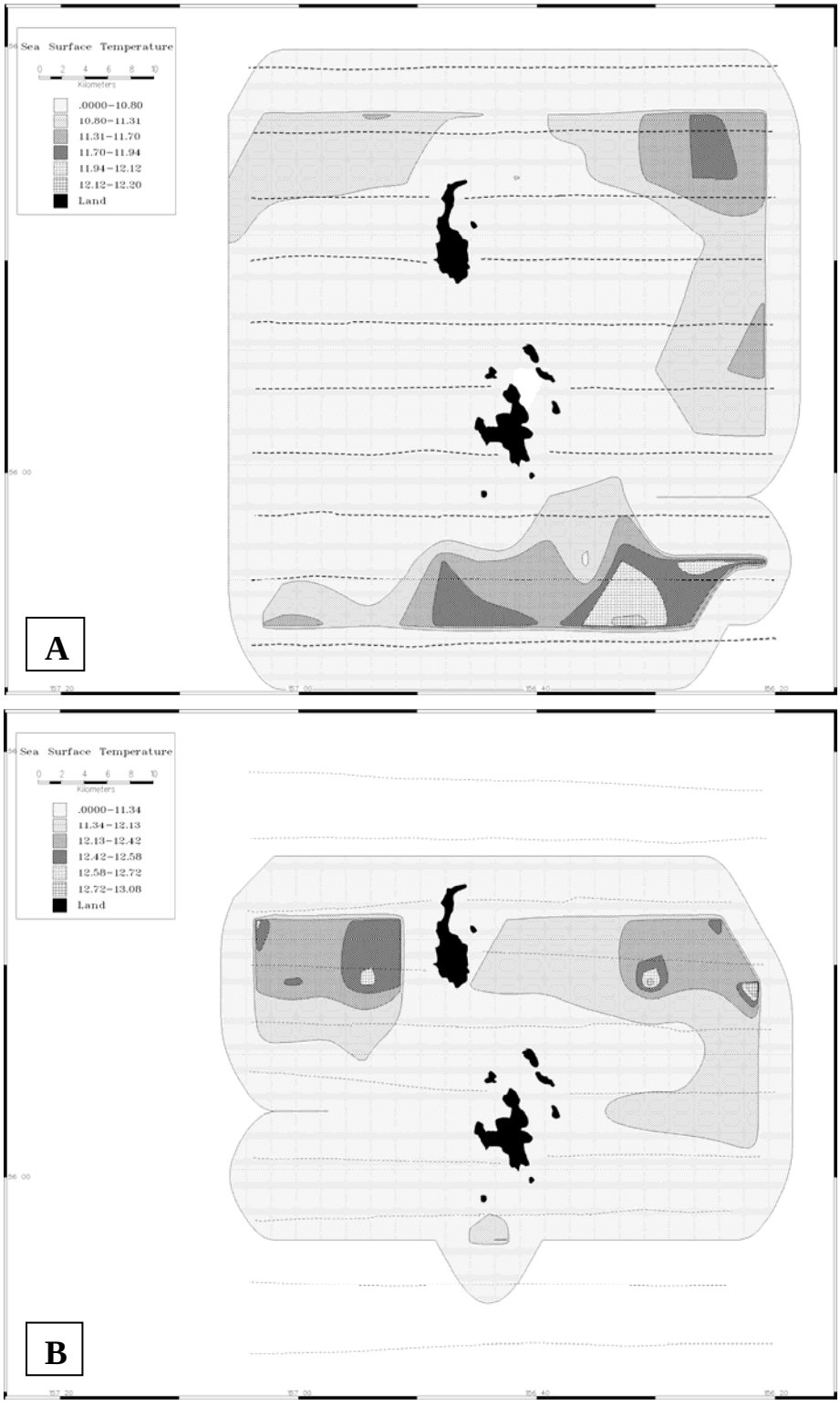


Figure 26. Sea surface temperatures interpolated from thermosalinograph records on transects surveyed in the Semidi Islands, Alaska in 2001 (A) and 2004 (B). Density scales vary by year.

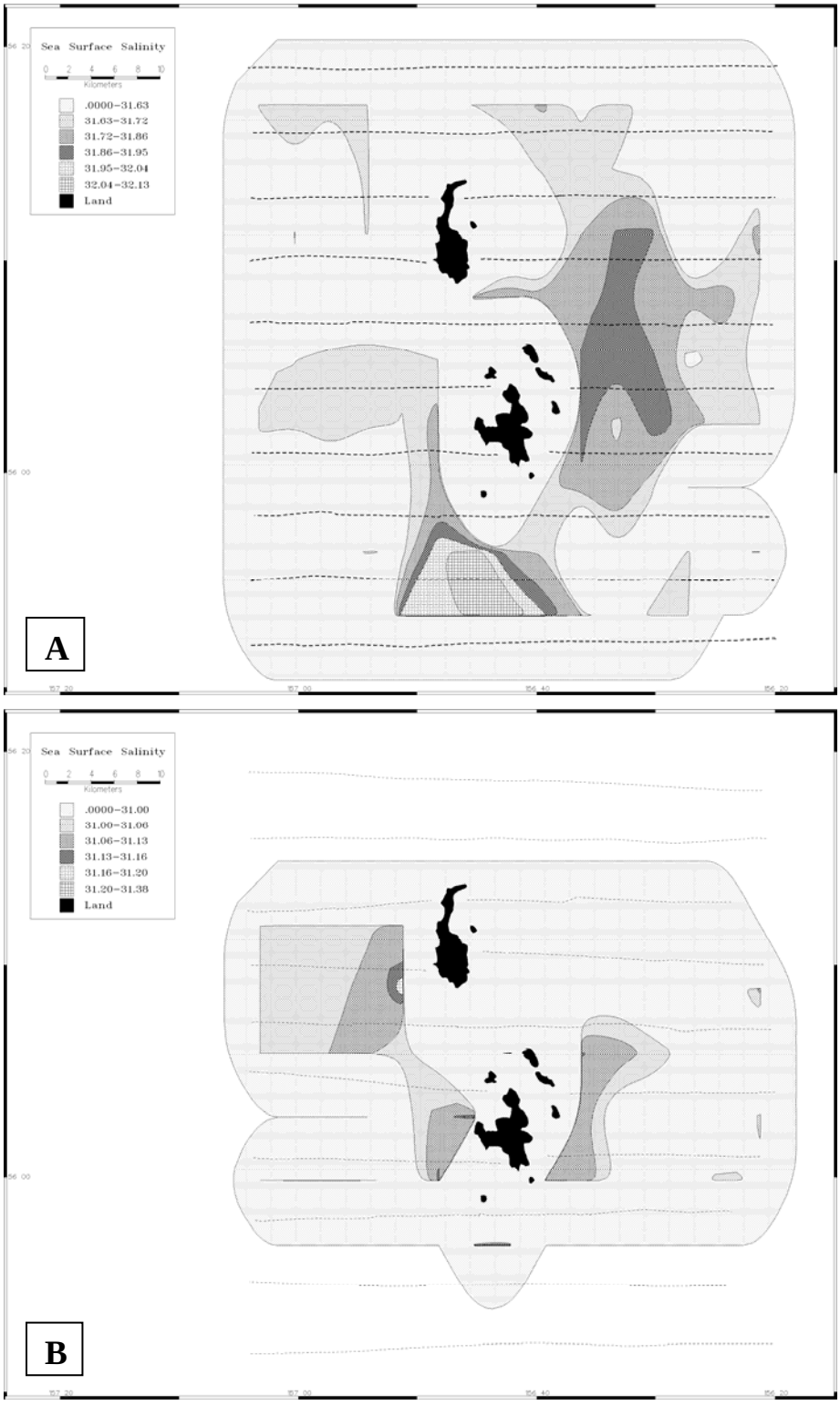


Figure 27. Sea surface salinities interpolated from thermosalinograph records on transects surveyed in the Semidi Islands, Alaska in 2001 (A) and 2004 (B). Density scales vary by year.

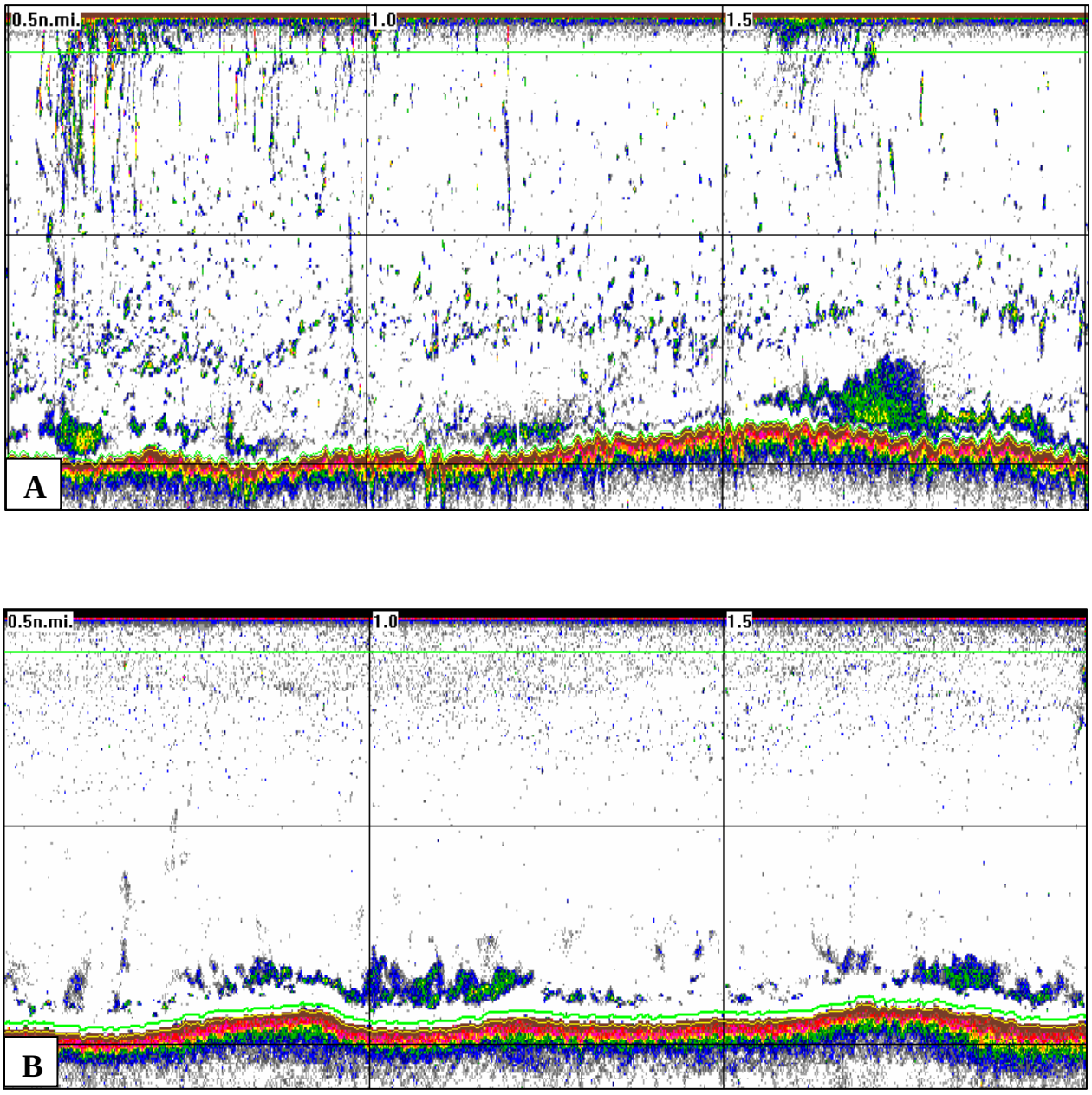


Figure 28. Echograms of acoustic sign recorded in the area (near the west end of Transect 2) where a flock of approximately 50,000 shearwaters was encountered in 2001 (A) but not in 2004 (B). Many of the vertical traces evident in the 2001 echogram probably are diving shearwaters. Bottom depth is approximately 90-100 m.

Appendix A. Numbers of seabirds observed on 14 linear transects in the Semidi Islands, Alaska during July 2001.

Species/ Transect Number	1E	1W	2	3E	3W	4E	4W	5	6	7	8E	8W	9	10
Laysan albatross	--	5	--	--	--	--	--	--	--	--	--	--	--	--
Northern fulmar	115	4	190	46	97	67	76	178	235	222	81	30	71	93
Sooty shearwater	--	--	--	--	3	1	1	--	--	--	--	2	--	2
Short-tailed shearwater	--	54	27	1	31	--	6	1	--	10	1	2	12	103
Unidentified shearwater	--	28	50,245	1	1	--	6	2	--	4	1	--	8	179
Fork-tailed storm-petrel	--	--	7	--	2	2	--	1	7	14	4	--	2	24
Leach's storm-petrel	2	--	--	--	--	1	--	--	4	--	--	--	--	--
Unidentified storm-petrel	--	--	--	--	--	1	--	--	1	--	--	1	--	--
Red-necked phalarope	2	--	--	--	--	--	--	--	--	--	--	--	--	--
Red phalarope	--	--	3	--	--	--	--	2	8	--	--	2	--	--
Unidentified phalarope	--	--	--	--	--	--	--	--	--	3	--	--	--	--
Pomarine jaeger	--	--	--	--	--	--	--	--	--	--	--	1	--	3
Parasitic Jaeger	--	--	--	--	--	--	--	--	1	--	--	--	--	1
Glaucous-winged gull	5	--	39	14	66	9	1	5	9	14	8	2	2	12
Black-legged kittiwake	1	5	22	3	5	8	7	27	2	63	8	8	66	65
Common murre	264	430	344	22	446	43	471	425	467	317	102	140	253	343
Thick-billed murre	1	--	7	--	6	--	9	3	1	2	7	11	6	8
Unidentified murre	47	220	362	28	34	48	162	852	445	98	123	69	193	524
Ancient murrelet	--	7	6	--	--	3	12	22	5	22	1	4	5	3
Cassin's auklet	5	2	15	--	30	7	34	117	178	235	7	25	3	3
Parakeet auklet	8	19	76	--	13	7	59	9	1	14	8	4	15	3
Least auklet	--	--	--	--	2	--	--	--	--	--	--	--	--	--
Unidentified auklet	--	--	--	--	--	--	--	1	--	--	--	--	--	--
Unidentified sm. dark alcid	3	--	--	--	--	3	--	9	12	8	2	1	2	1
Rhinoceros auklet	--	--	1	--	--	--	--	5	6	10	--	--	--	1
Horned puffin	5	7	23	2	13	2	38	61	67	76	19	2	11	103
Tufted puffin	35	7	154	13	44	27	44	27	40	54	34	10	38	42

Appendix B. Numbers of seabirds observed on 14 linear transects in the Semidi Islands, Alaska during July 2004.

Species/ Transect Number	1E	1W	2	3E	3W	4E	4W	5	6	7	8E	8W	9	10
Black-footed albatross	--	--	--	--	--	--	--	1	--	--	1	--	--	--
Northern fulmar	110	30	465	113	163	211	599	142	104	97	226	50	73	46
Short-tailed shearwater	2	--	7	5	--	5	2	4	5	1	1	--	1	1
Unidentified shearwater	--	--	--	--	--	--	--	4	4	--	--	--	1	2
Fork-tailed storm-petrel	--	--	--	--	--	1	--	3	8	8	6	--	3	4
Leach's storm-petrel	--	--	--	--	--	--	--	2	5	3	--	--	3	1
Red-faced cormorant	--	1	--	--	--	--	--	2	--	--	--	2	--	--
Red-necked phalarope	--	--	1	--	--	--	--	--	--	--	--	--	--	--
Red phalarope	--	--	1	--	--	--	--	--	--	--	--	--	--	--
Parasitic Jaeger	--	--	--	--	--	--	1	--	--	--	--	--	--	--
Glaucous-winged gull	10	1	17	11	20	8	9	10	--	6	16	6	10	3
Black-legged kittiwake	3	2	15	3	5	2	1	19	13	1	9	2	31	22
Common murre	66	166	580	176	244	60	1137	230	78	88	130	289	186	103
Thick-billed murre	--	--	1	--	2	1	1	--	1	2	3	--	1	1
Unidentified murre	--	1	17	--	14	7	2	49	73	24	--	--	221	167
Ancient murrelet	18	4	119	51	12	29	12	87	49	94	176	17	41	30
Cassin's auklet	--	--	3	--	3	--	--	10	8	5	2	--	12	12
Parakeet auklet	16	15	14	22	4	10	4	56	34	12	5	--	38	13
Least auklet	--	--	--	--	--	--	1	--	--	--	--	--	--	--
Unidentified small dark alcid	--	--	--	--	1	--	--	--	--	--	1	--	--	--
Rhinoceros auklet	--	--	--	--	--	2	--	1	--	--	--	--	--	--
Horned puffin	10	8	26	35	8	8	23	28	67	36	19	29	28	10
Tufted puffin	11	11	79	89	9	66	7	59	78	31	25	6	27	37

Appendix C. Numbers of seabirds observed during circumnavigations in the Semidi Islands, Alaska during July 2004.

Species/ Transect Number	Aghiyuk I.	Chowiet I.	South I.	Suklik I.
Northern fulmar	380	106	137	649
Short-tailed shearwater	5	1	--	--
Fork-tailed storm-petrel	--	--	2	--
Red-faced cormorant	--	1	--	8
Glaucous-winged gull	4	3	1	10
Black-legged kittiwake	32	17	2	7
Common murre	1160	479	90	748
Thick-billed murre	4	13	--	--
Unidentified murre	33	66	109	--
Pigeon guillemot	1	28	--	1
Ancient murrelet	22	26	13	11
Cassin’s auklet	--	2	3	--
Parakeet auklet	18	125	131	43
Unidentified small dark alcid	2	--	--	--
Rhinoceros auklet	--	1	--	1
Horned puffin	19	42	26	111
Tufted puffin	39	119	202	212

Appendix D. Numbers of marine mammals observed on 14 linear transects in the Semidi Islands, Alaska during July 2001.

Species/ Transect Number	1E	1W	2	3E	3W	4E	4W	5	6	7	8E	8W	9	10
Fin whale	--	--	--	--	--	--	--	--	--	3	1	--	--	--
Killer whale	7	--	--	--	--	--	--	--	--	--	--	--	--	--
Unidentified whale	--	--	--	--	--	--	--	--	--	--	1	--	1	--
Dall's porpoise	--	--	--	--	--	4	--	--	2	4	6	--	1	2
Northern fur seal	--	--	--	--	--	--	--	--	1	1	--	--	--	--
River otter	--	--	--	--	--	--	--	1	--	--	--	--	--	--

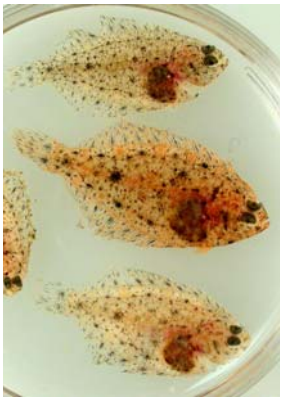
Appendix E. Numbers of marine mammals observed on 14 Linear transects in the Semidi Islands, Alaska during July 2004.

Species/ Transect Number	1E	1W	2	3E	3W	4E	4W	5	6	7	8E	8W	9	10
Fin whale	--	--	--	--	--	--	--	2	--	--	--	--	--	1
Dall's porpoise	3	--	--	--	--	3	--	5	--	2	--	--	1	--
Northern fur seal	--	--	--	--	--	--	--	--	--	--	--	--	--	2
Steller's sea lion	--	--	--	--	--	--	--	--	2	--	--	--	--	--

Appendix F. Photographs of some fish species caught during SMMOCI cruises to the Semidi Islands, Alaska in 2001 and/or 2004 (all by C. Mecklenburg).

Grunt Sculpin

Leister Sculpin



Southern Rock Sole

Tadpole Sculpin

Yelloweye Rockfish

Fourhorn Poacher

Pacific Sand Lance