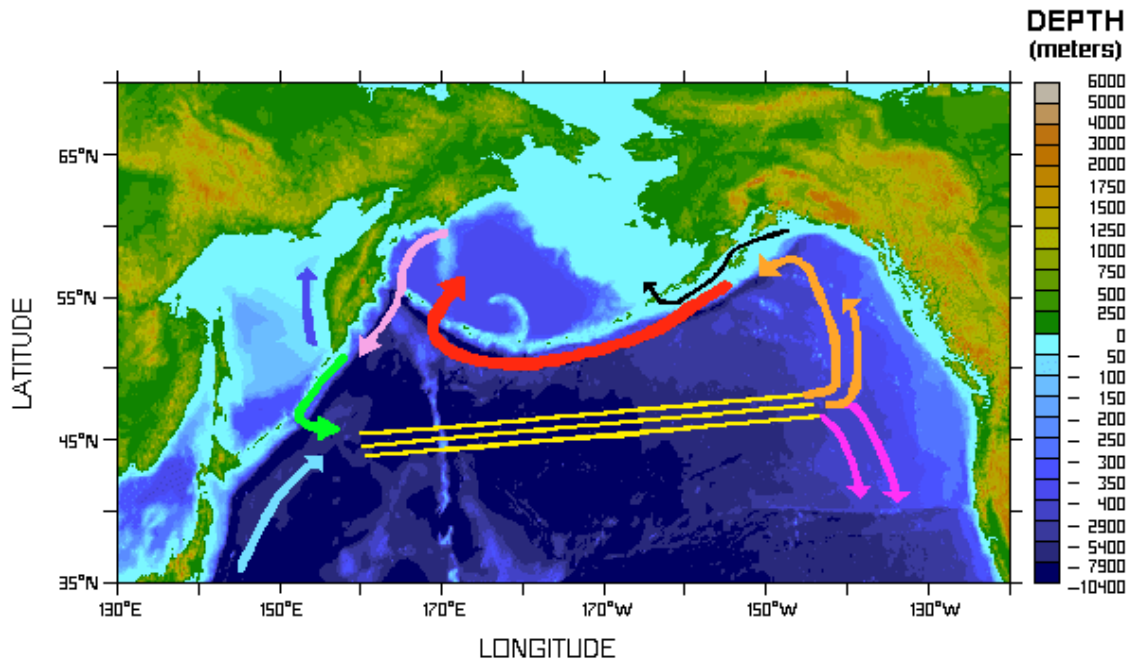


Chapter 3

Figures

This page intentionally left blank



← = West Wind Drift (or North Pacific Current)

← = California Current ← = Alaskan Current ← = Alaskan Coastal Current

← = Alaskan Stream ← = Kamchatka Current ← = West Kamchatka Current

← = Oyashio Current ← = Kuroshio Current

Figure 3.3-1. North Pacific Ocean currents.

Source: <http://www.pmel.noaa.gov/bering/pages/npmap4.html>.

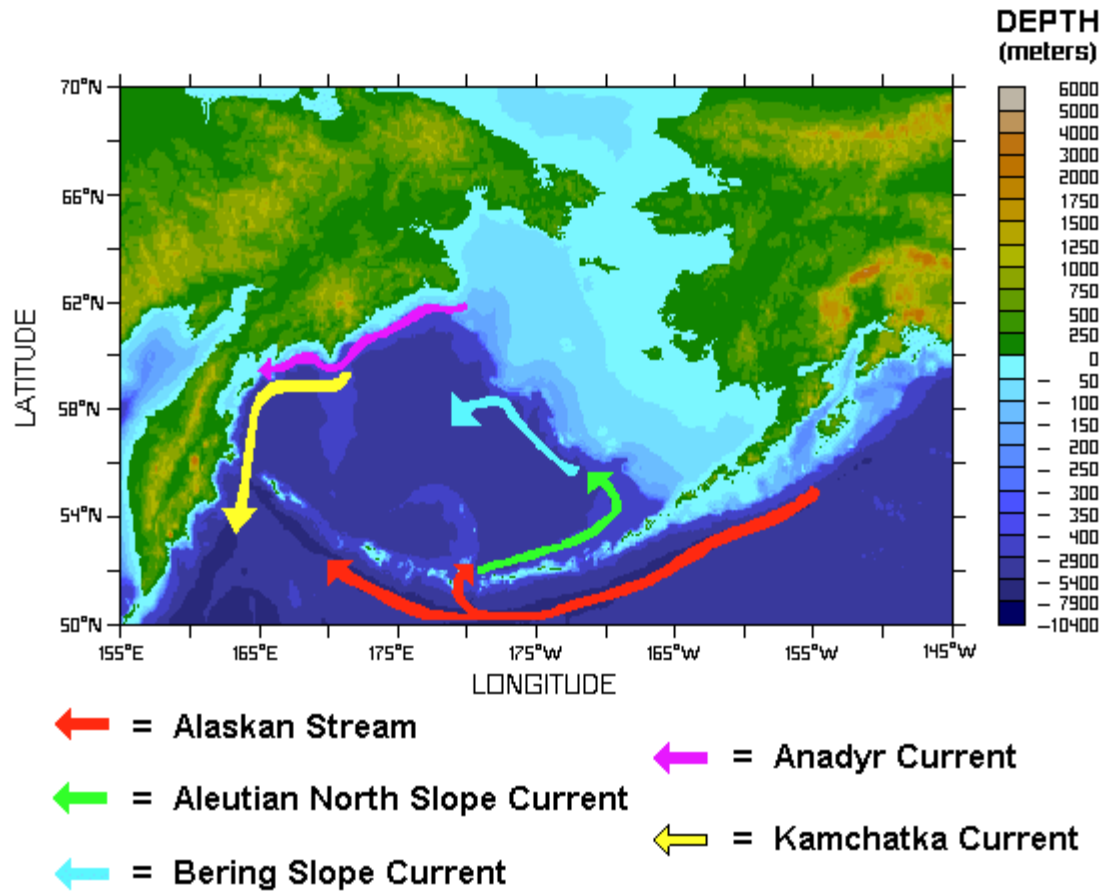


Figure 3.3-2. Major currents of the Bering Sea.
 Source: <http://www.pmel.noaa.gov/bering/pages/bseamap5.html>.

EASTERN BERING SEA

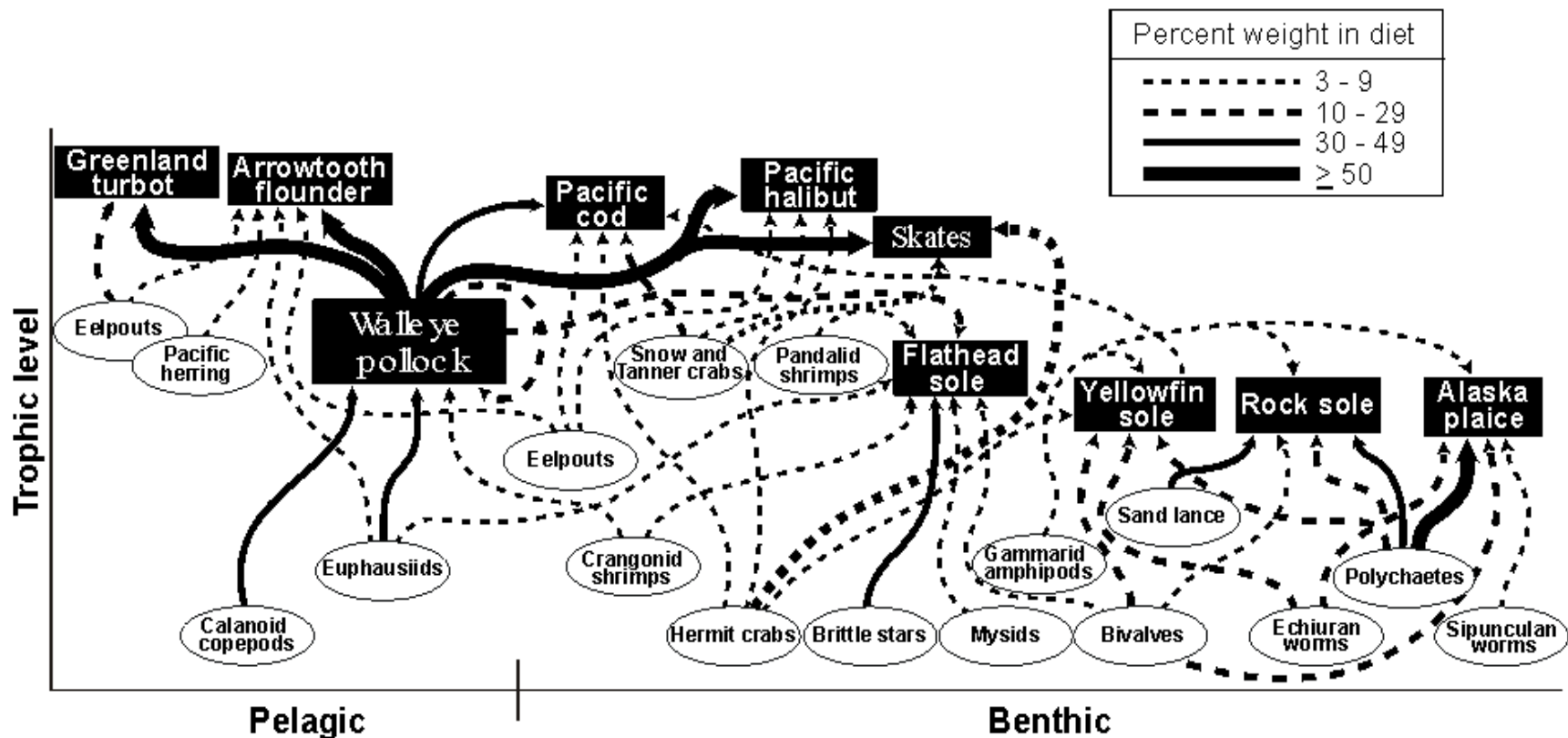


Figure 3.5-1. Trophic interactions of key eastern Bering Sea groundfish. Source: NMFS.

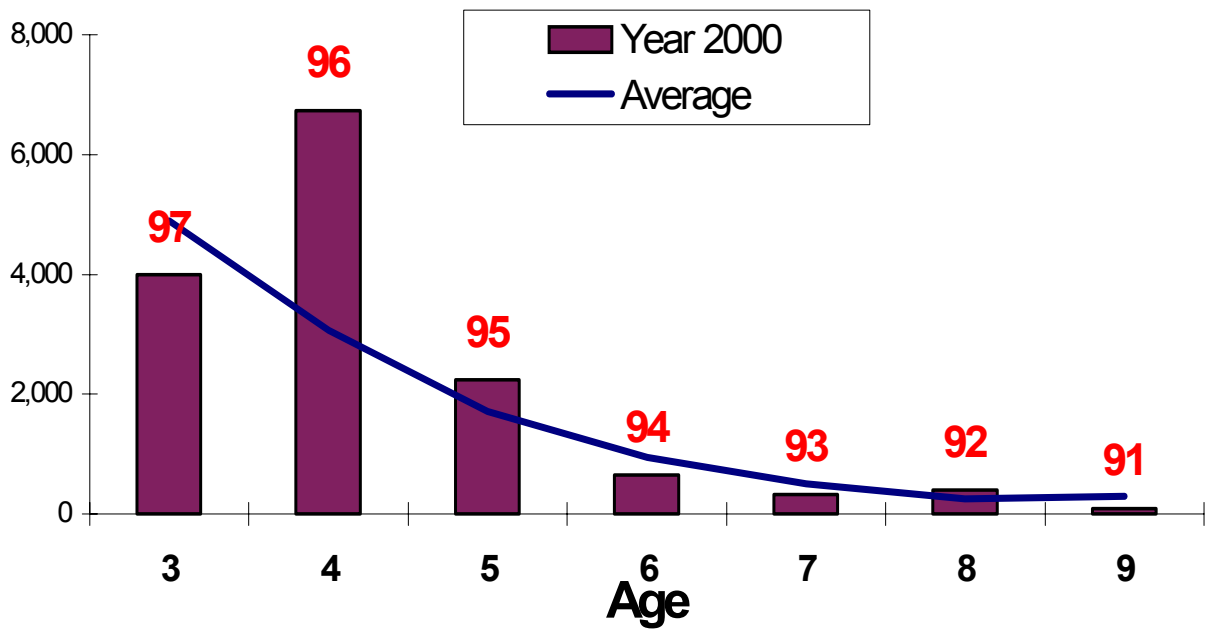


Figure 3.5-2. Projected age distribution (year classes noted on bottom of bars) and long-term average (solid line) for eastern Bering Sea pollock, 2000. Source: Ianelli et al. 1999.

GULF OF ALASKA

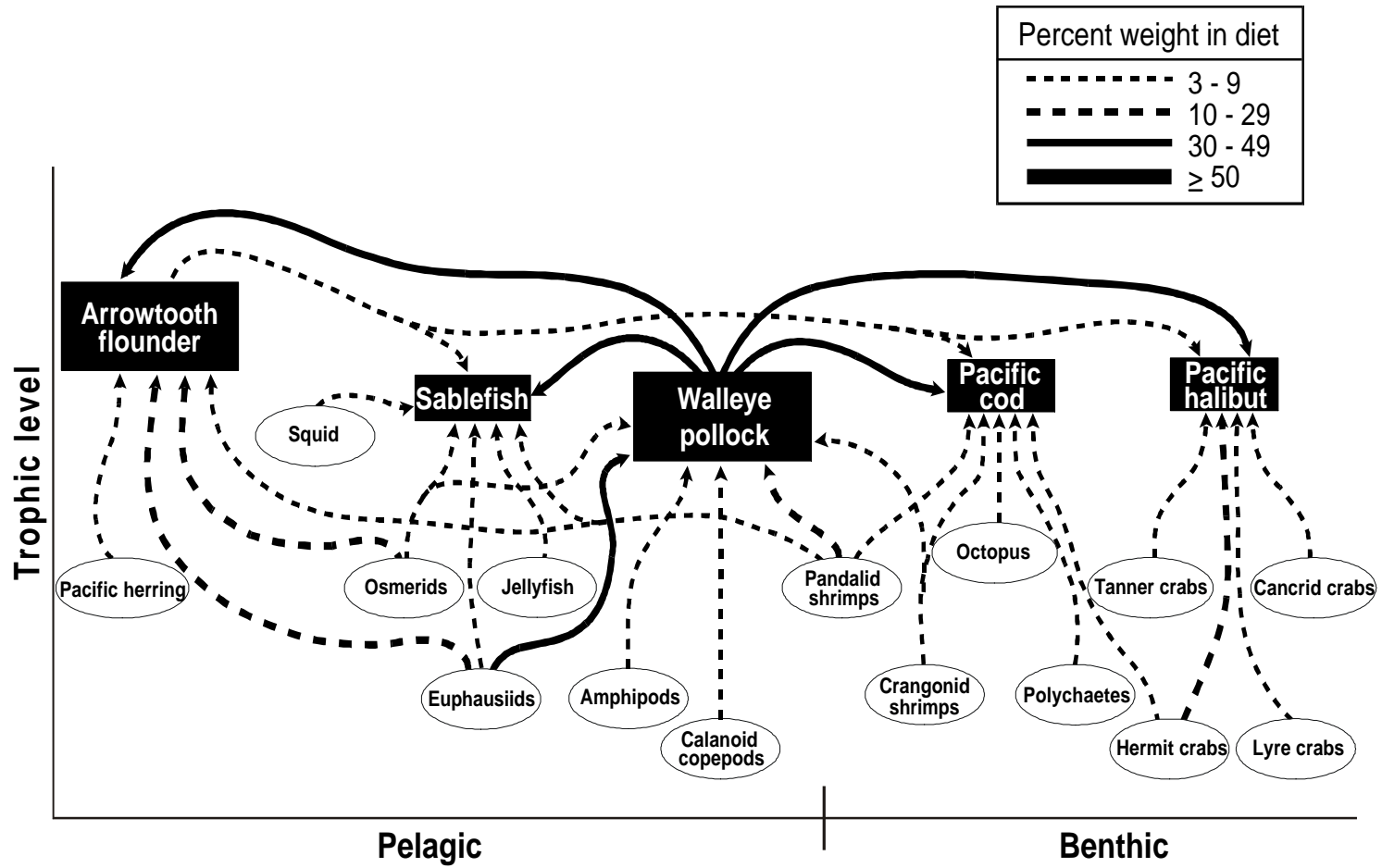


Figure 3.5-3. Trophic relationships of the groundfishes in the Gulf of Alaska. Source: NMFS.

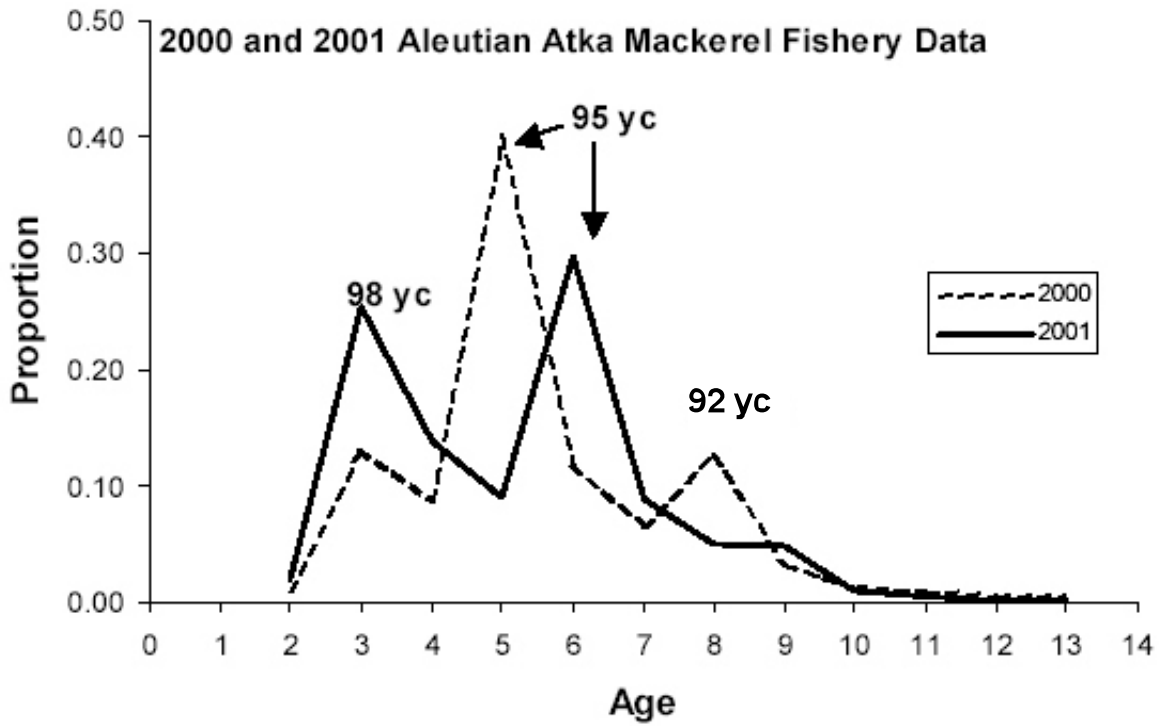


Figure 3.5-4. 2000 and 2001 Aleutian Islands Atka mackerel fishery age composition data.

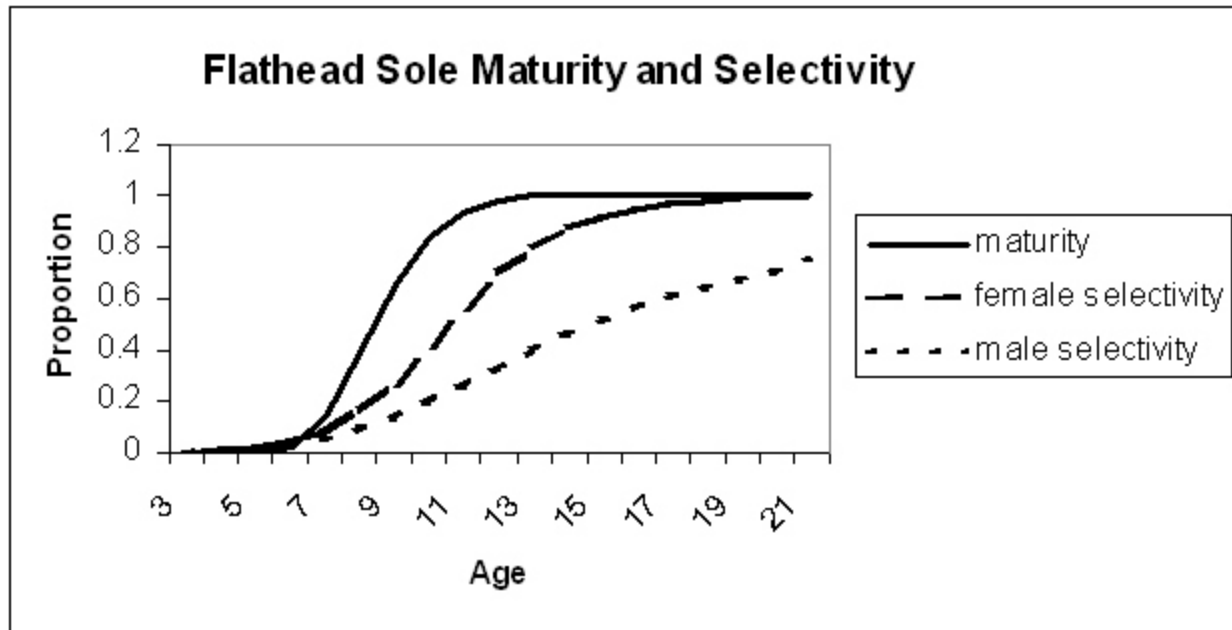


Figure 3.5-5. Bering Sea and Aleutian Islands flathead sole maturity and selectivity.

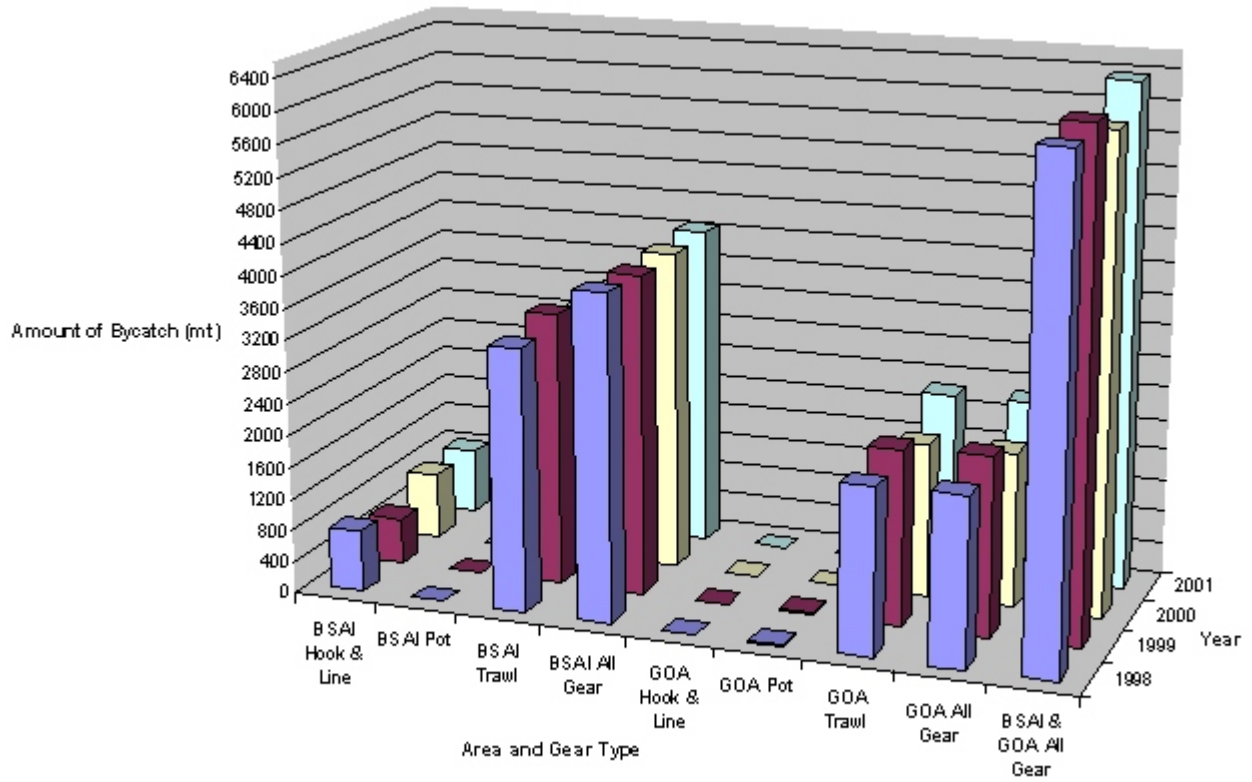


Figure 3.5-6. Halibut bycatch by area and gear, 1998-2001.

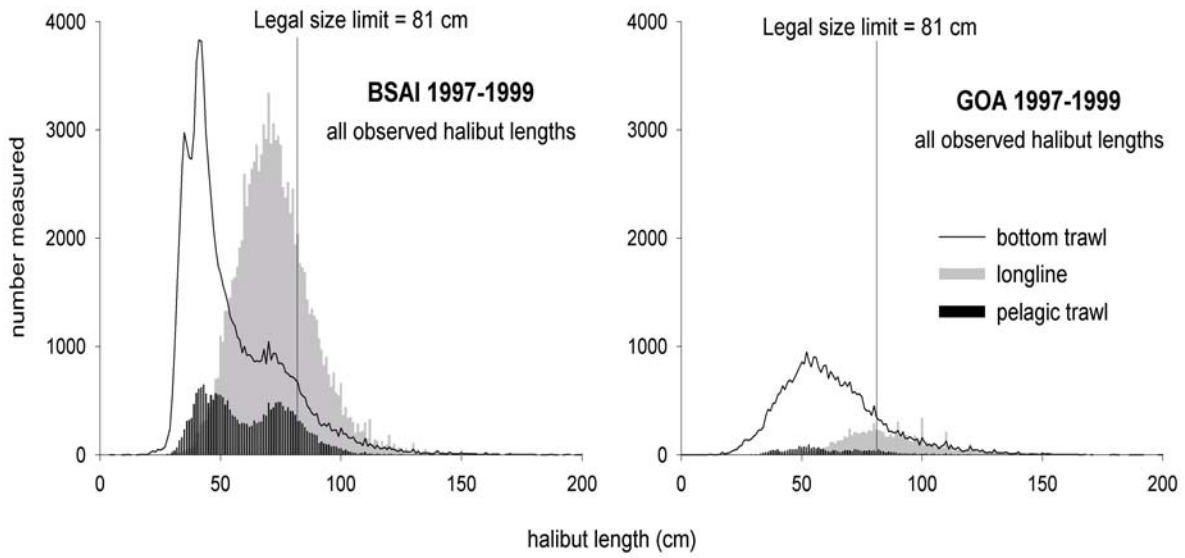


Figure 3.5-7. Length frequency of halibut observed in Bering Sea and Aleutian Islands and Gulf of Alaska groundfish fisheries, 1997-1999. Source: NMFS.

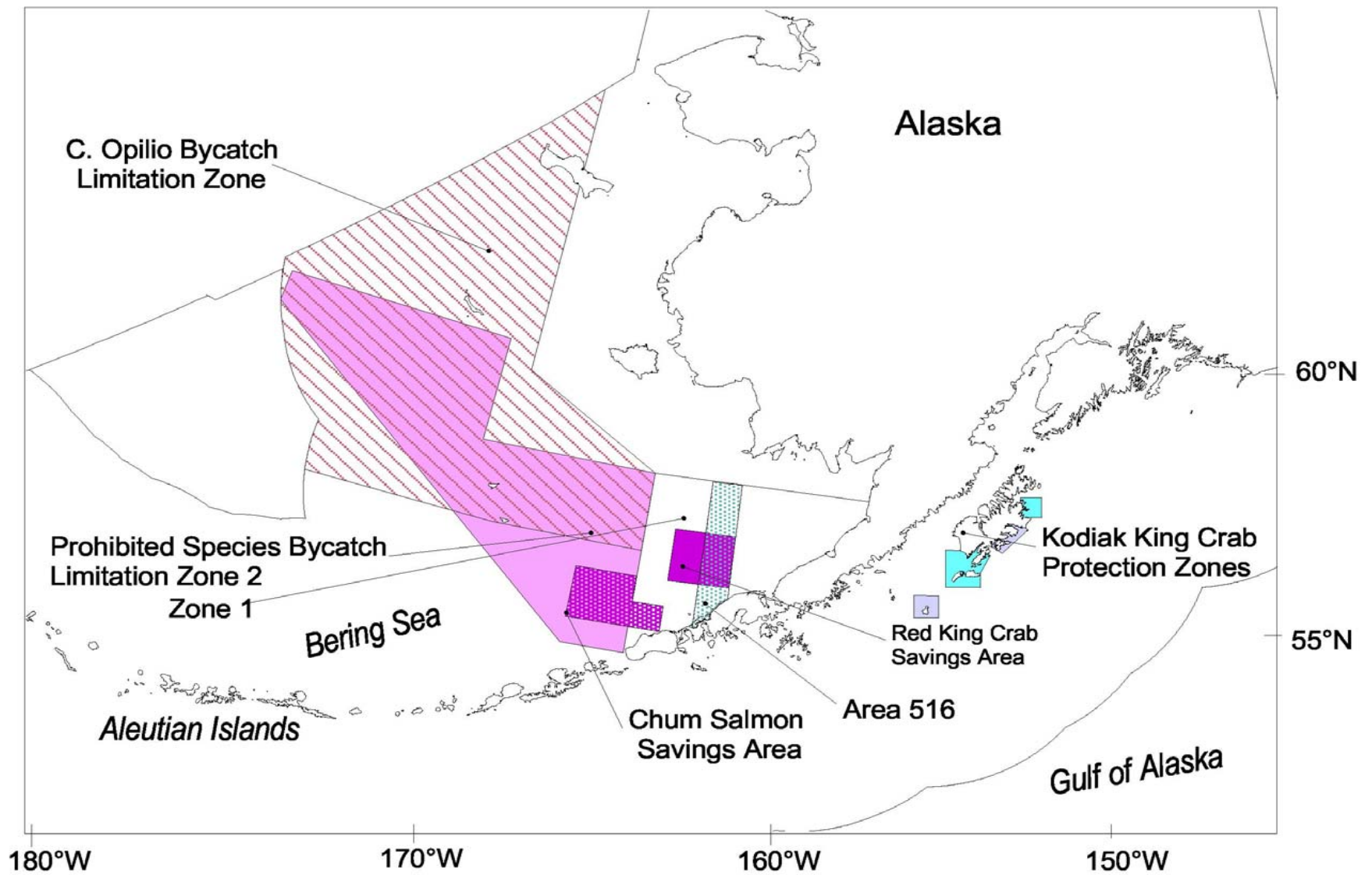


Figure 3.5-8. Management areas involving prohibited species in the Bering Sea and Gulf of Alaska. Source: NMFS.

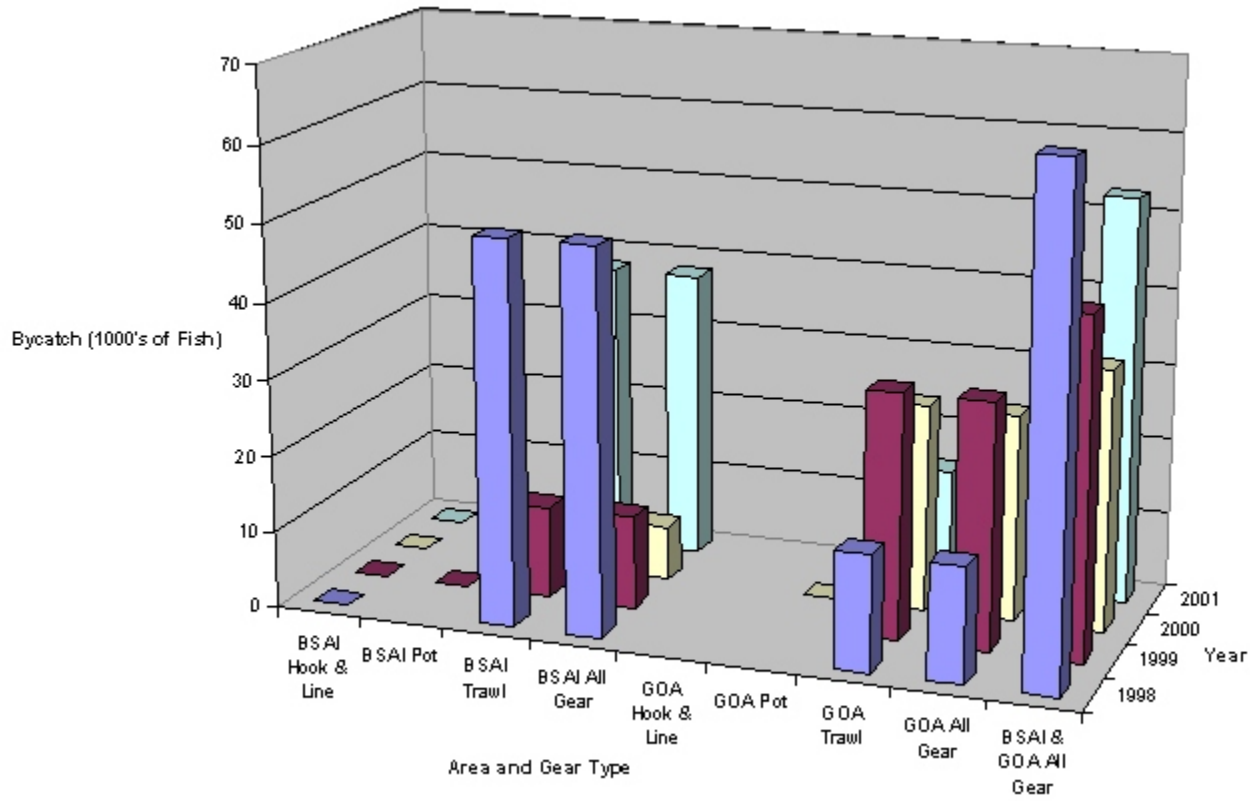


Figure 3.5-9. Chinook salmon bycatch by area and gear, 1998-2001.

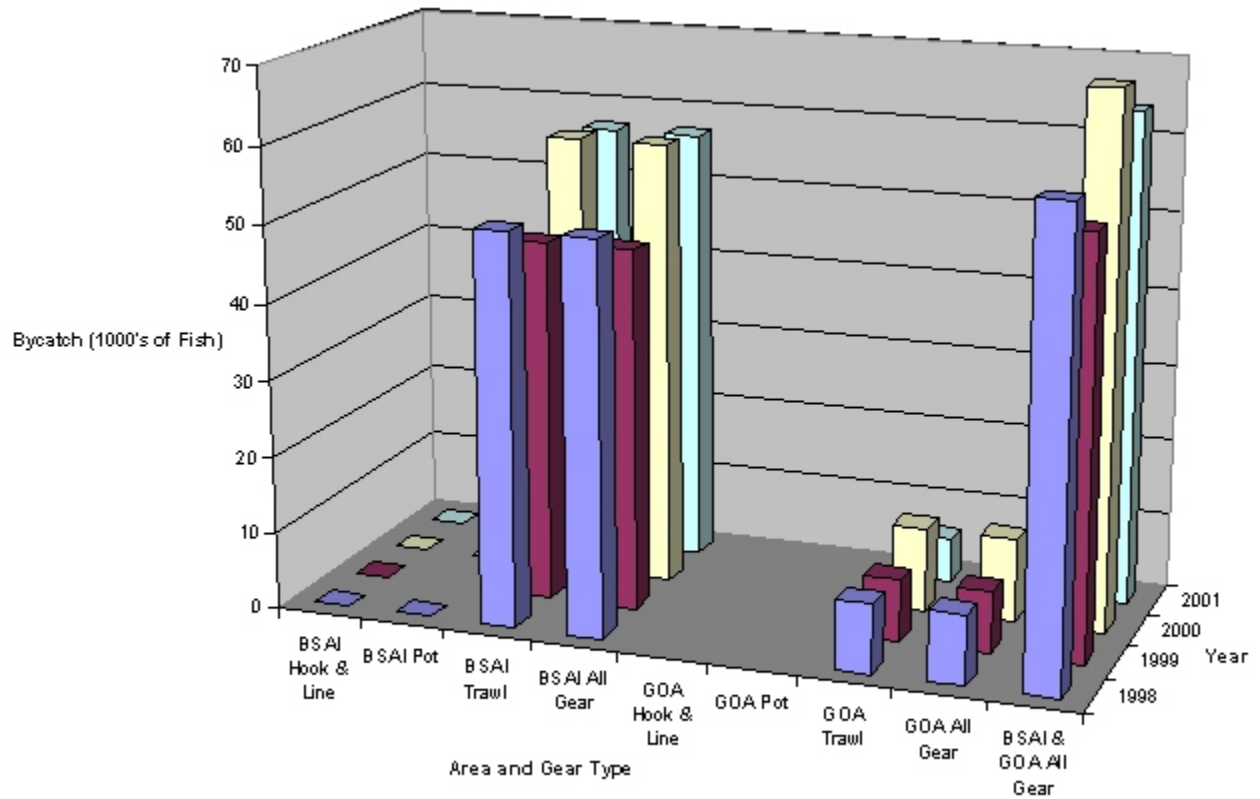


Figure 3.5-10. Other salmon bycatch by area and gear, 1998-2001.

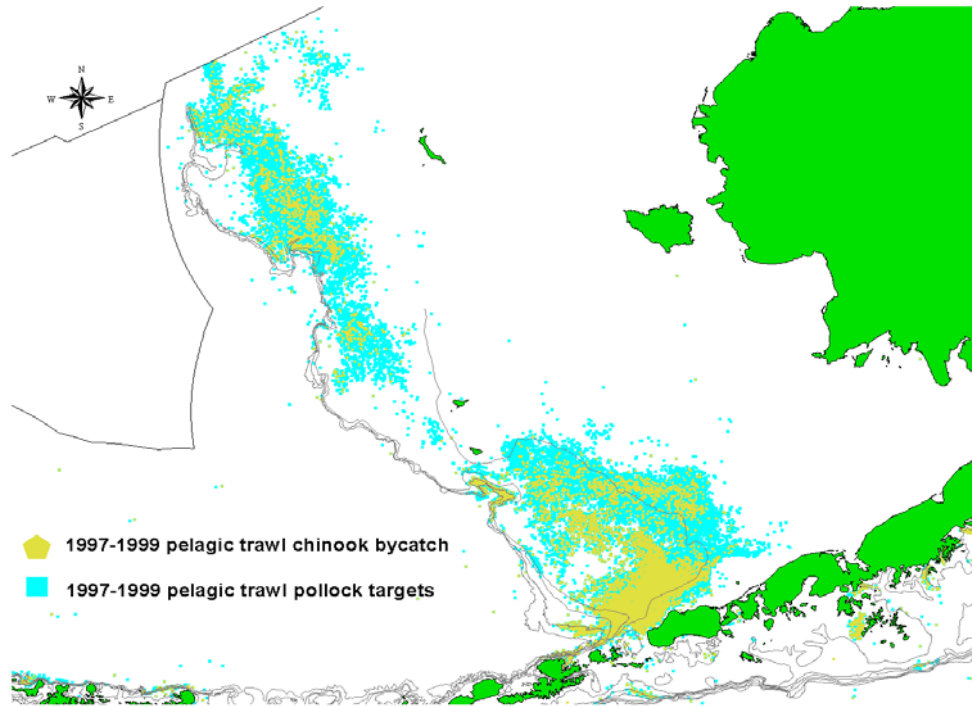


Figure 3.5-11. Distribution of salmon bycatch in the pelagic trawl fishery, 1997-1999.

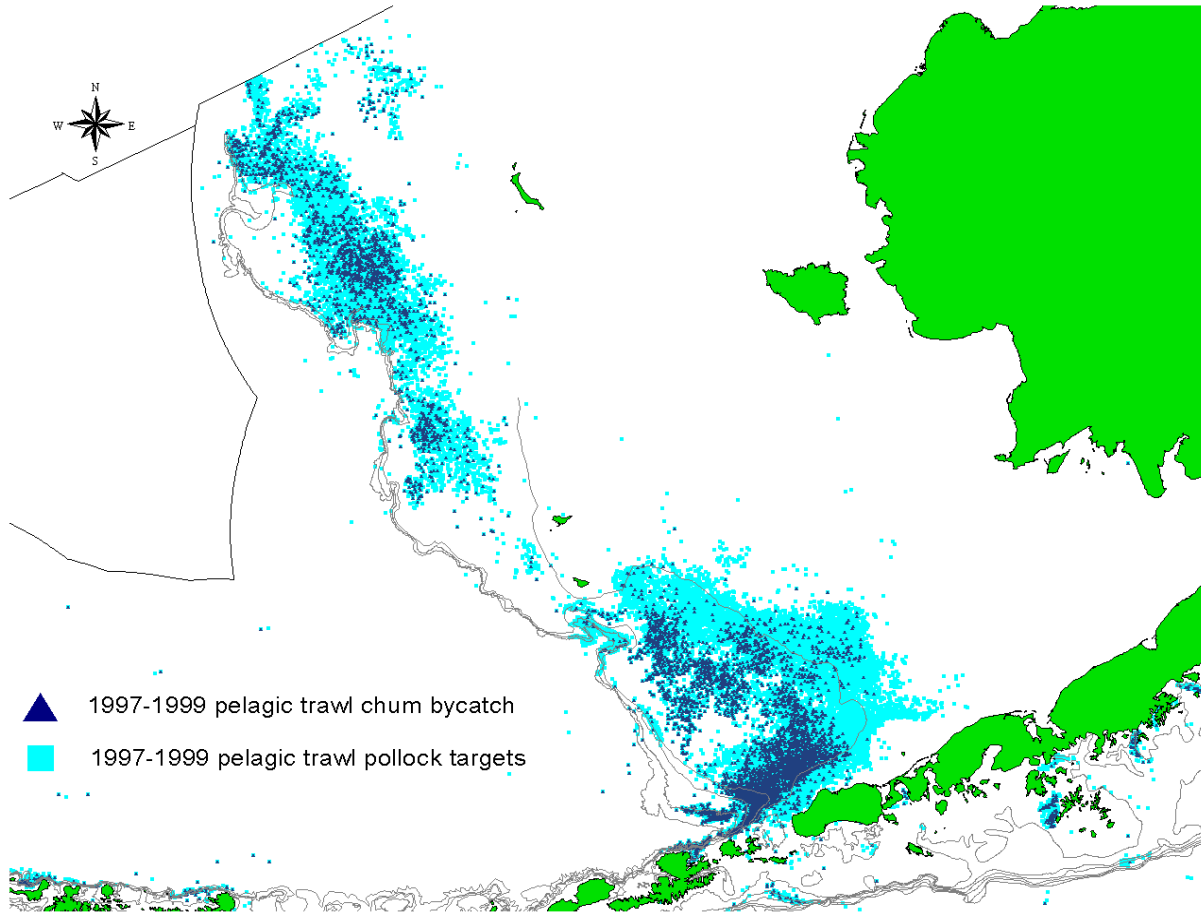


Figure 3.5-12. Distribution of Bering Sea and Aleutian Islands chum salmon bycatch in the pelagic trawl fishery, 1997-1999.

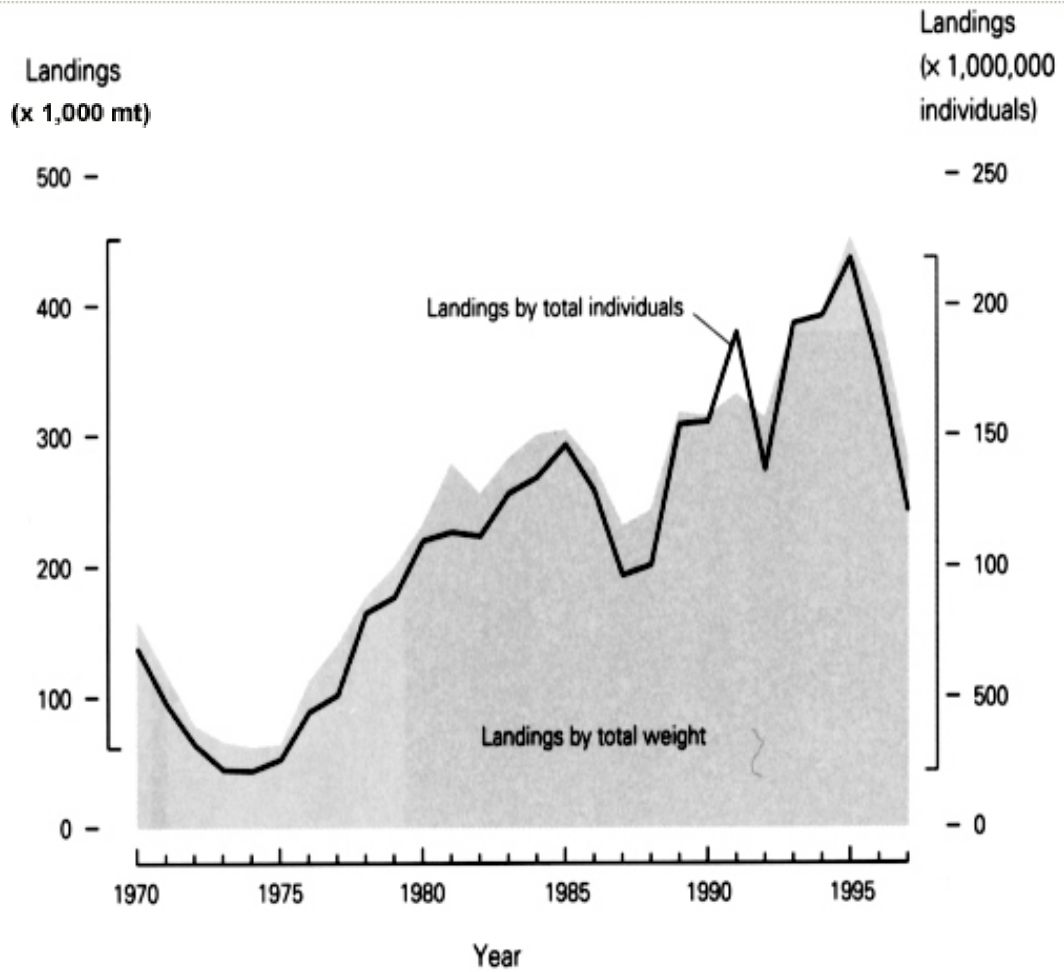


Figure 3.5-13. Commercial landings of Alaska salmon, all species, 1970-1997, by metric tons and numbers of fish. Source: NOAA 1999.

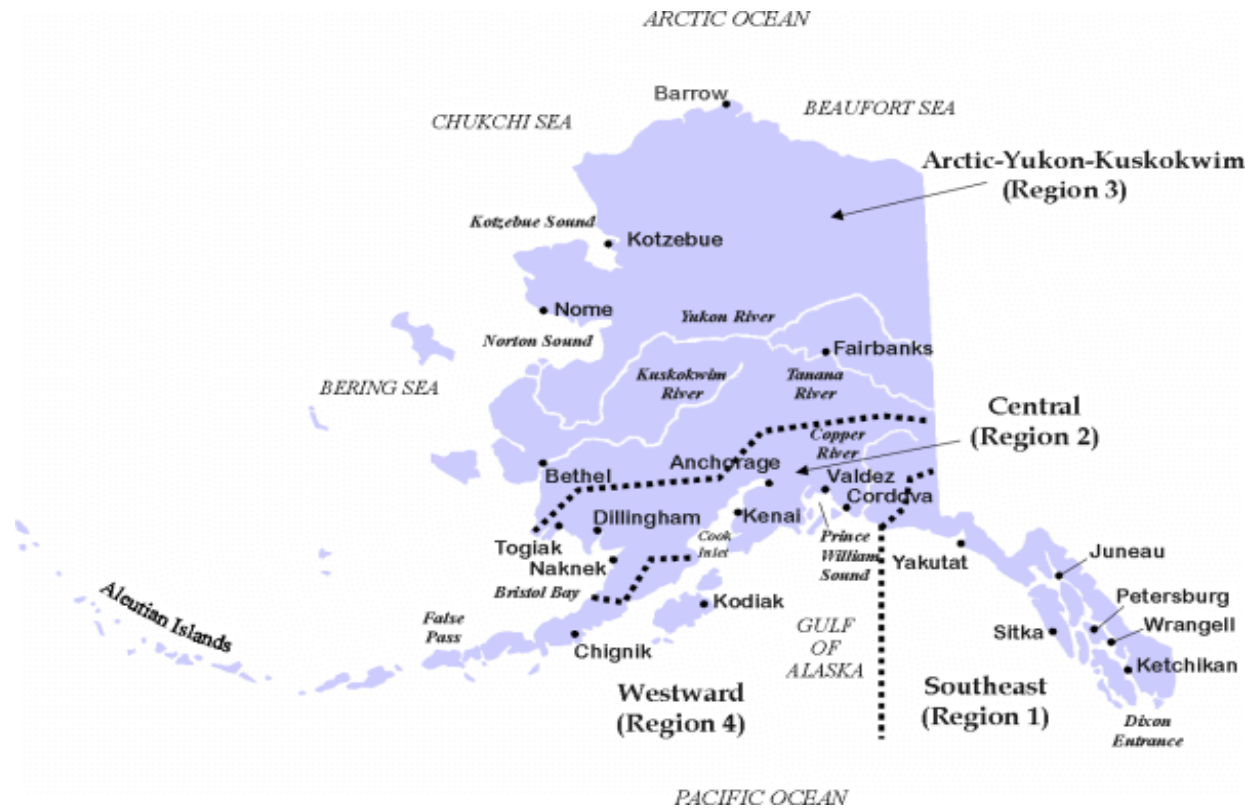


Figure 3.5-14. Salmon management areas established by Alaska Department of Fish and Game.

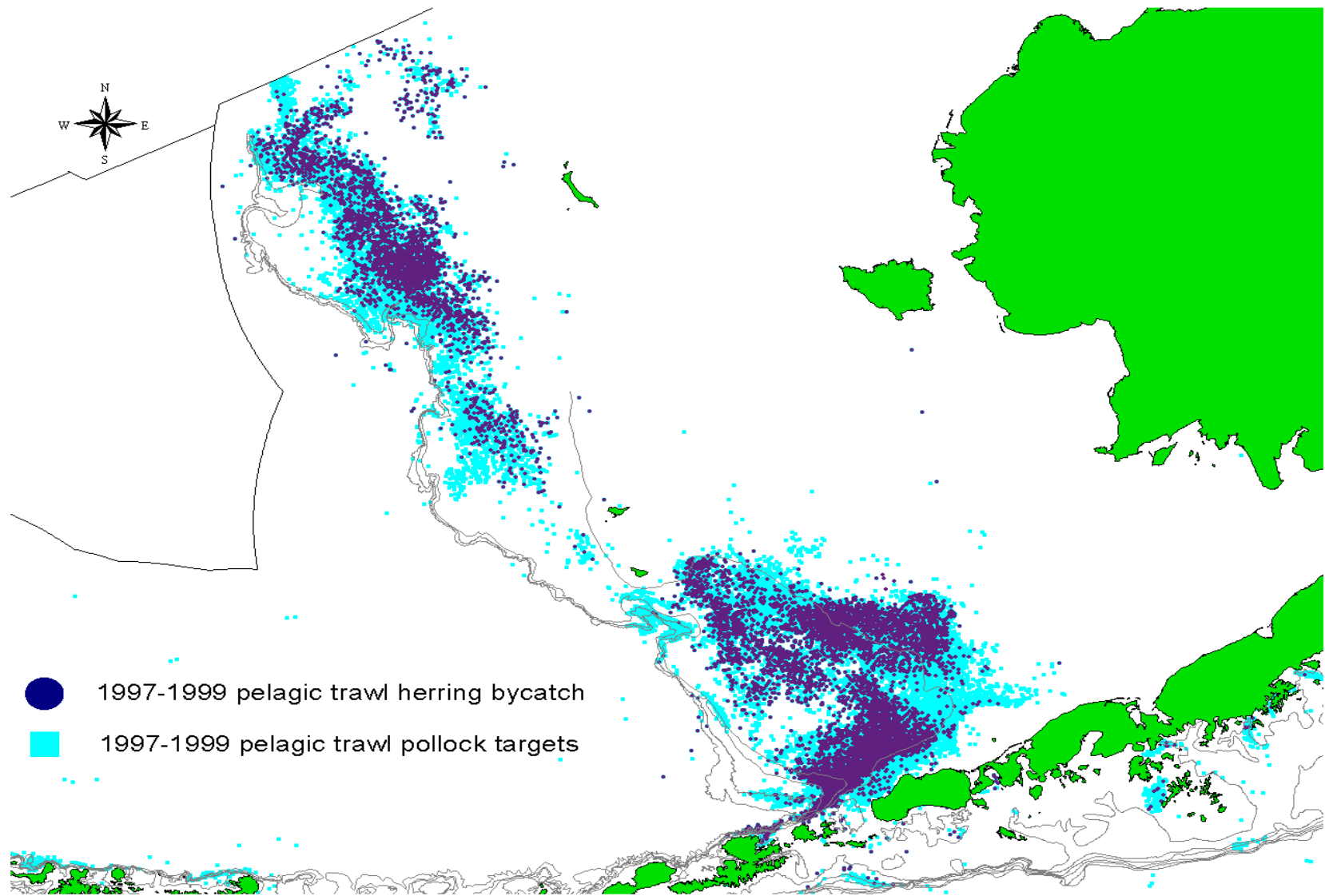


Figure 3.5-15. Spatial distribution of herring bycatch within the Bering Sea and Aleutian Islands pelagic pollock fishery, 1997-1999.

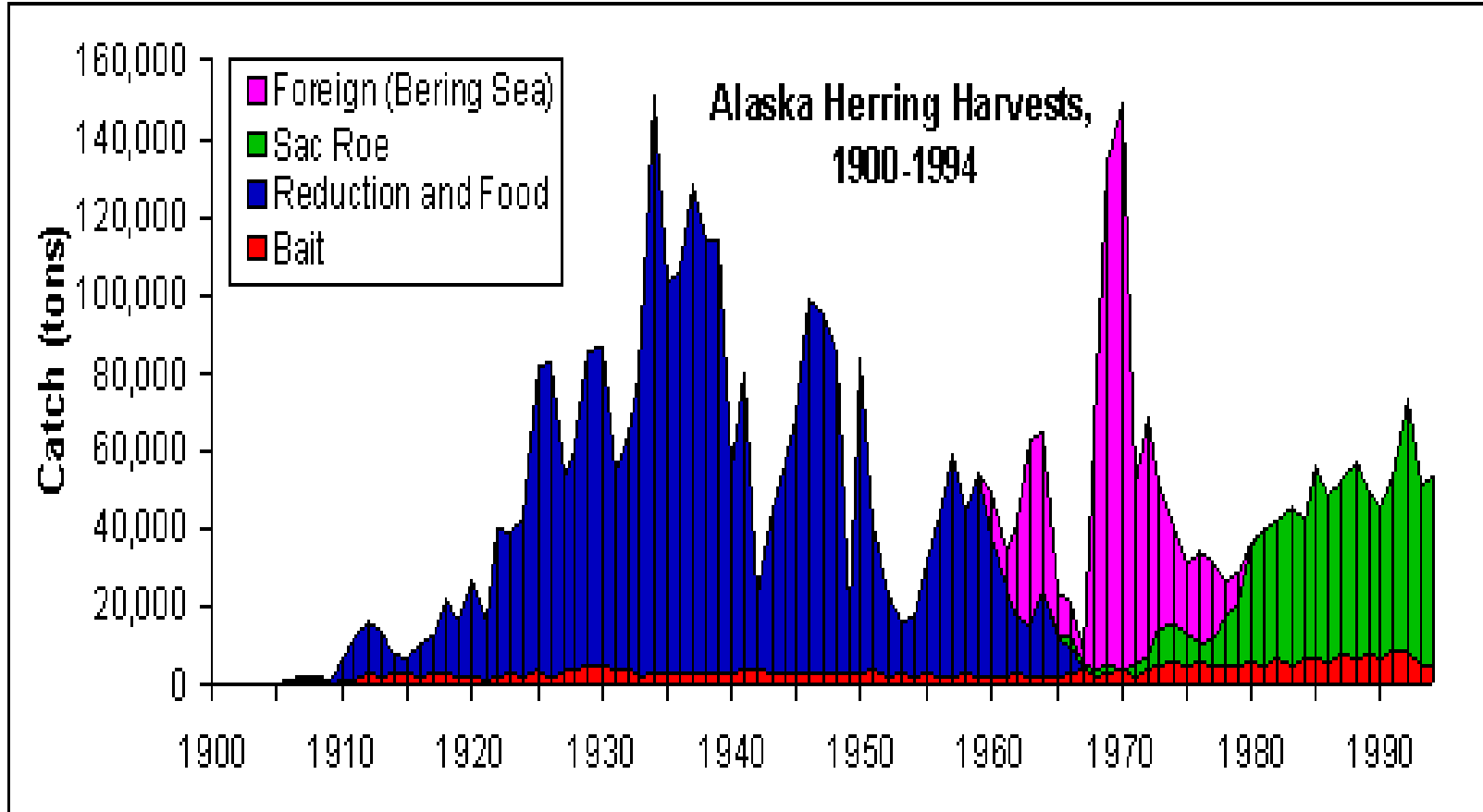


Figure 3.5-16. Historical catch of Pacific herring in Alaska. Source: ADF&G 2000.

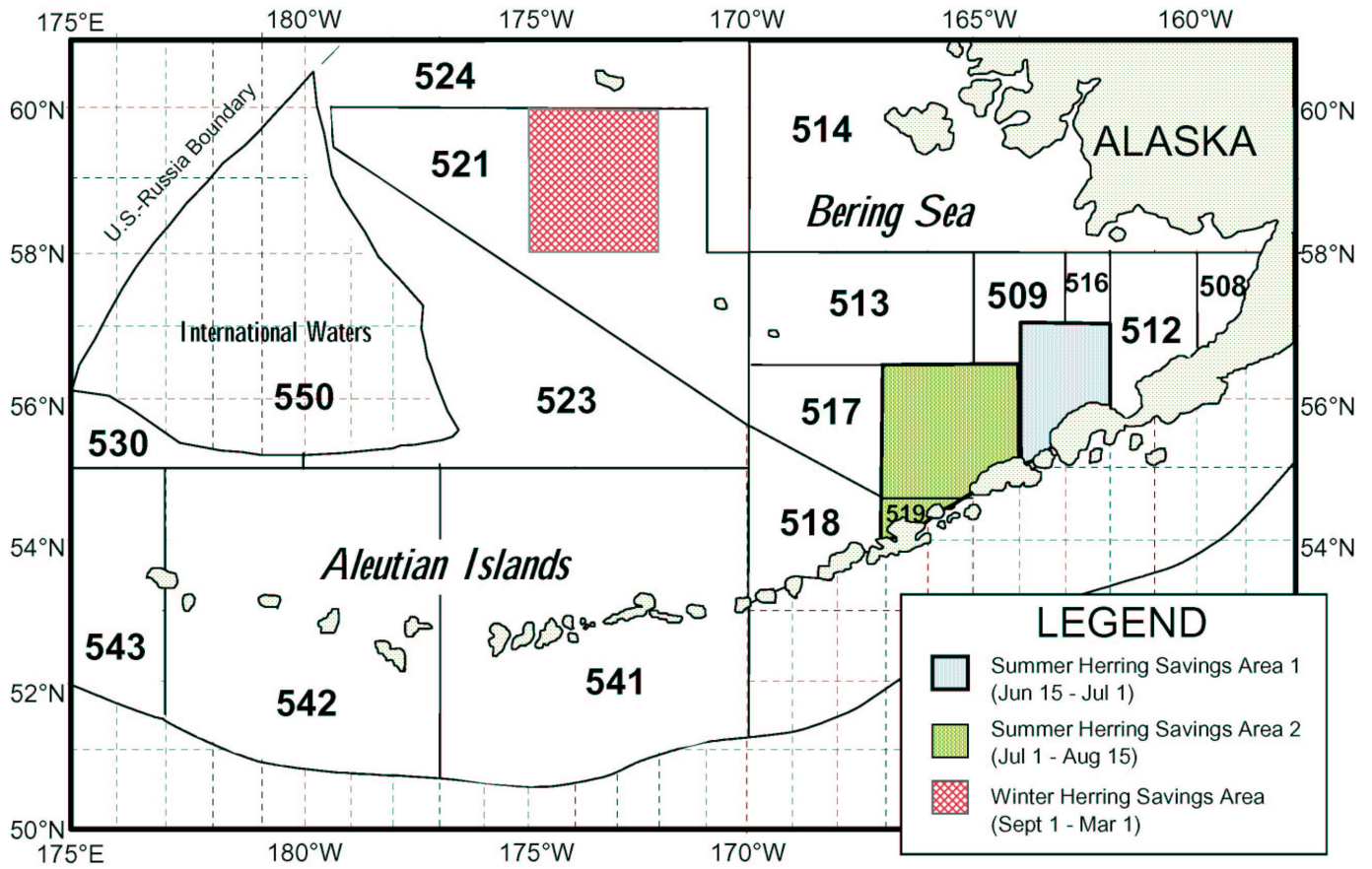


Figure 3.5-17. Designated herring savings areas.

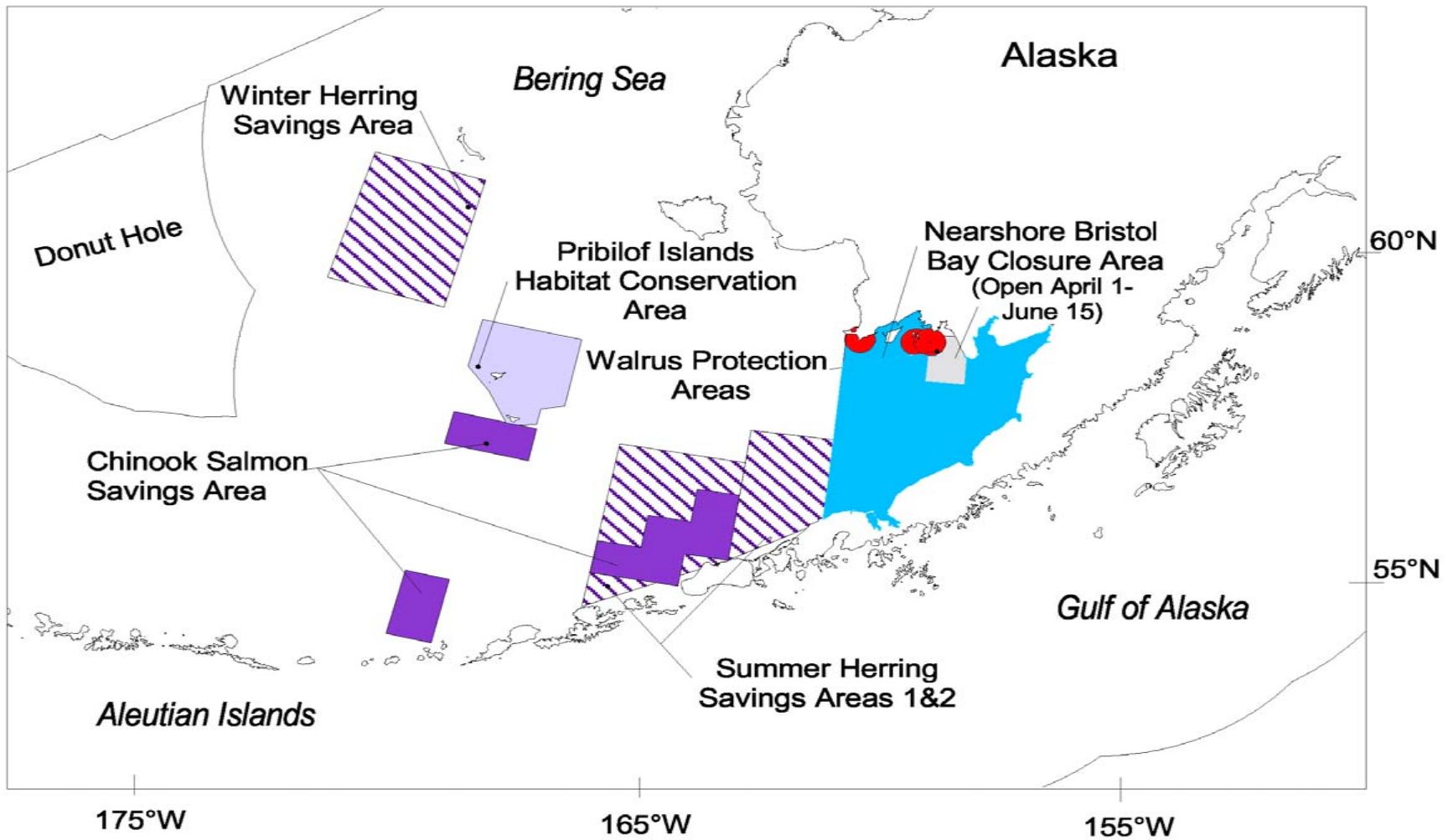


Figure 3.5-18. Management areas involving prohibited species and walrus in the Bering Sea. Source: NMFS.

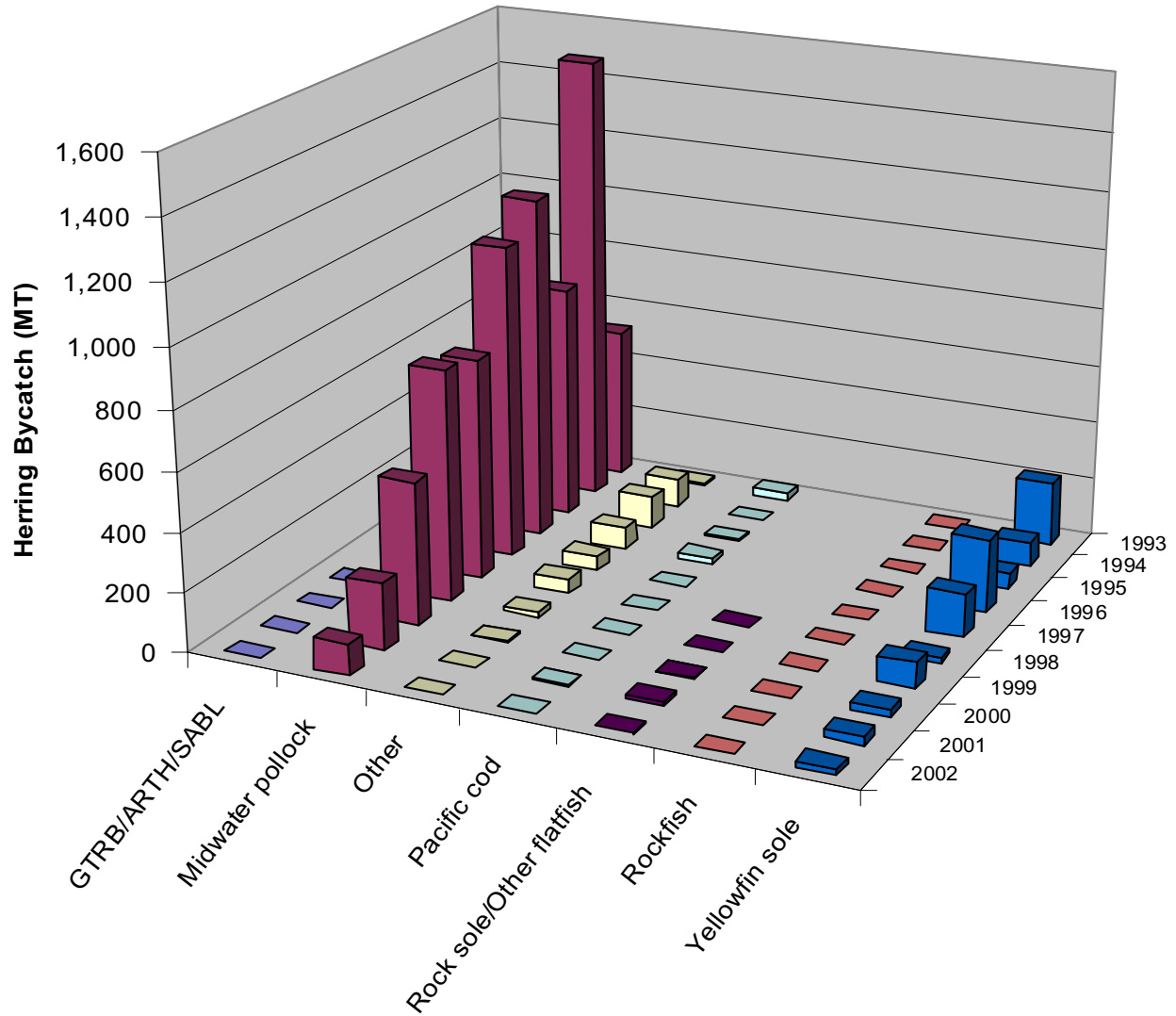


Figure 3.5-19. Herring bycatch by fishery and year in the Bering Sea and Aleutian Islands trawl fisheries.

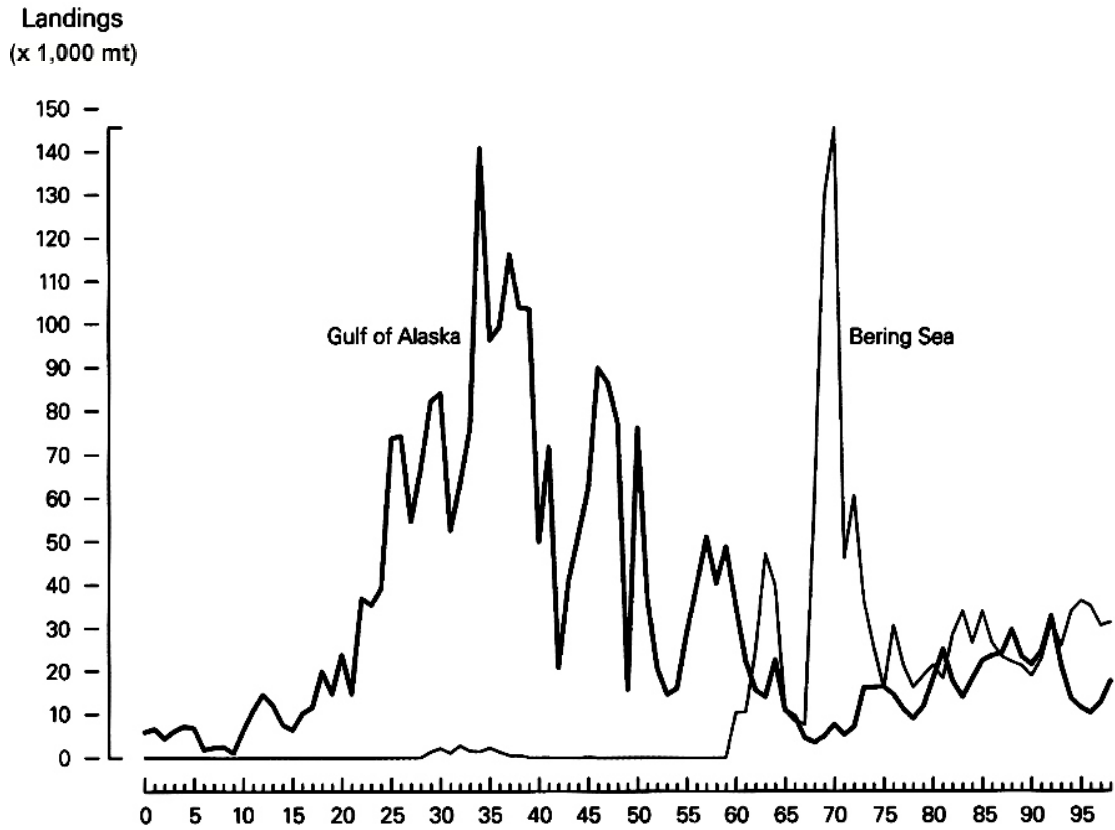


Figure 3.5-20. Historical trend of Pacific herring catch in the Bering Sea and Gulf of Alaska, 1900-1998. Source: NOAA 1999.

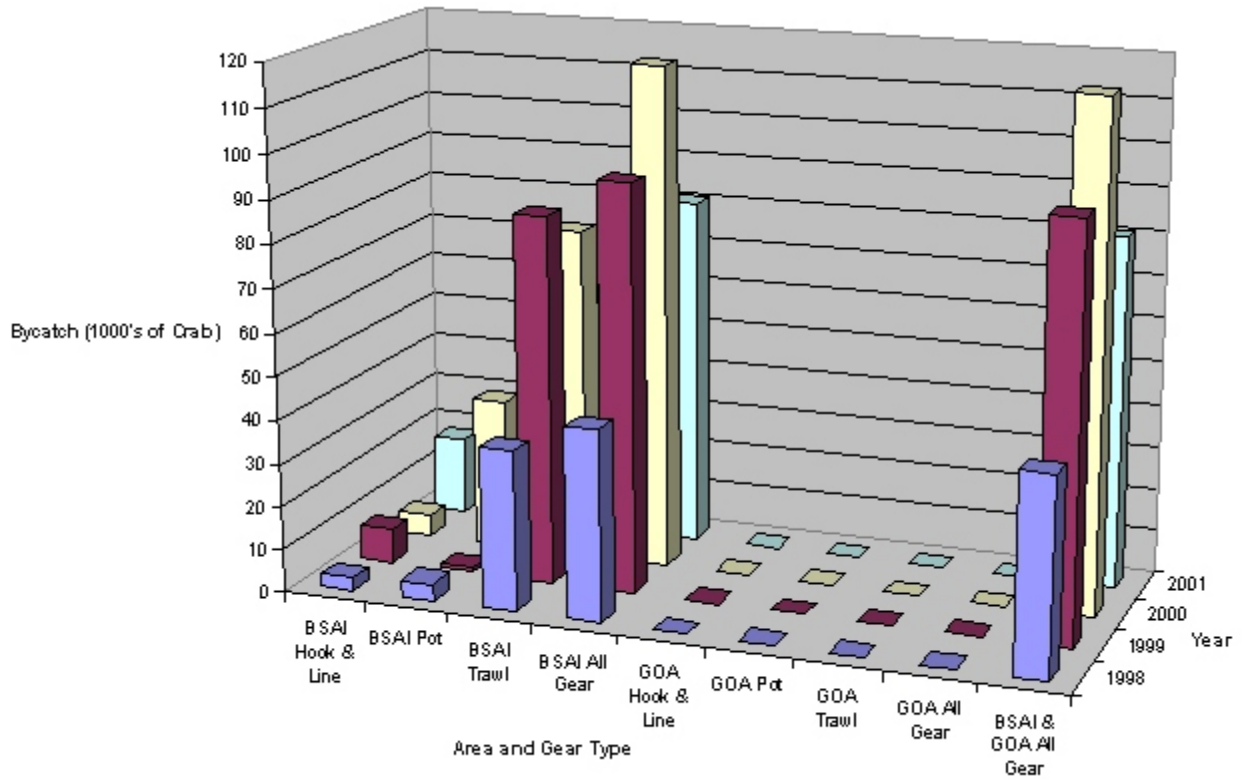


Figure 3.5-21. Red King crab bycatch by area and gear, 1998-2001.

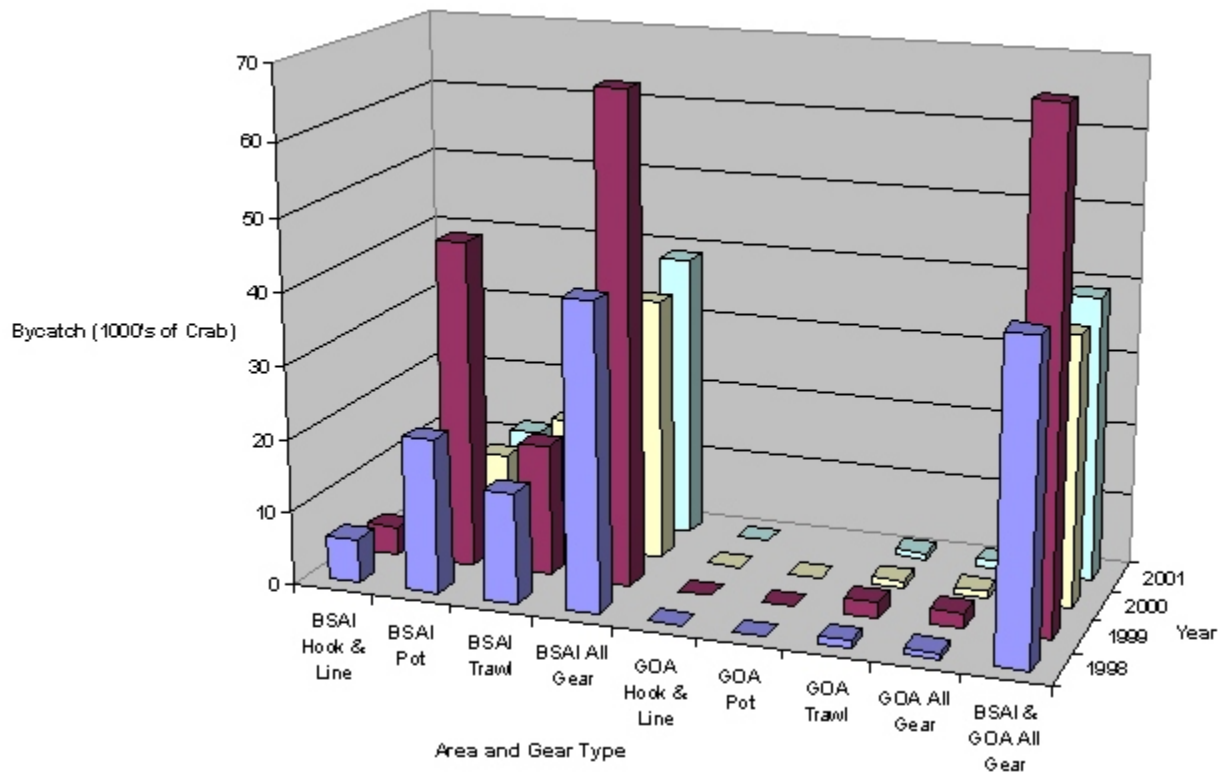


Figure 3.5-22. Other king crab bycatch by area and gear, 1998-2001.

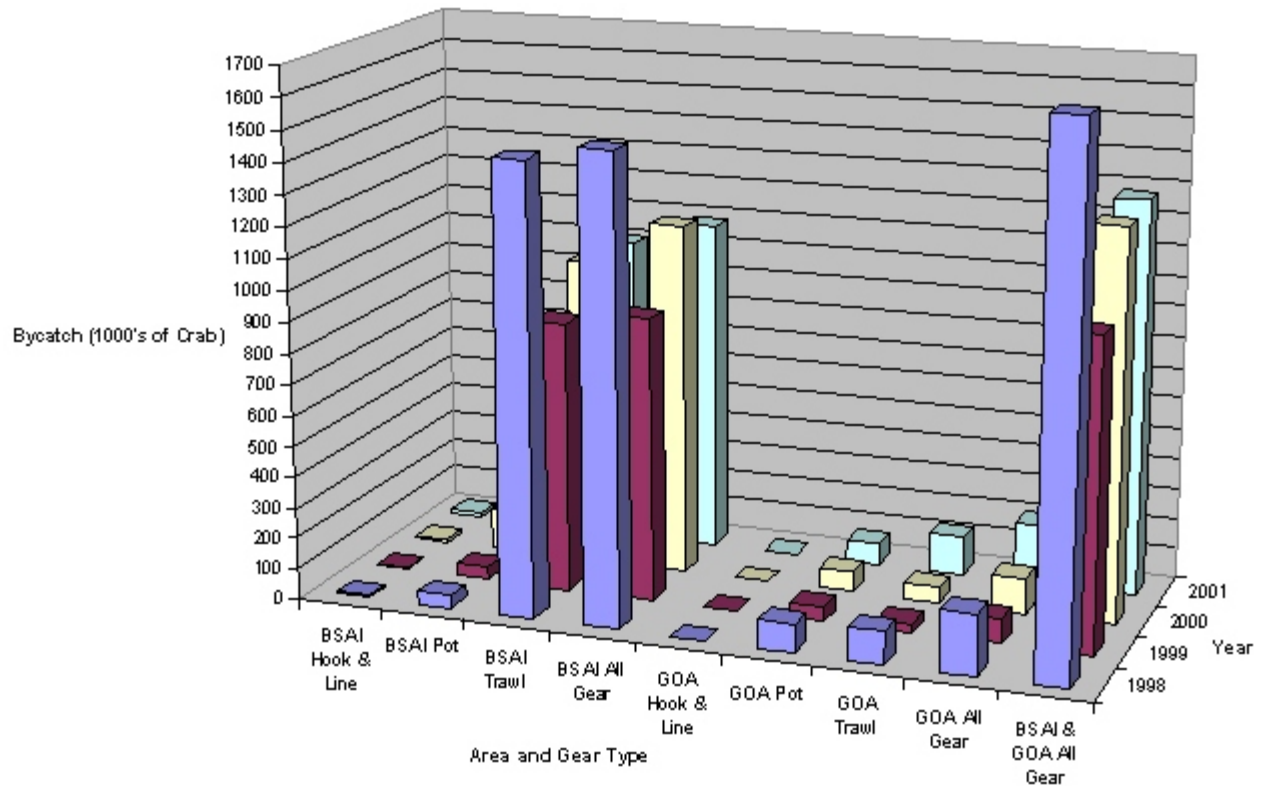


Figure 3.5-23. Bairdi crab bycatch by area and gear, 1998-2001.

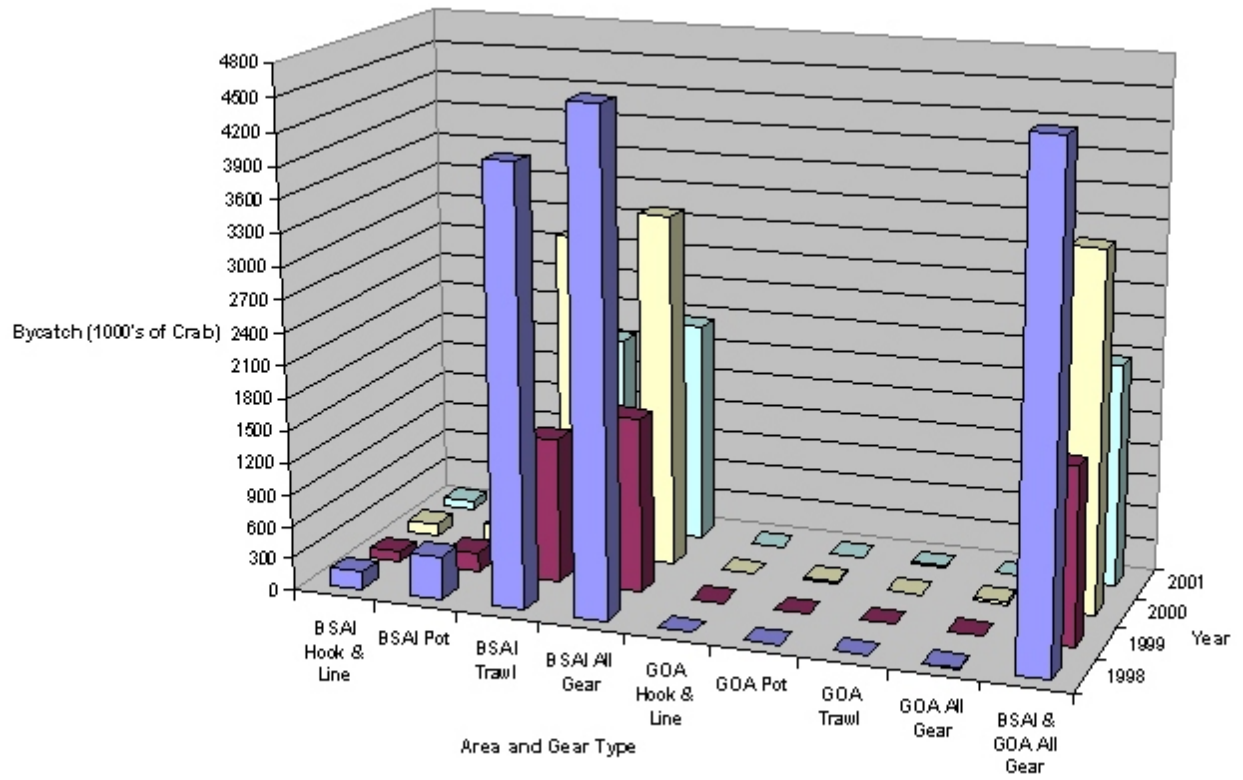


Figure 3.5-24. Other Tanner crab bycatch by area and gear, 1998-2001.

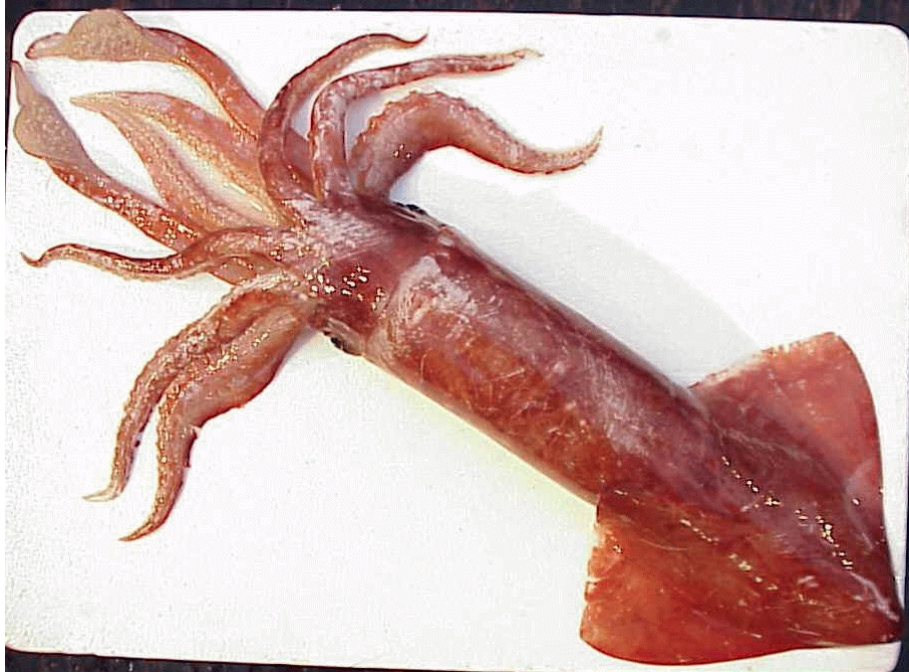


Figure 3.5-25. The magistrate armhook squid, *Berryteuthis magister*.

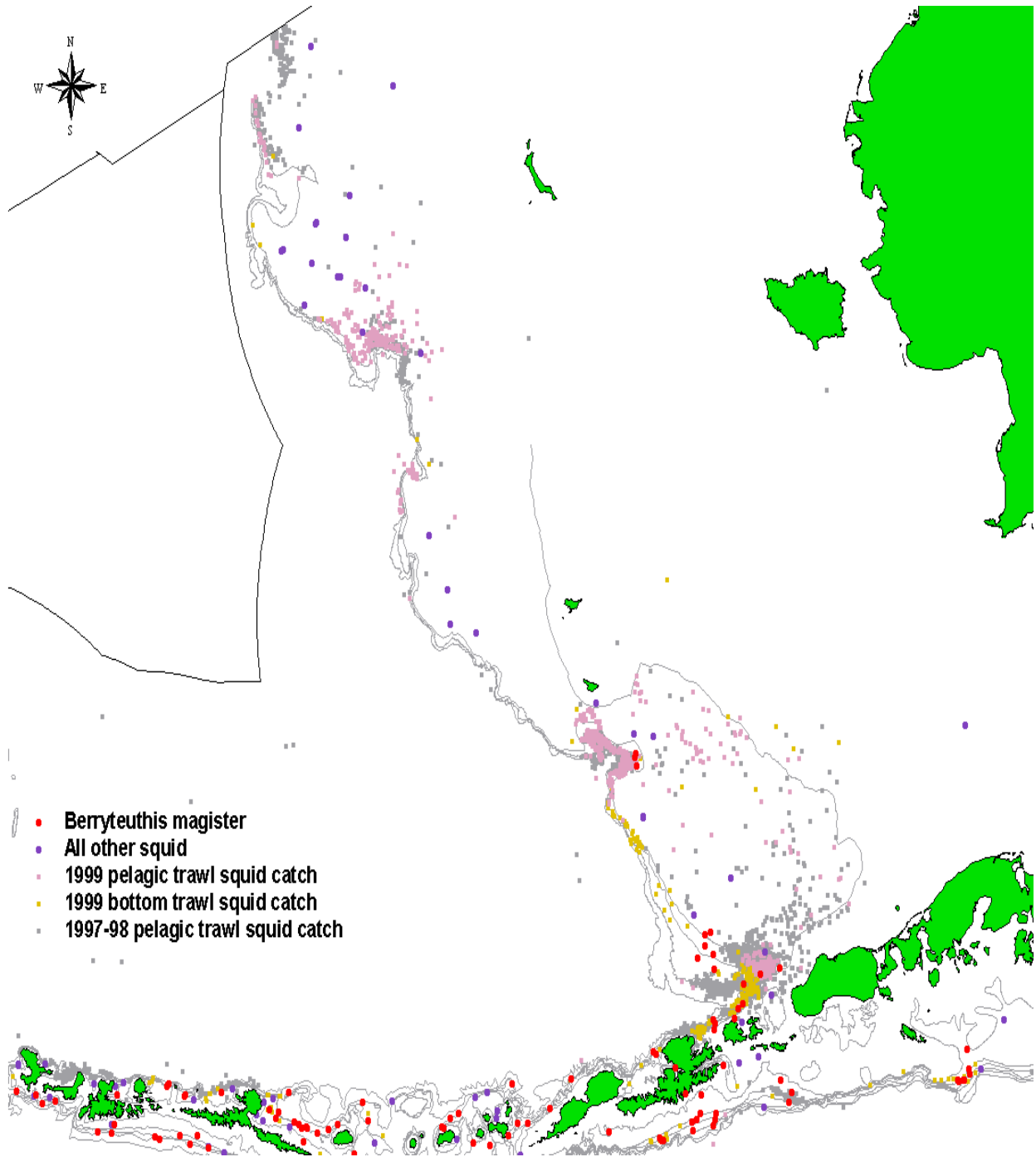


Figure 3.5-26. Distribution of squid species from bottom trawl and midwater surveys (dots) and catch (shaded squares), 1997-1999.

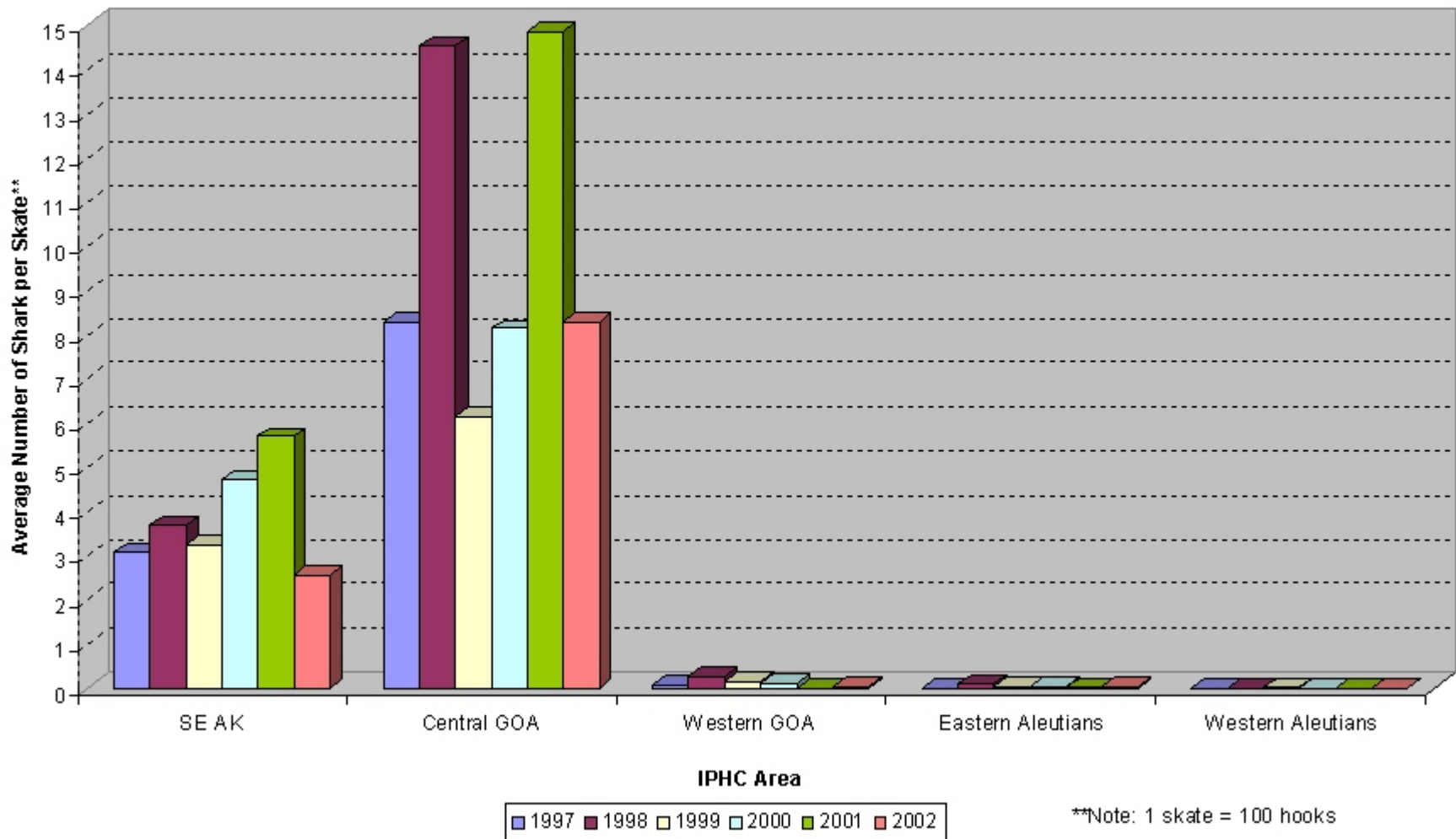


Figure 3.5-27. Average stock density of dogfish estimated by International Pacific Halibut Commission setline surveys in Alaska, 1997-2002.

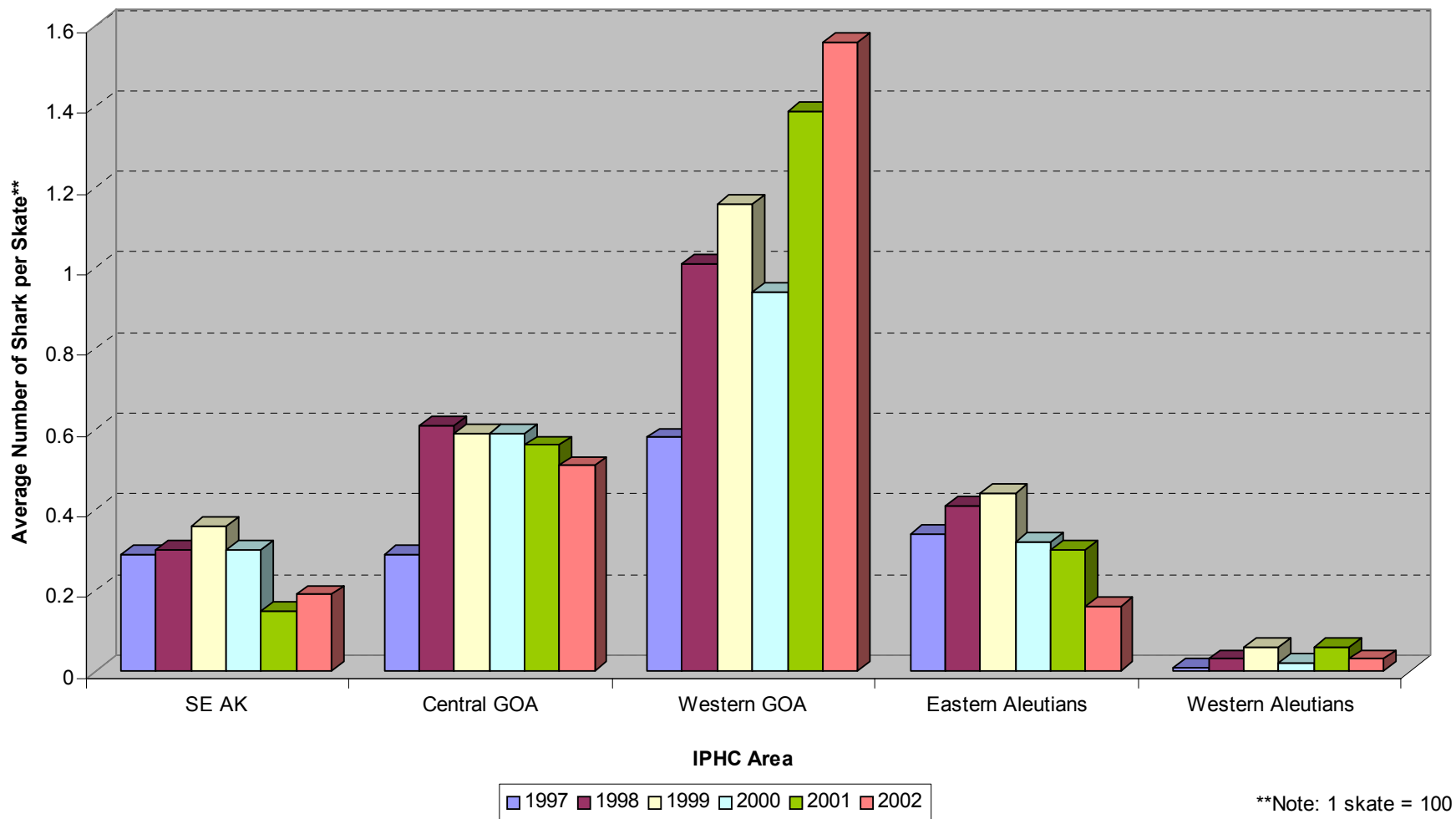


Figure 3.5-28. Average stock density of sleeper shark estimated by International Pacific Halibut Commission setline surveys in Alaska, 1997-2002.

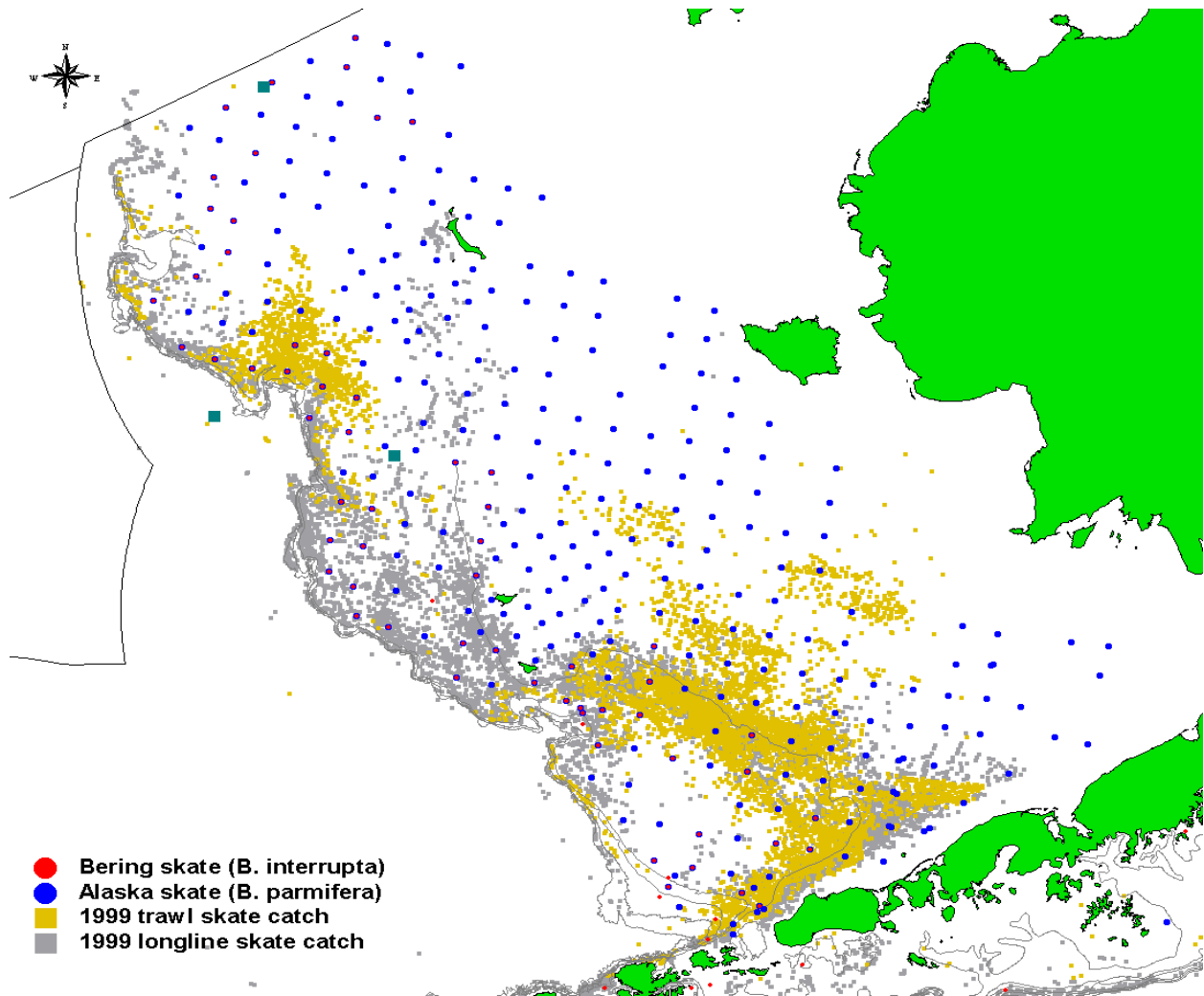


Figure 3.5-29. Distribution of skate species and skate catch in the eastern Bering Sea, 1999.

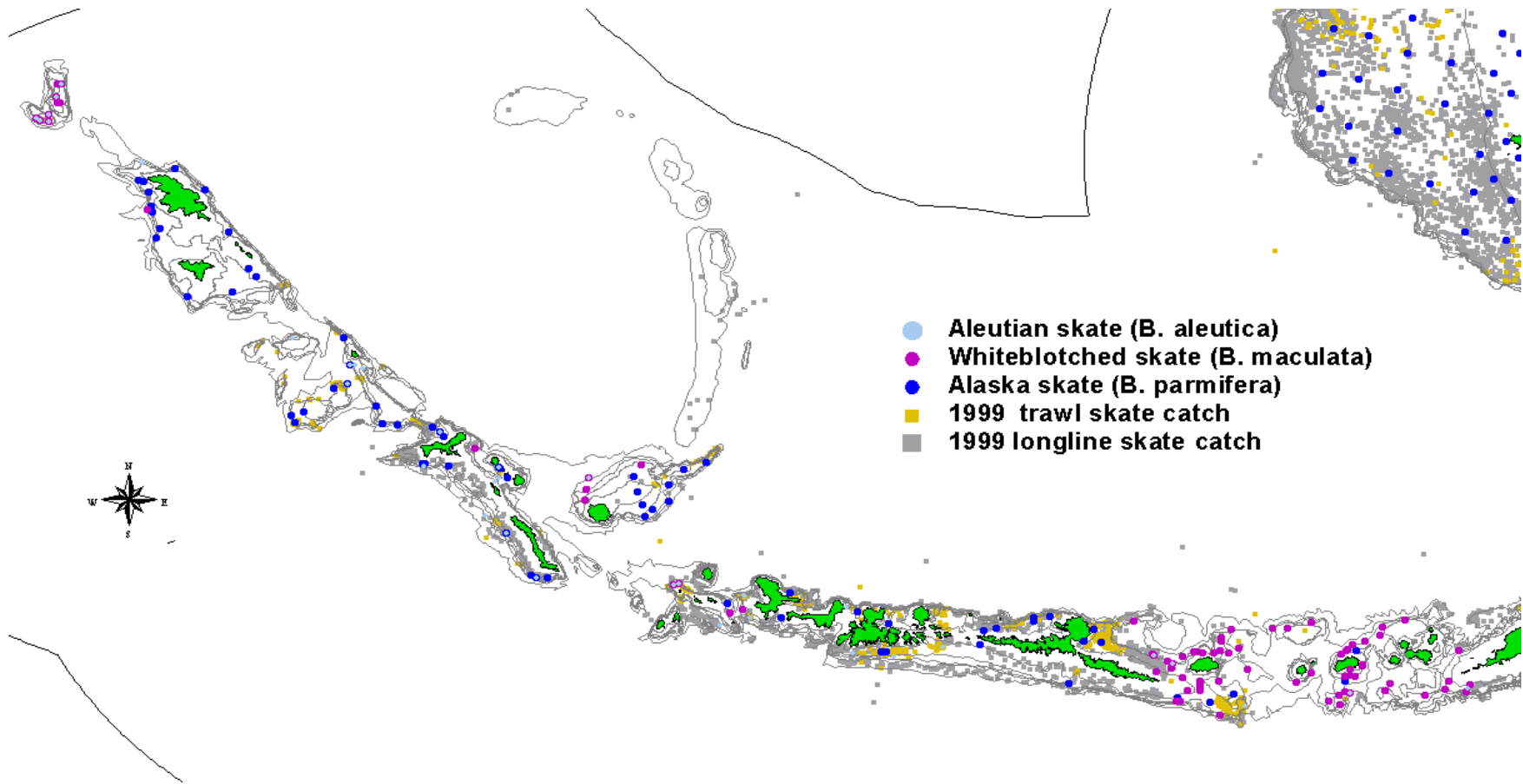


Figure 3.5-30. Distribution of skate species (1997 survey) and skate catch in the Aleutian Islands, 1999.

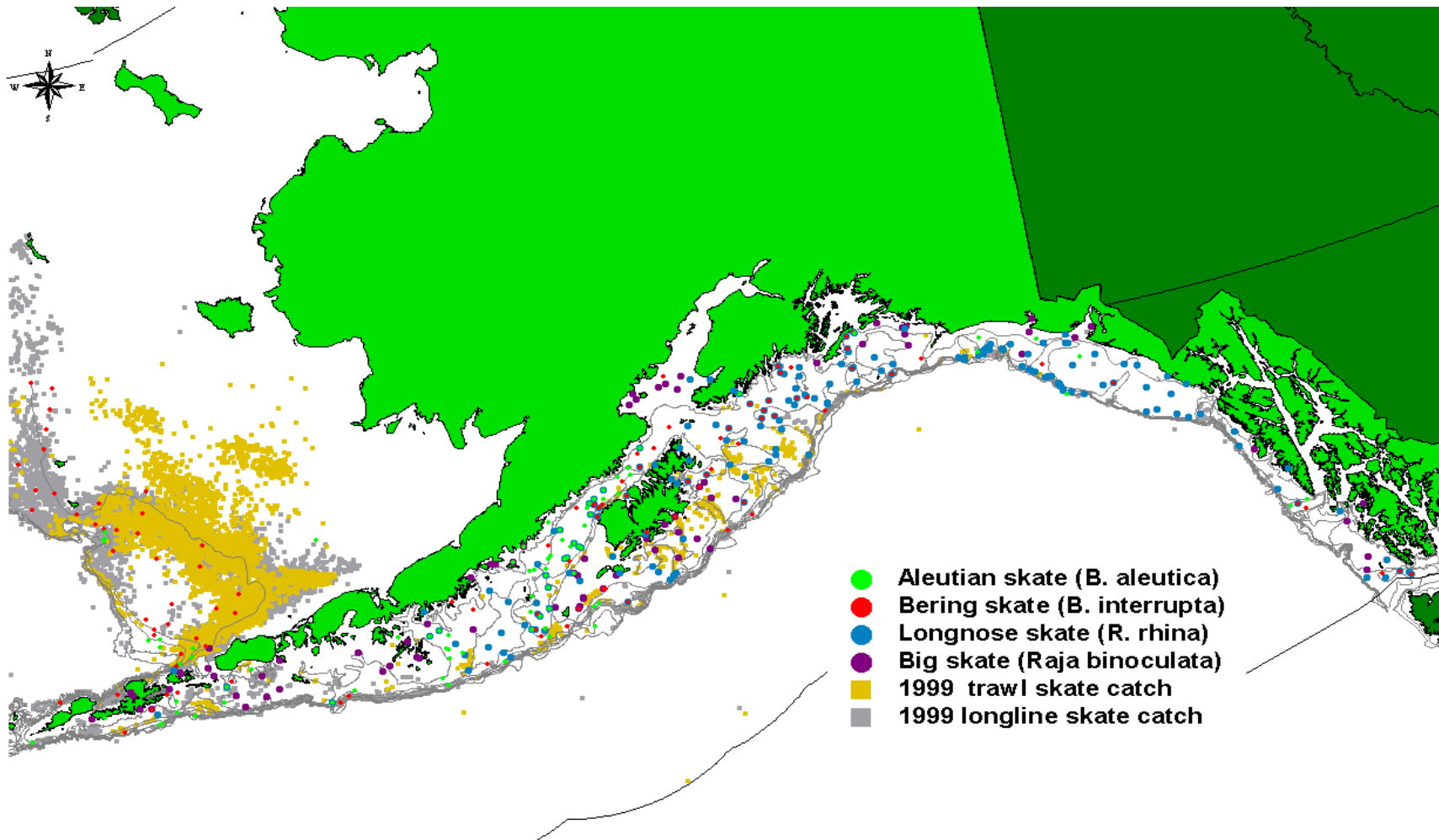


Figure 3.5-31. Distribution of skate species (1999 survey) and skate catch in the Gulf of Alaska, 1999.

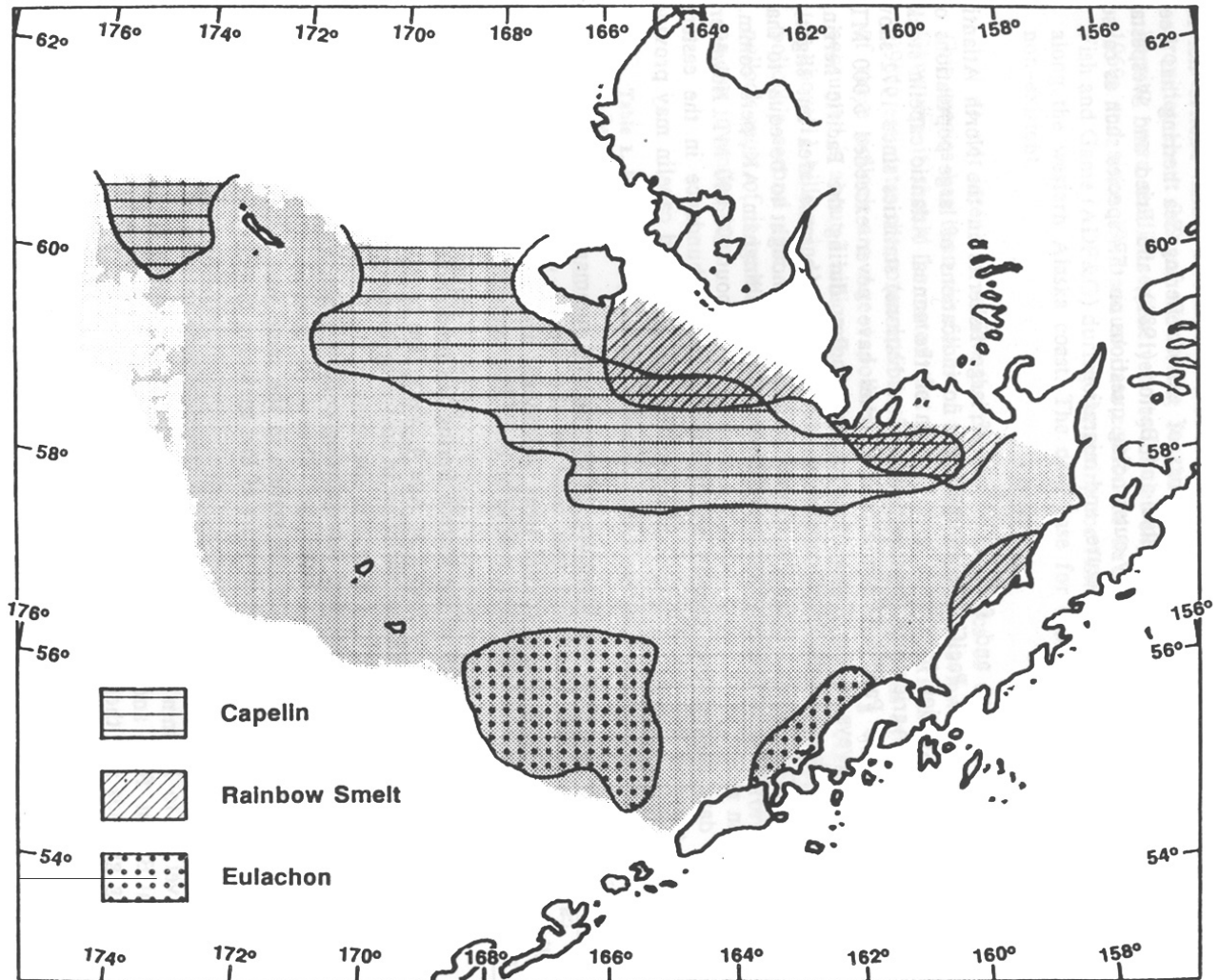


Figure 3.5-32. Distribution of capelin, rainbow smelt, and eulachon in Alaska Fisheries Science Center summer groundfish trawl surveys. Source: NMFS.

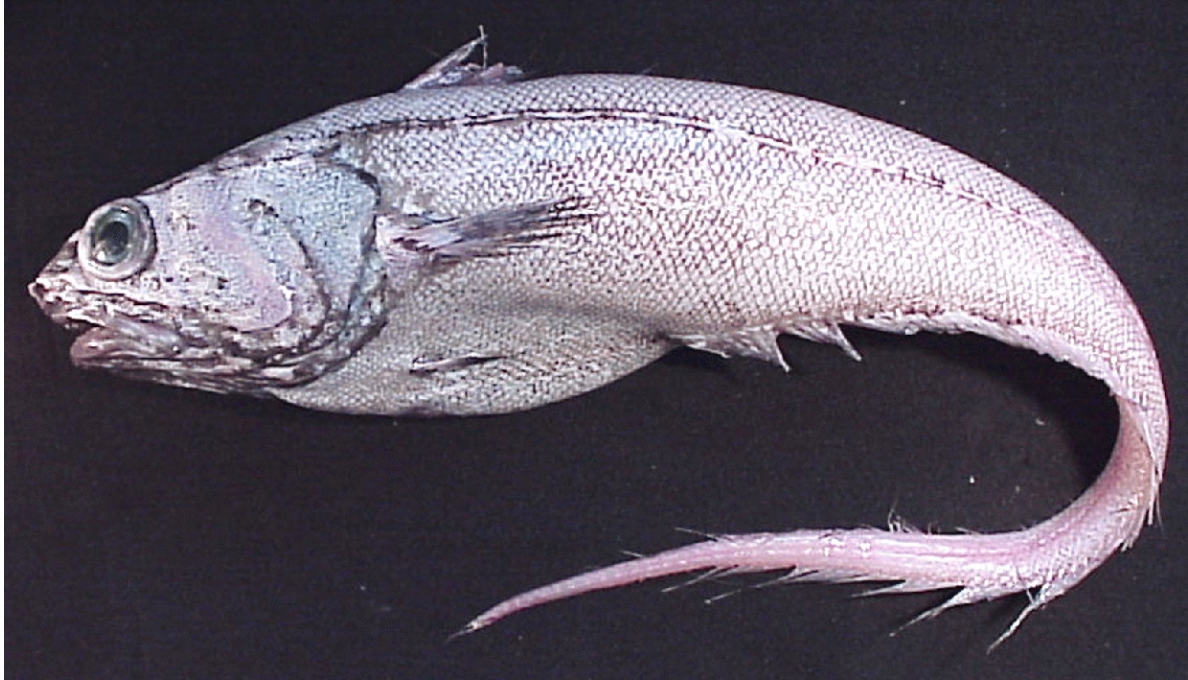


Figure 3.5-33. The giant grenadier, *Albatrossia pectoralis*.

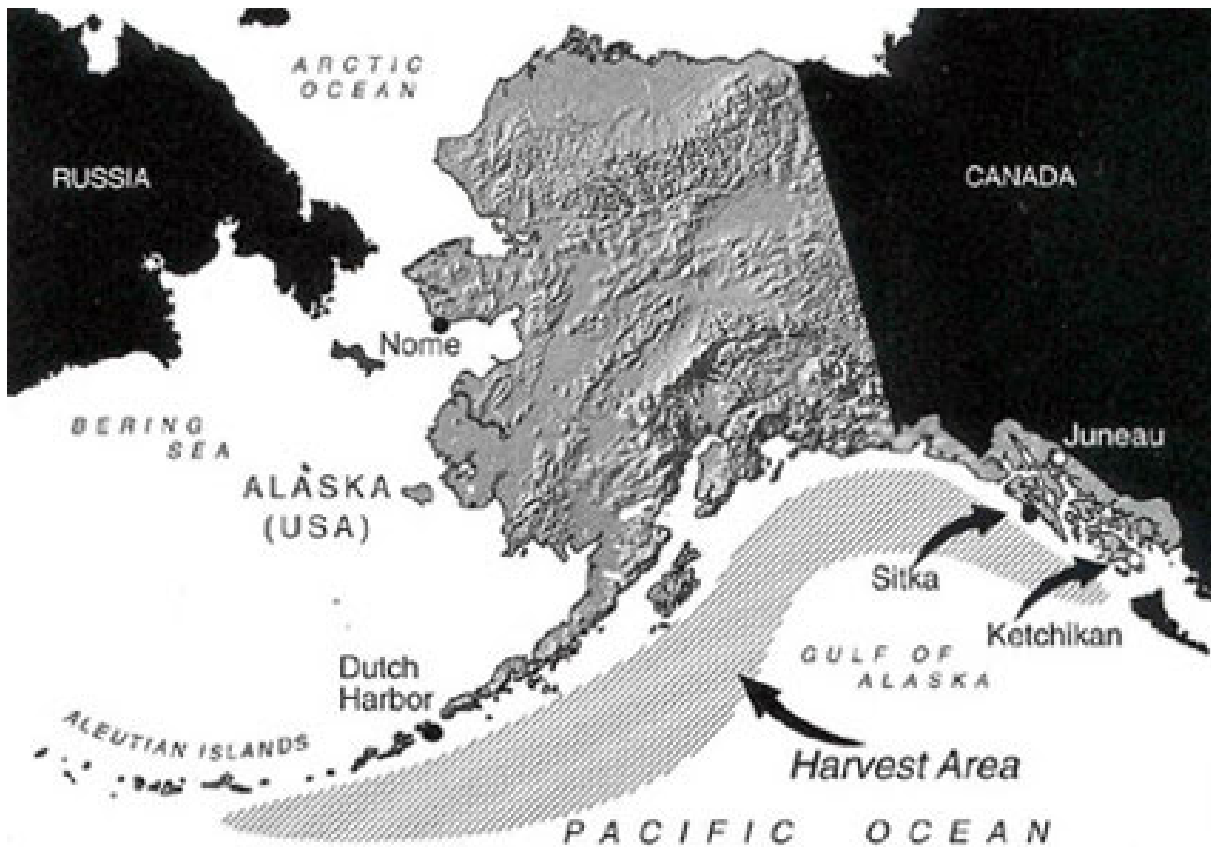


Figure 3.5-34. Distribution of grenadiers (sablefish) in the Gulf of Alaska (harvest area map from eastern Yakutat to the western gulf area).

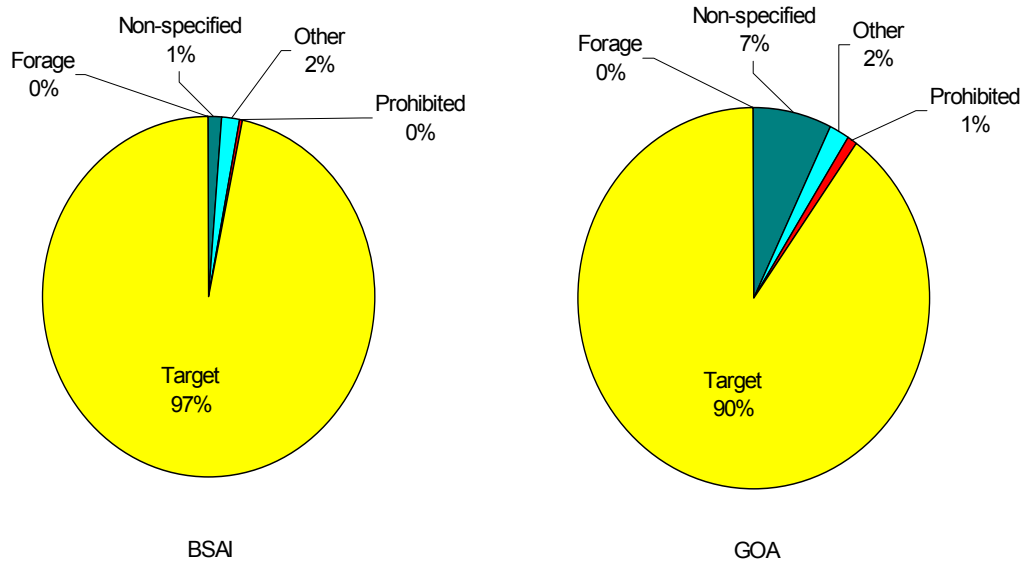


Figure 3.5-35. All catch (retained and discarded) by Fishery Management Plan species category in each area, 1997 to 1999. Proportions are based on weight. Non-target species include the forage, nonspecified, other, and prohibited species categories.

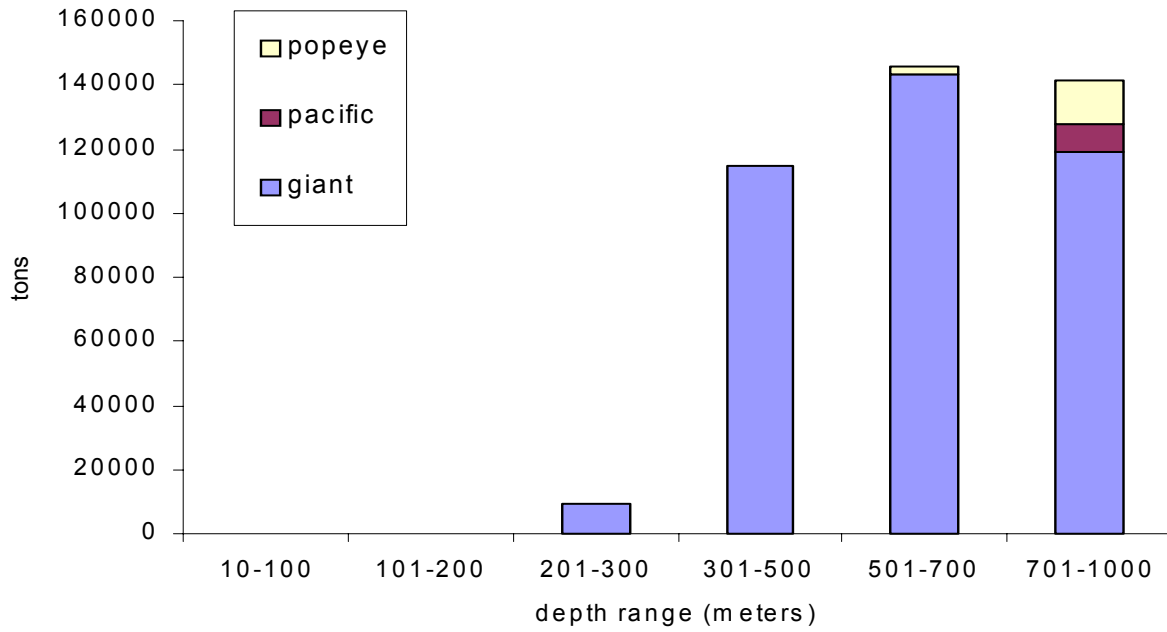


Figure 3.5-36. Depth distribution of grenadier biomass in the 1999 Gulf of Alaska survey.

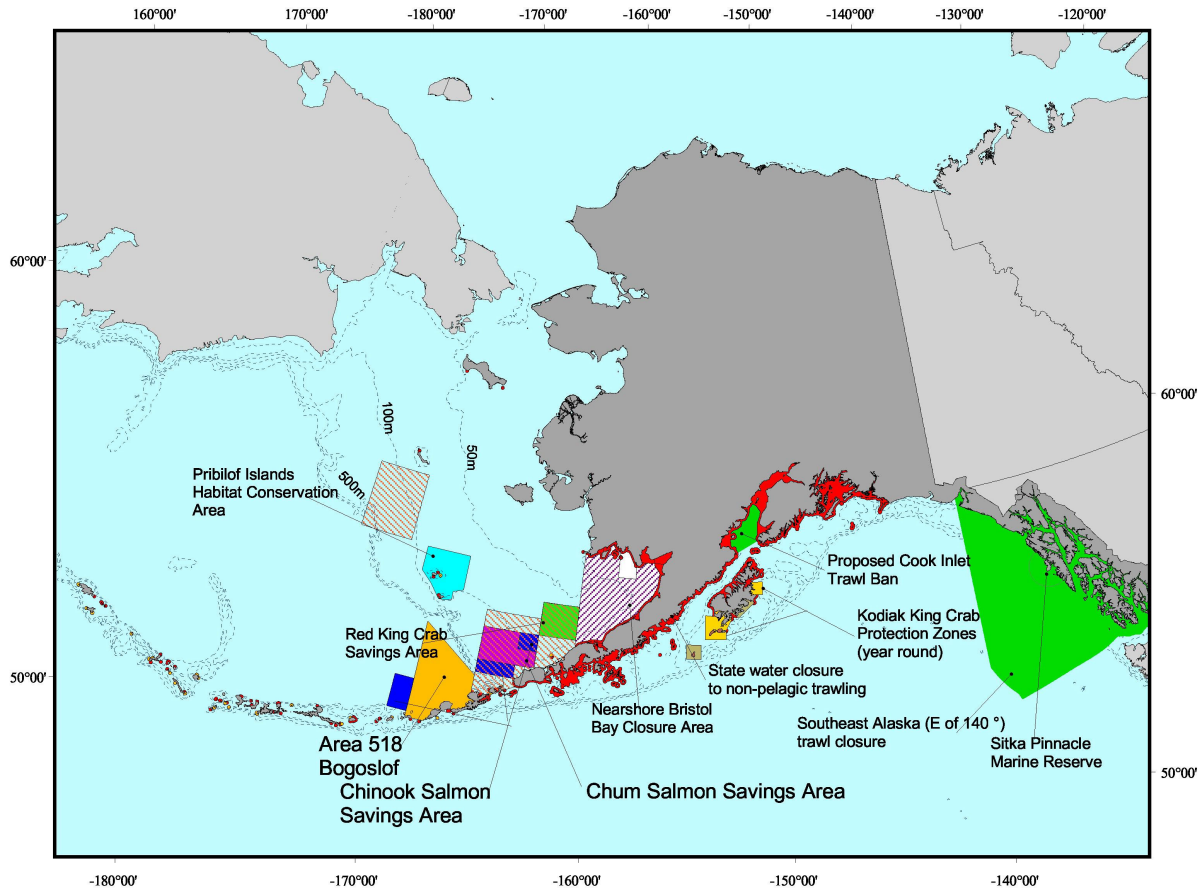


Figure 3.6-1. Groundfish closures in Alaska's exclusive economic zone. Source: C. Coon, NPFMC.

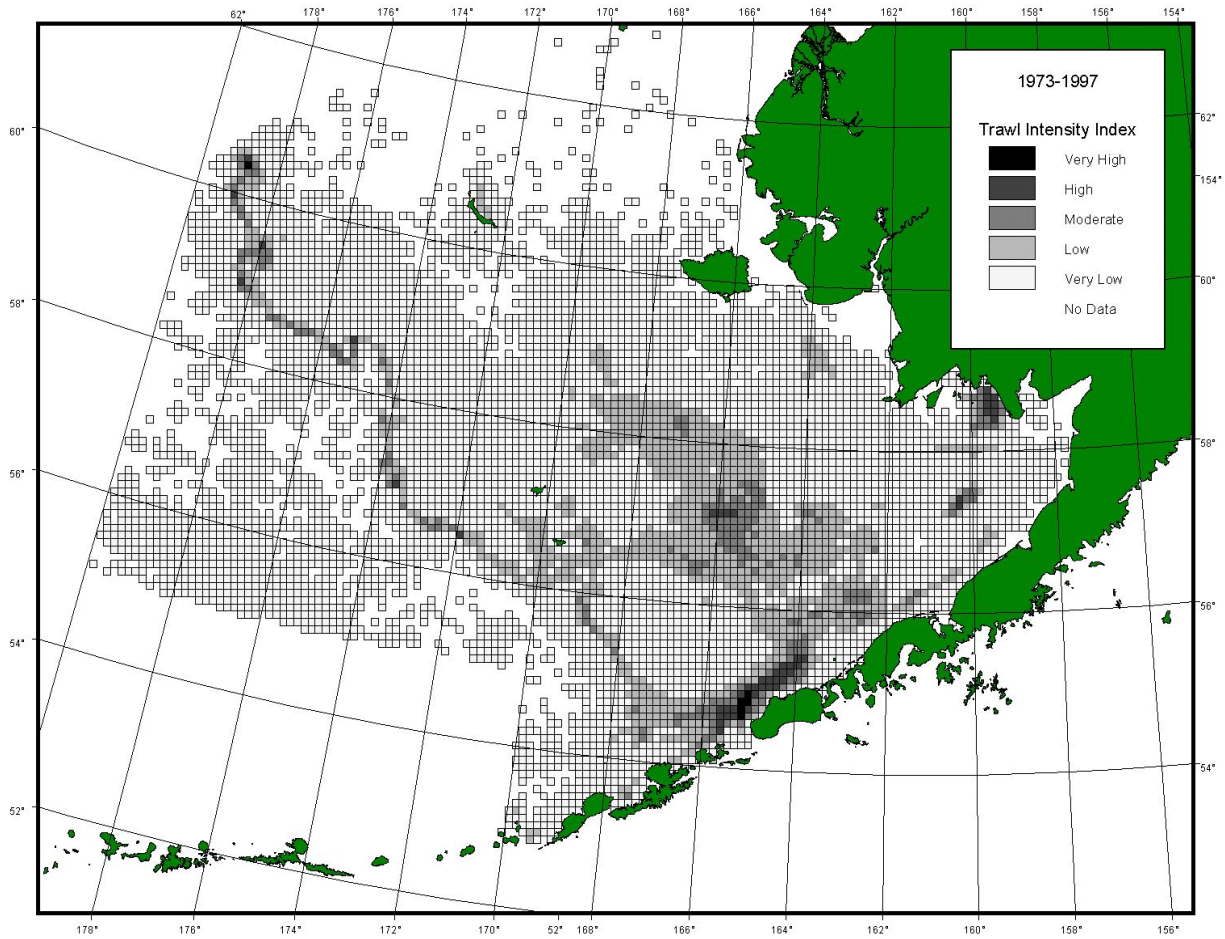


Figure 3.6-2. Location and intensity of bottom trawl efforts in the Bering Sea, 1973-1997. Source: NMFS, http://www.afsc.noaa.gov/race/groundfish/habitat/hist_trawldata.htm.

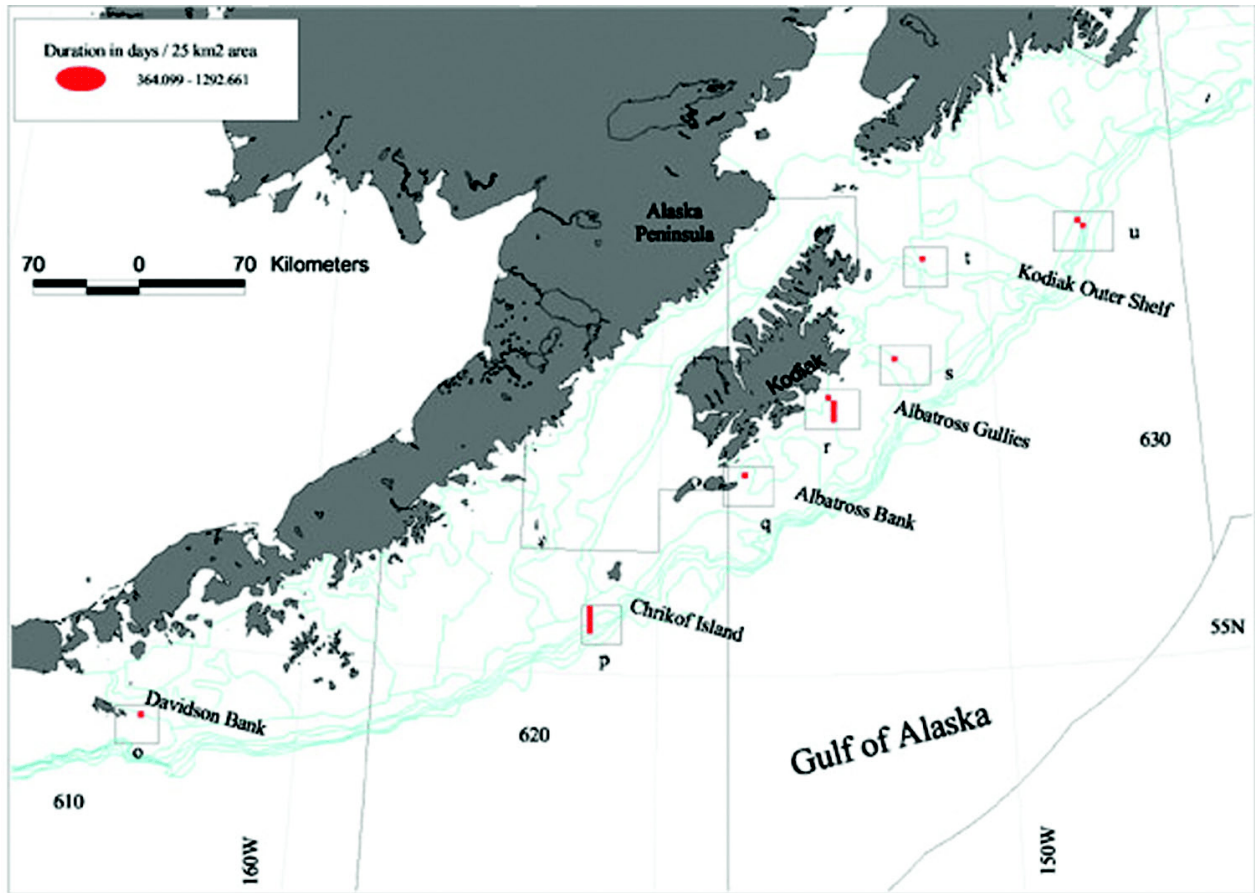


Figure 3.6-3. Location and density of bottom trawl efforts in the Gulf of Alaska, 1990-1998. Source: NMFS, http://www.afsc.noaa.gov/abl/MarFish/spatial_patterns_maps.htm#fig3.

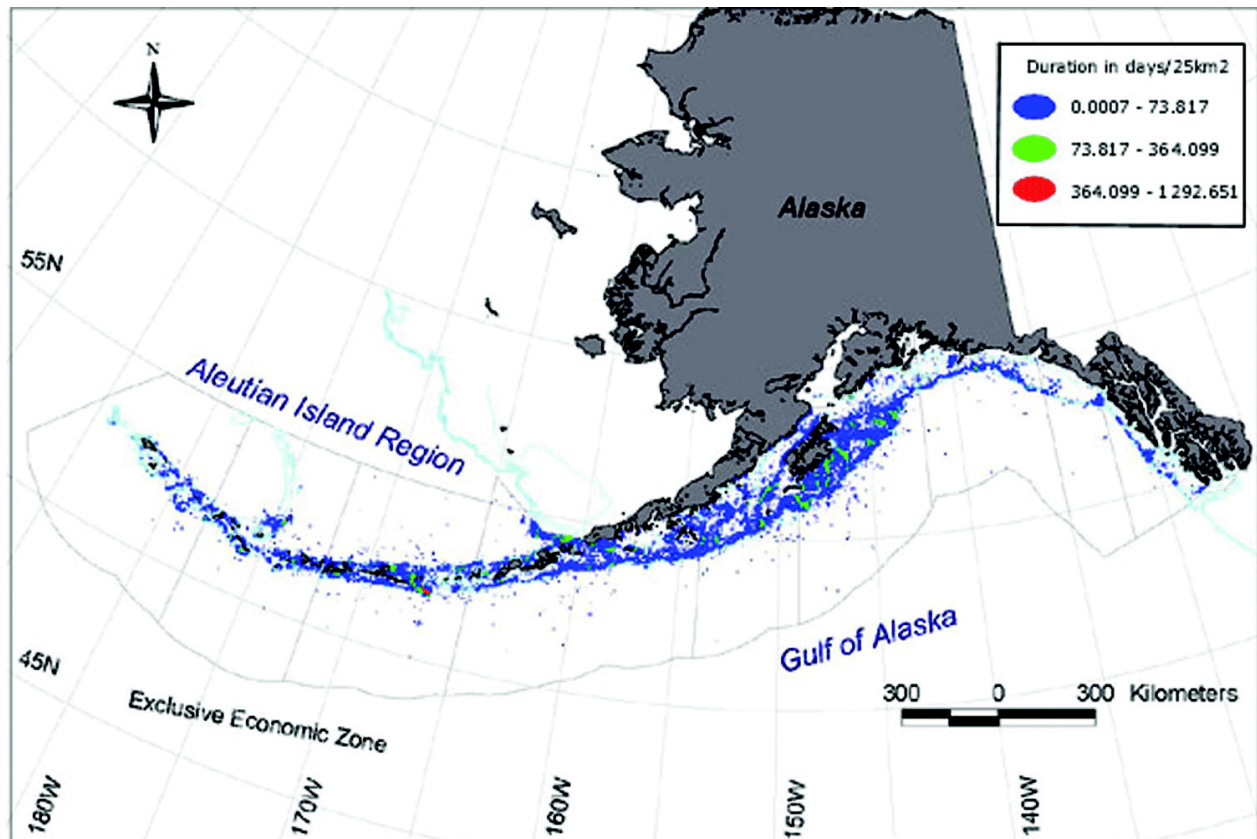


Figure 3.6-4. Location and density of bottom trawl effort in the Aleutian Islands, 1990-1998.
 Source: NMFS,
http://www.afsc.noaa.gov/abl/MarFish/spatial_patterns_maps.htm#fig1.

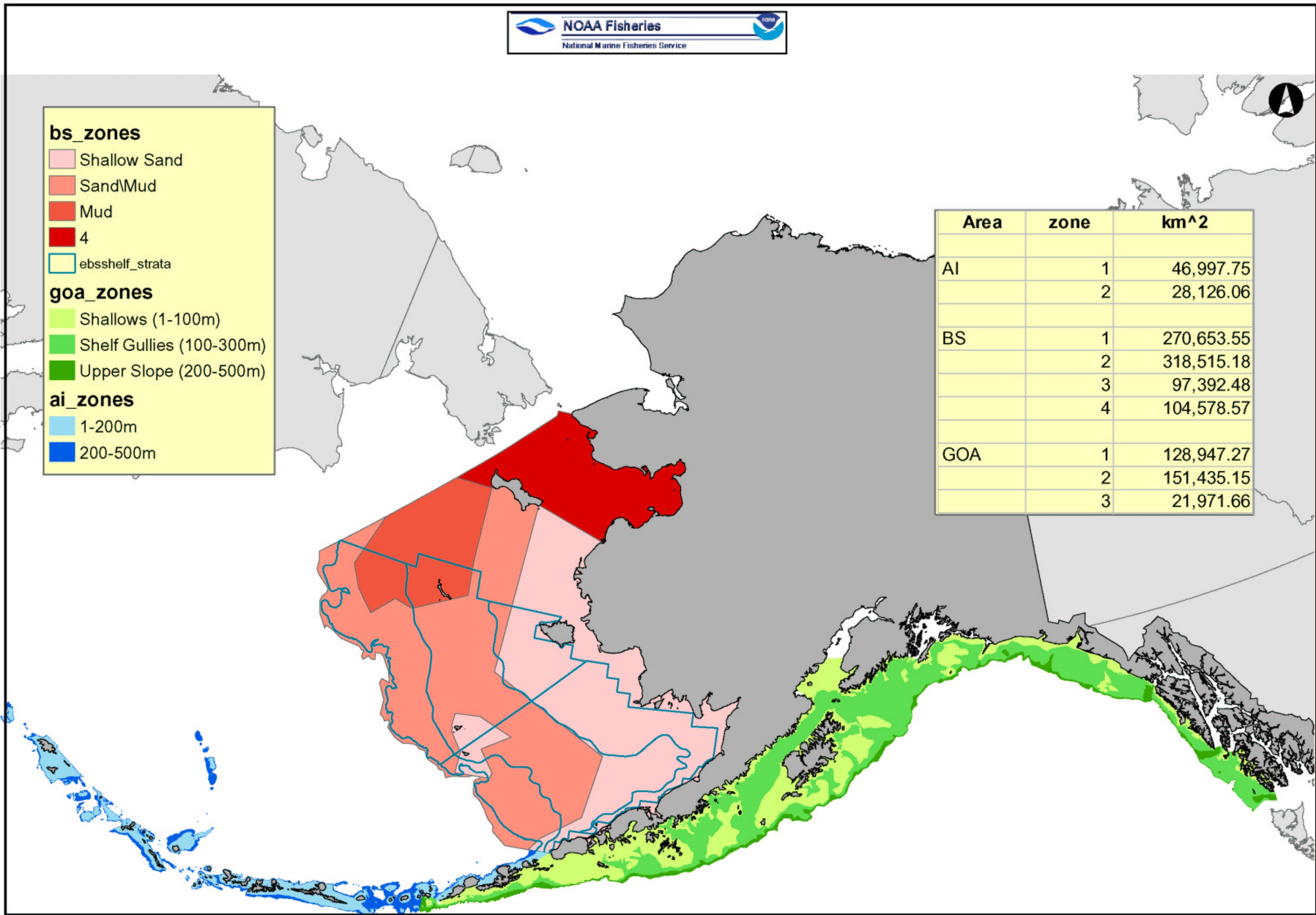


Figure 3.6-5. Essential fish habitat delineation.

This page intentionally left blank

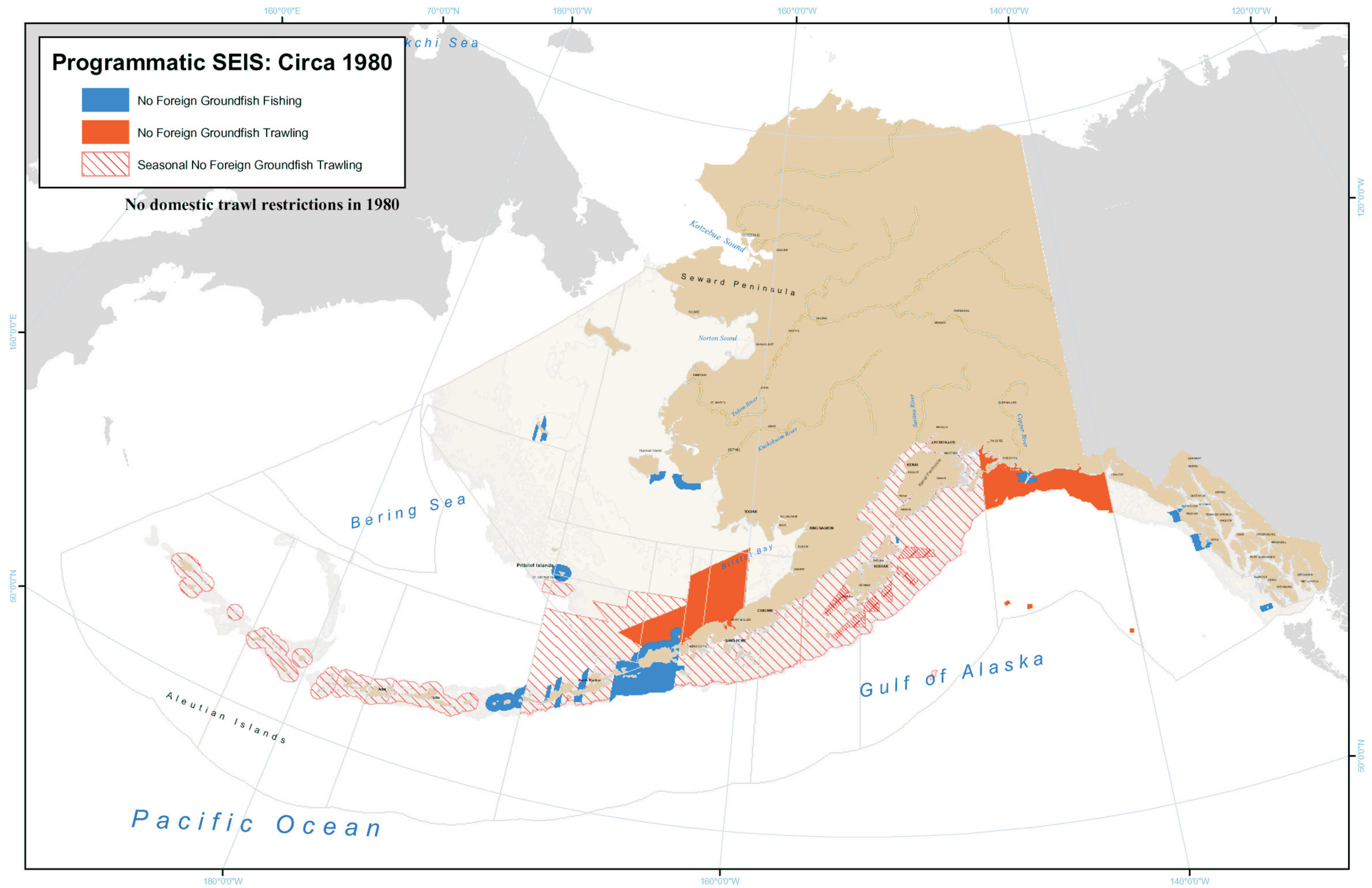


Figure 3.6-6. Groundfish no-trawl areas, Circa 1980.

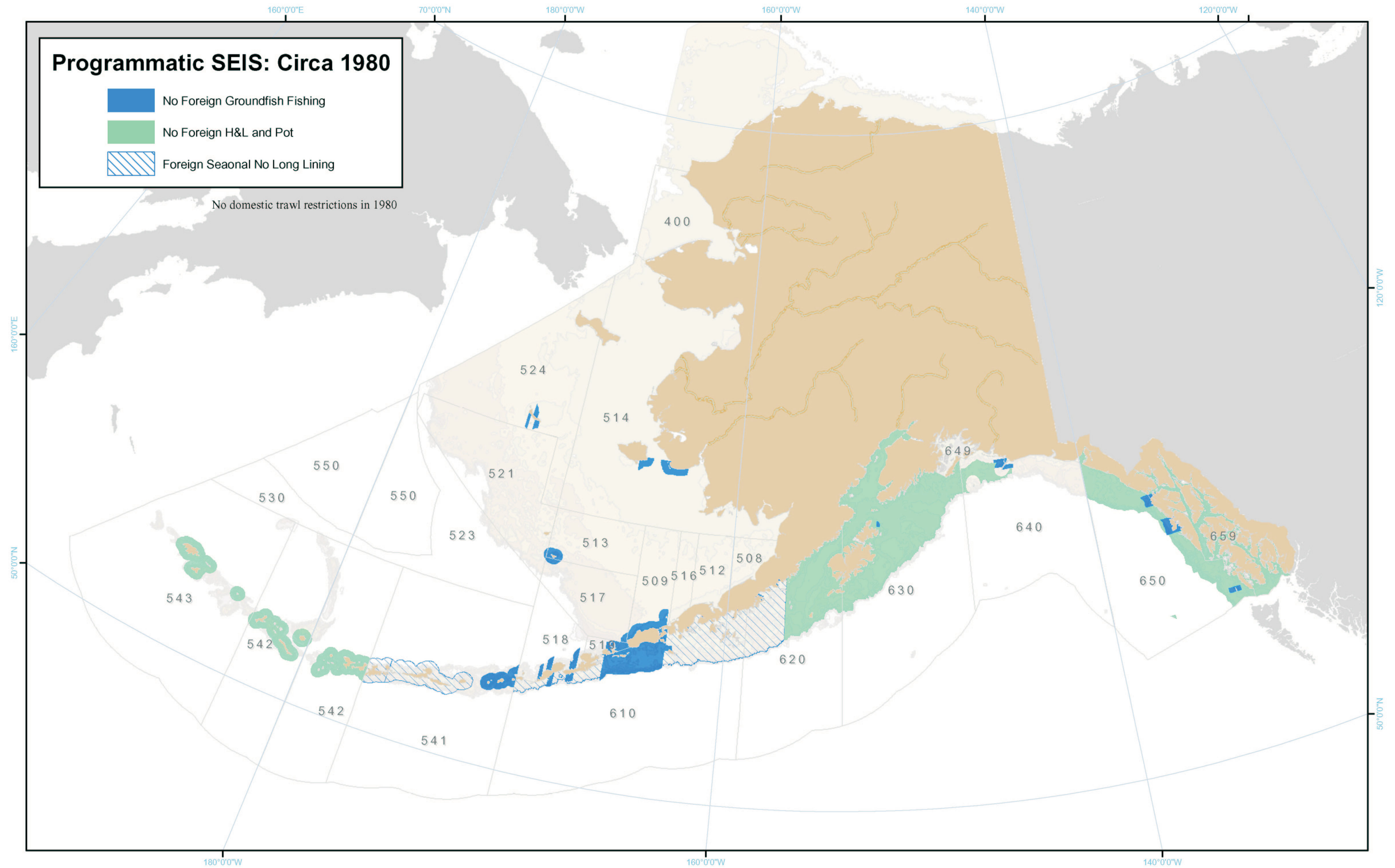


Figure 3.6-7. Groundfish areas closed to fixed gear, Circa 1980.

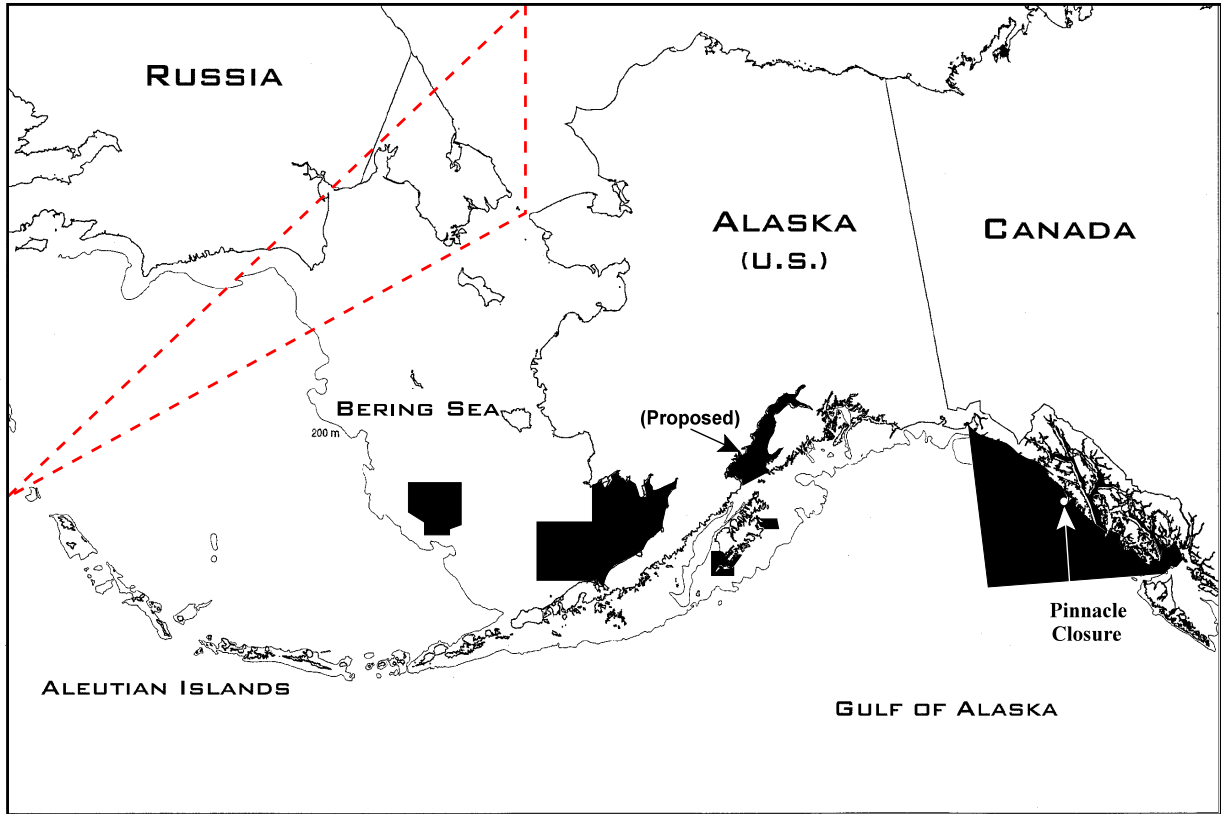


Figure 3.6-8. Marine protected areas off Alaska where trawling is prohibited year-round to protect habitat, reduce bycatch, and reduce competition with marine mammals.

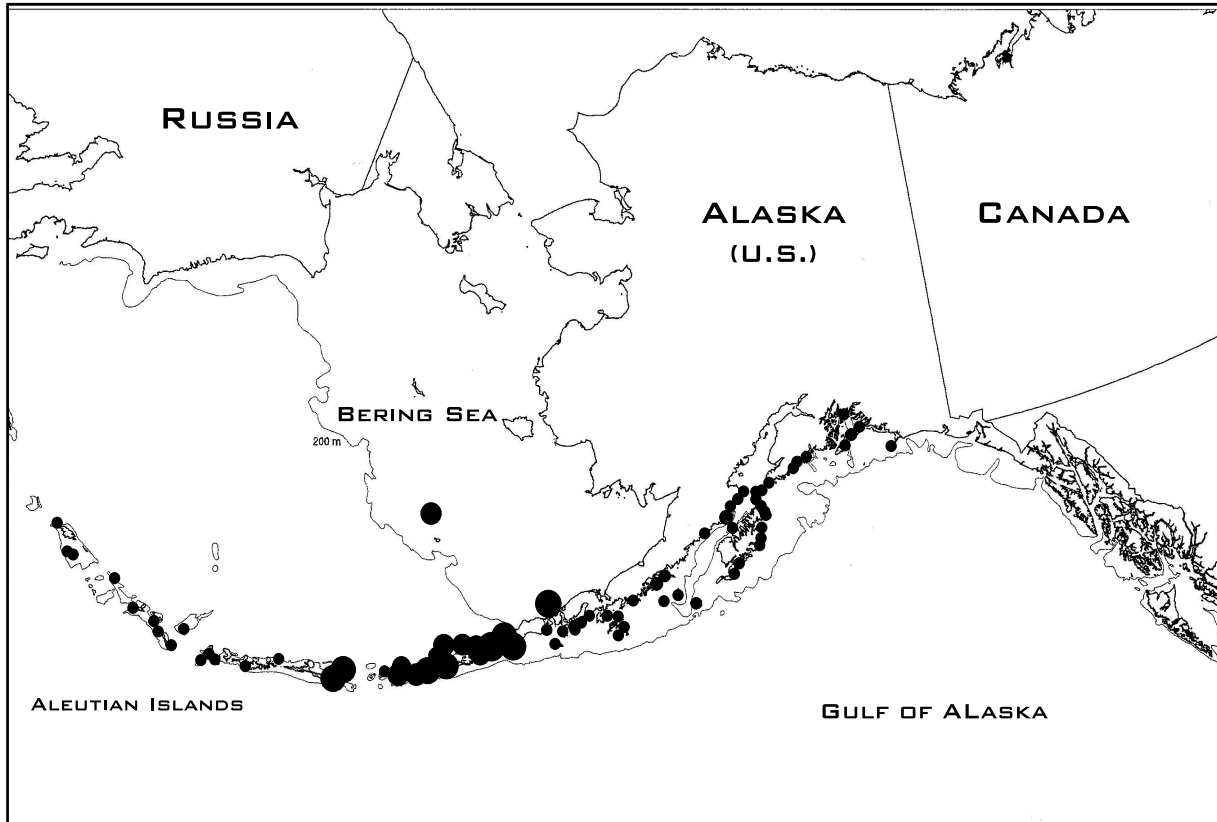


Figure 3.6-9. Zones around Steller sea lion rookeries and haulouts where pollock trawling is prohibited to reduce competition for prey. The no-trawling zones were temporarily extended under court order in August 2000.

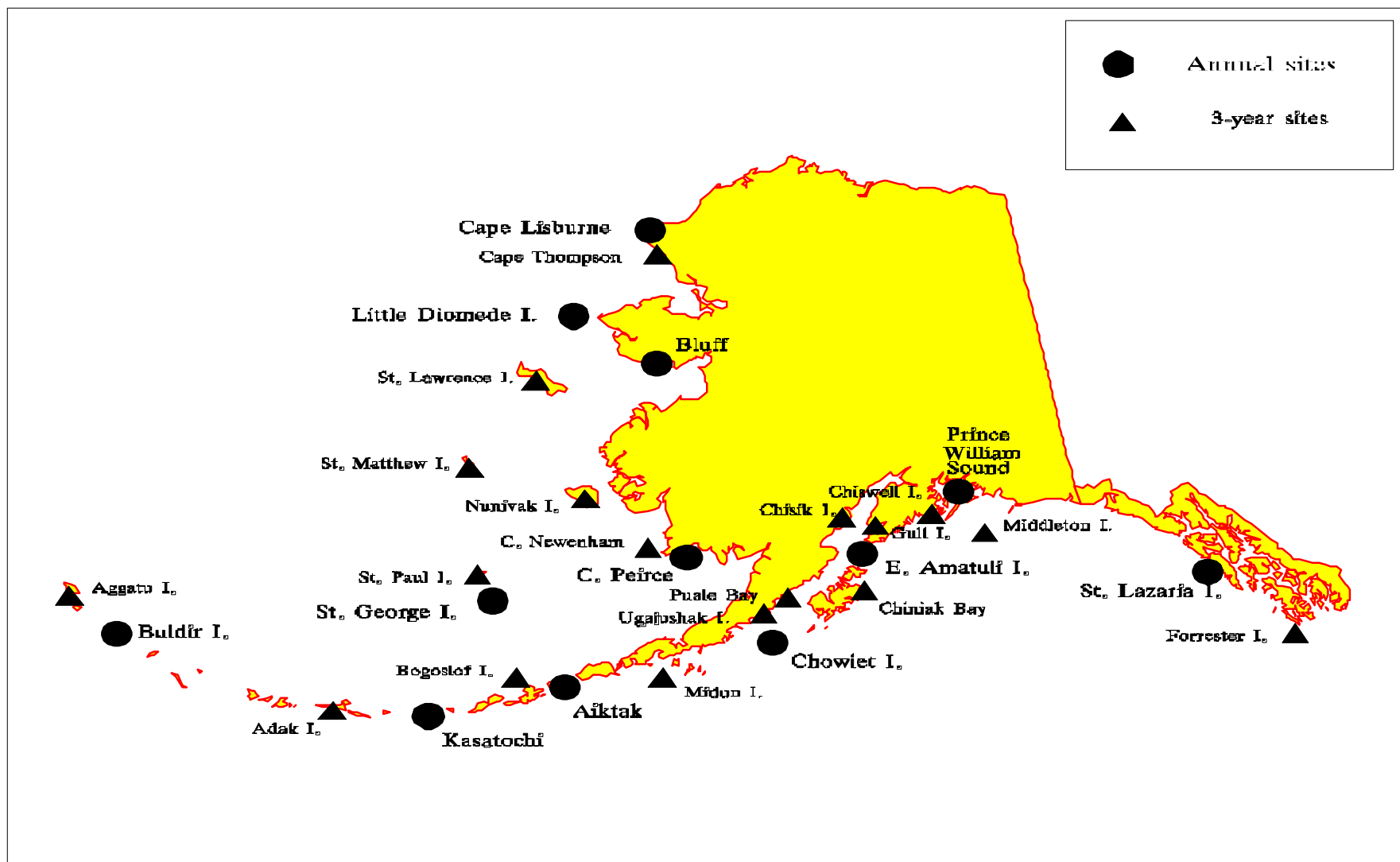


Figure 3.7-1. Location of seabird colony sites in Alaska monitored by the U.S. Fish and Wildlife Service and the U.S. Geological Survey Biological Research Division. Circles indicate sites monitored annually, triangles indicate sites monitored on a three-year rotation. Source: SAFE 2002, Appendix C, Ecosystems Considerations for 2003.

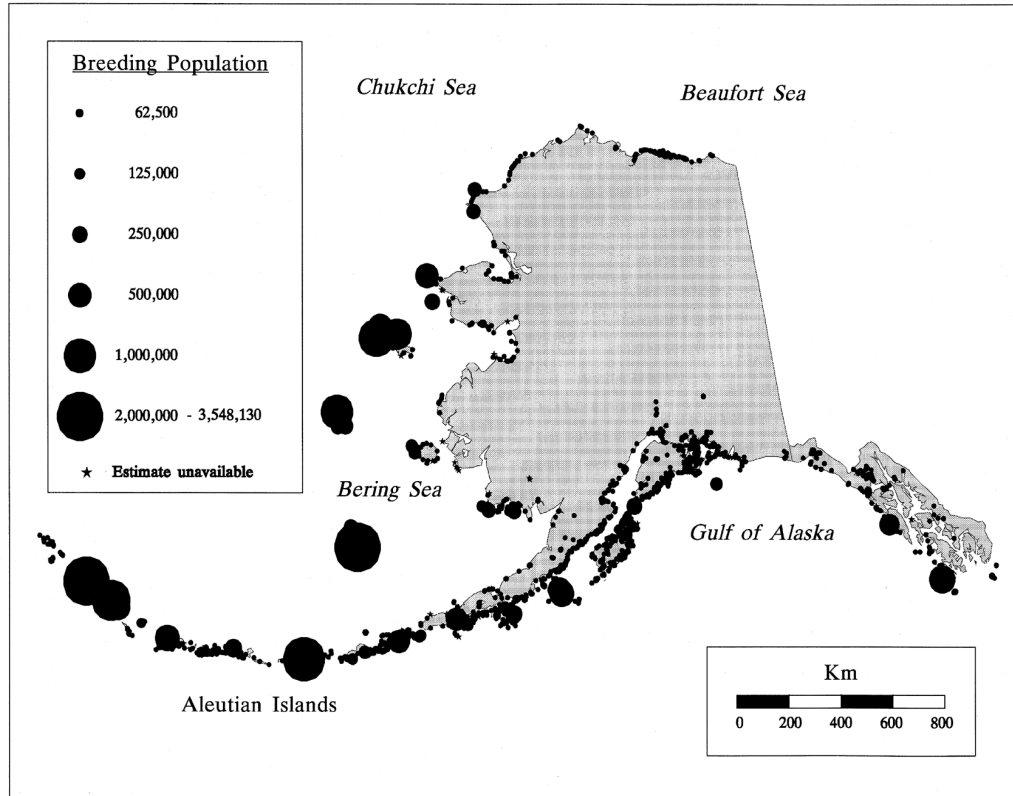


Figure 3.7-2. Seabird colonies of Alaska. Source: USFWS 2000.

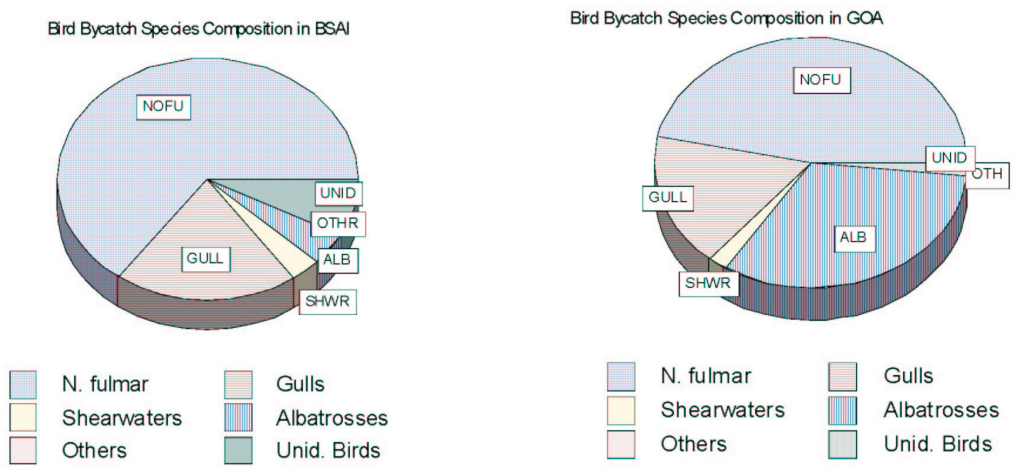


Figure 3.7-3. Relative species composition of seabird incidental catch in the longline fisheries, Bering Sea and Aleutian Islands (left) and Gulf of Alaska (right). Average annual estimates, 1997-2001. Source: SAFE 2002, Appendix C, Ecosystems Considerations for 2003.



Figure 3.7-4. Average annual estimate of number of seabirds taken by gear type, 1997-2001. Estimates differ based on trawl sampling methodology used. Source: SAFE 2002, Appendix C, Ecosystems Considerations for 2003.

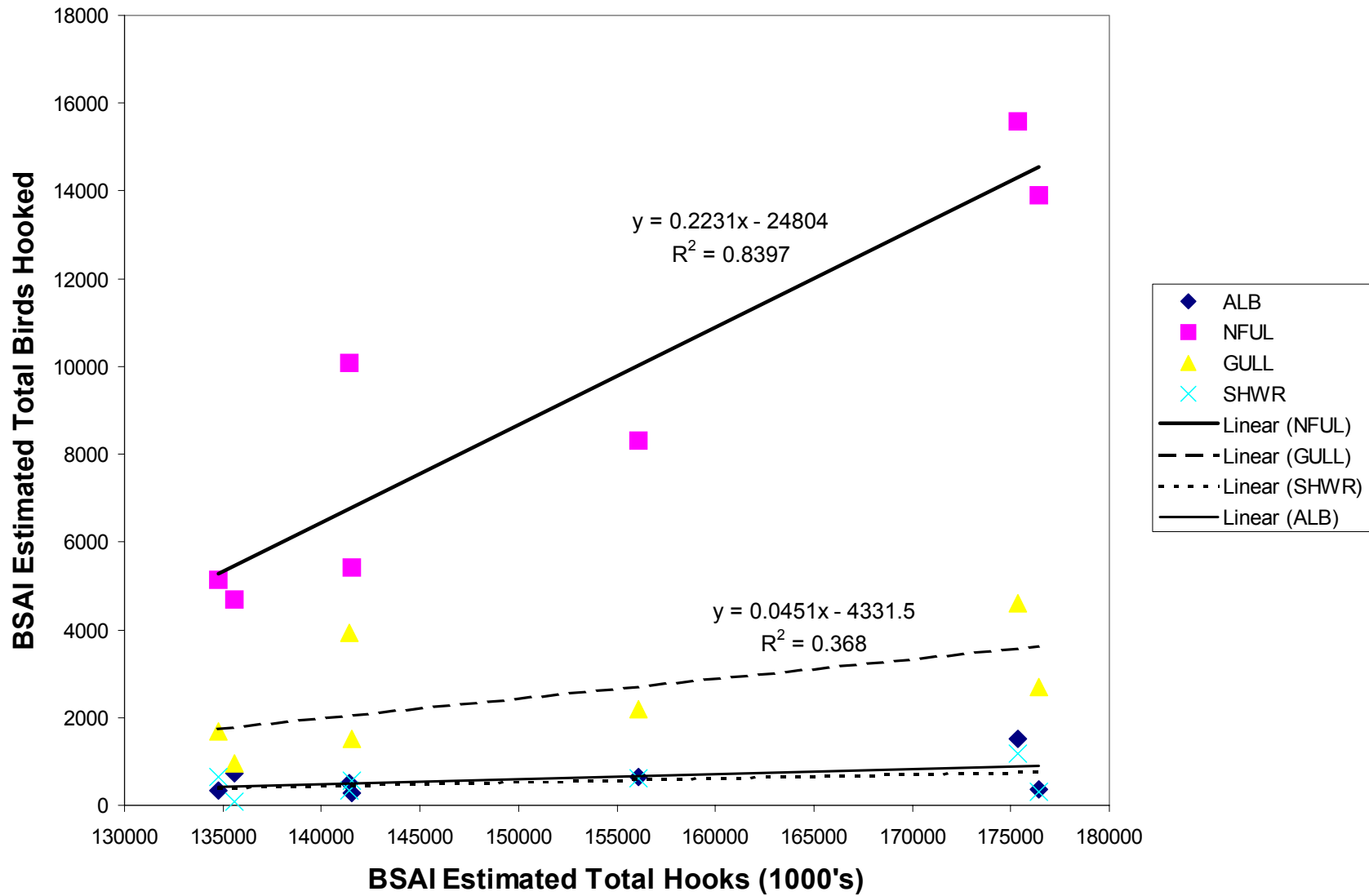


Figure 3.7-5. Relationship between fishing effort and number of birds hooked in the Bering Sea and Aleutian Islands, 1993-1994. Source:NMFS.

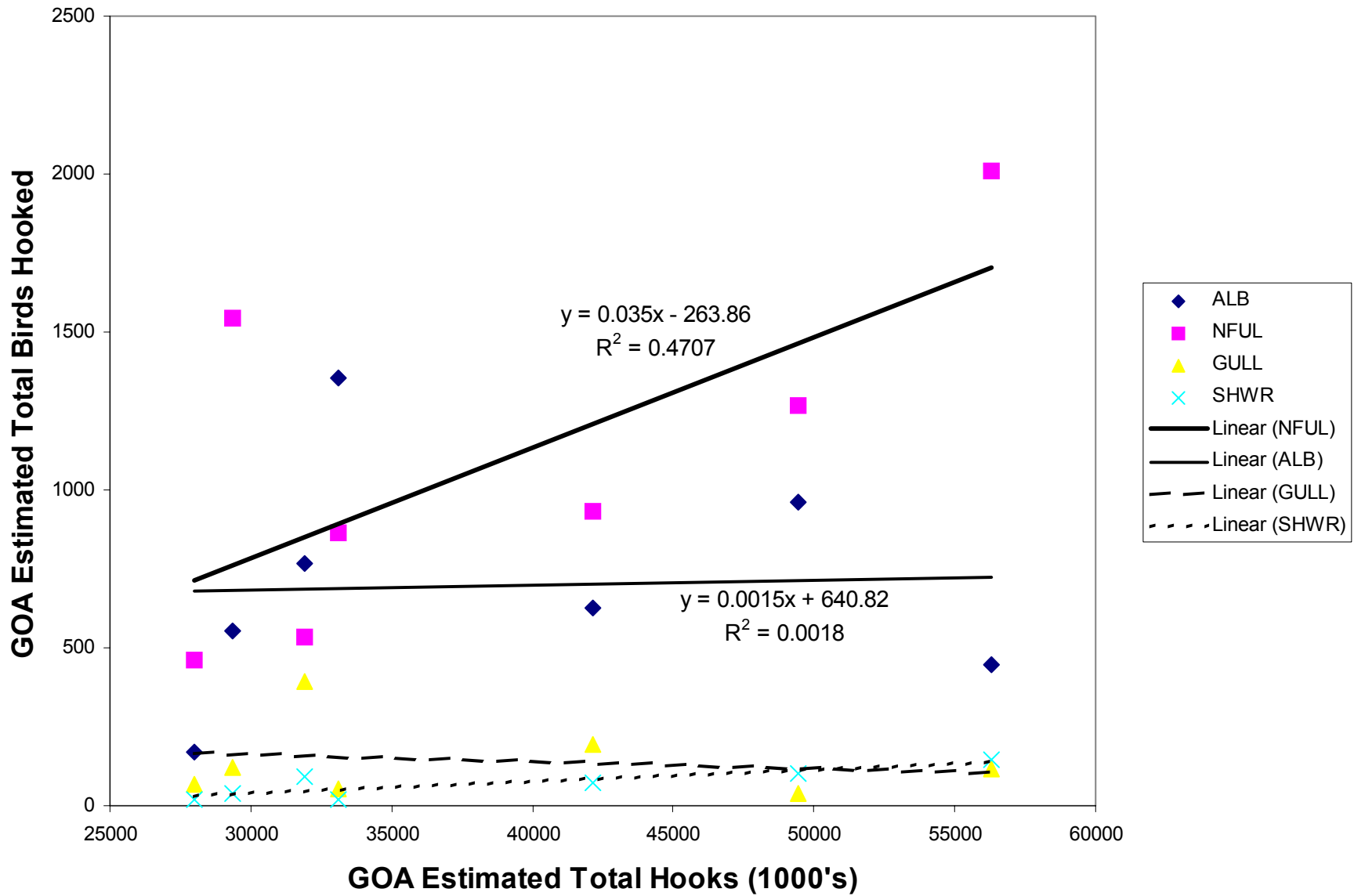


Figure 3.7-6. Relationship between fishing effort and number of birds hooked in the Gulf of Alaska, 1993-1999. Source: NMFS.

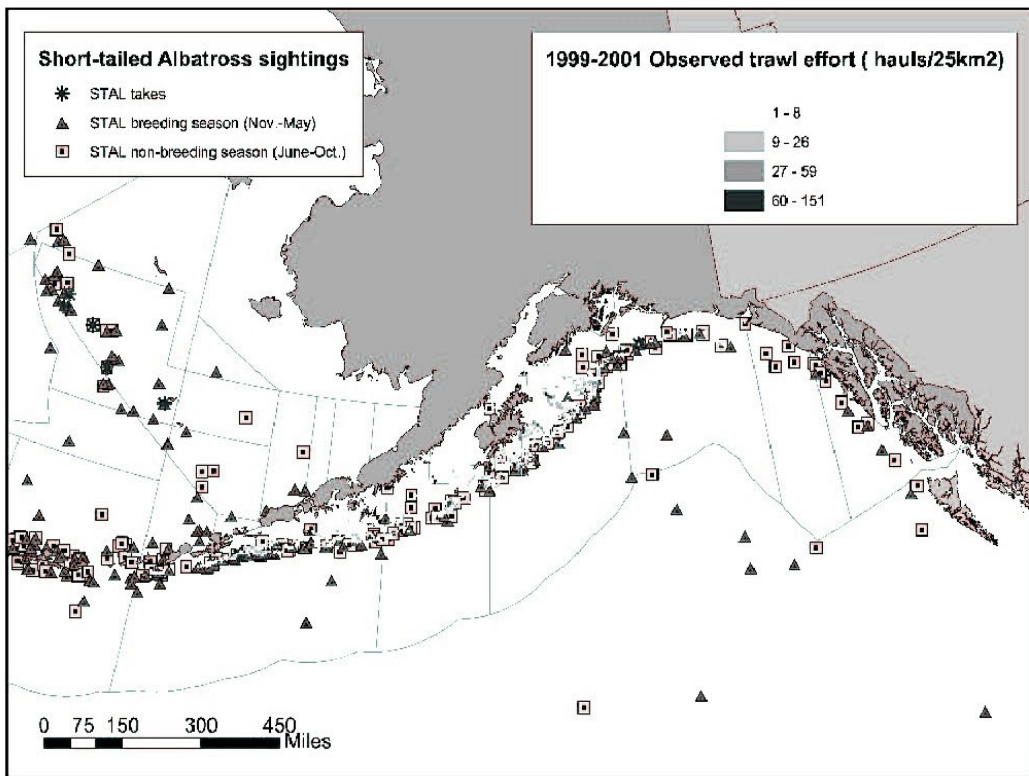


Figure 3.7-7. Distribution of short-tailed albatross in Alaskan waters. Source: SAFE 2002, Appendix C, Ecosystems Considerations for 2003.

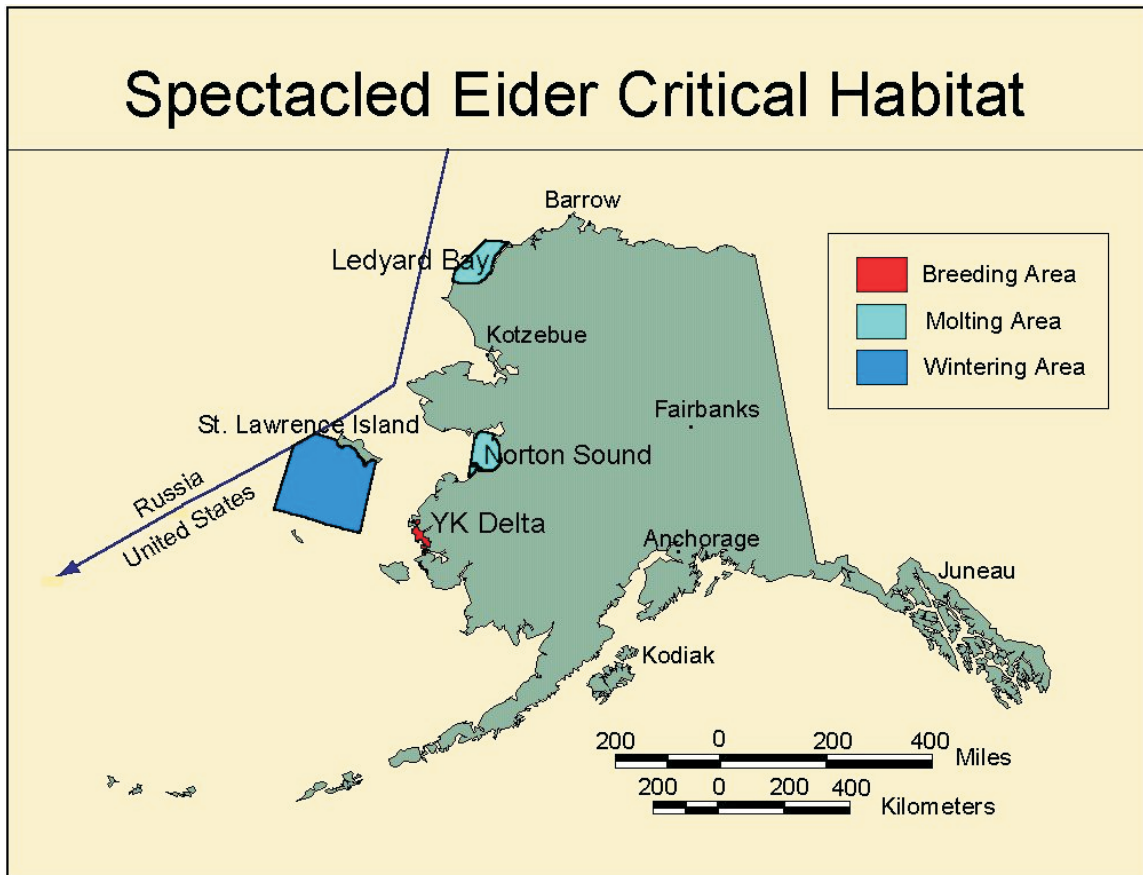


Figure 3.7-8. Spectacled eider critical habitat area map as per 66 FR 9146, Final rule February 6, 2001. Source: USFWS. Source: USFWS 2001.



Figure 3.7-9. Steller's eider critical habitat area map as per 66 FR 8849, final rule February 2, 2001. Source: USFWS. Source:USFWS 2001.

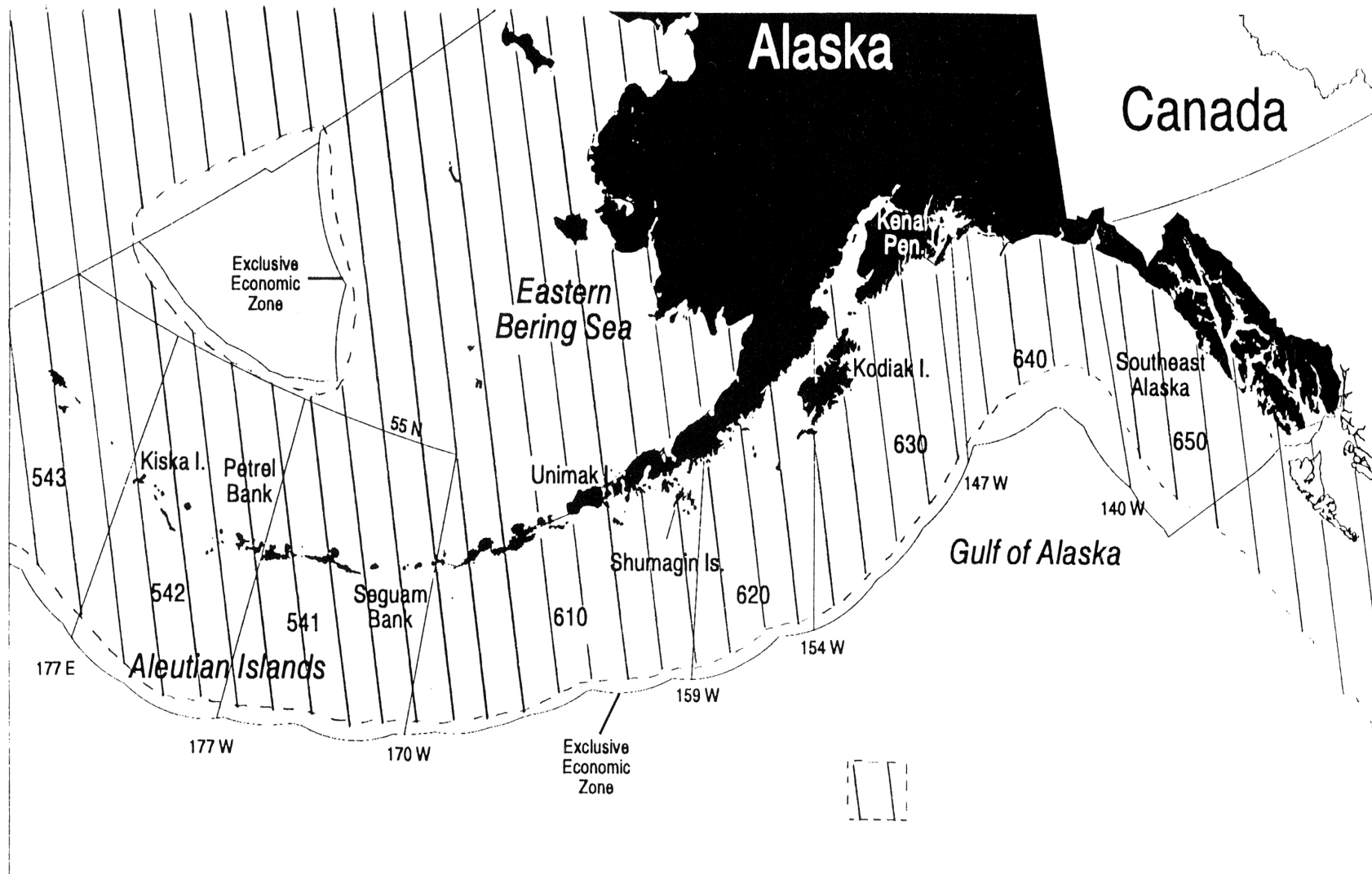


Figure 3.8-1. Steller sea lion range. The population is most abundant in the core region from the Kenai Peninsula to Kiska Island.
 Source: NMFS 2001b.

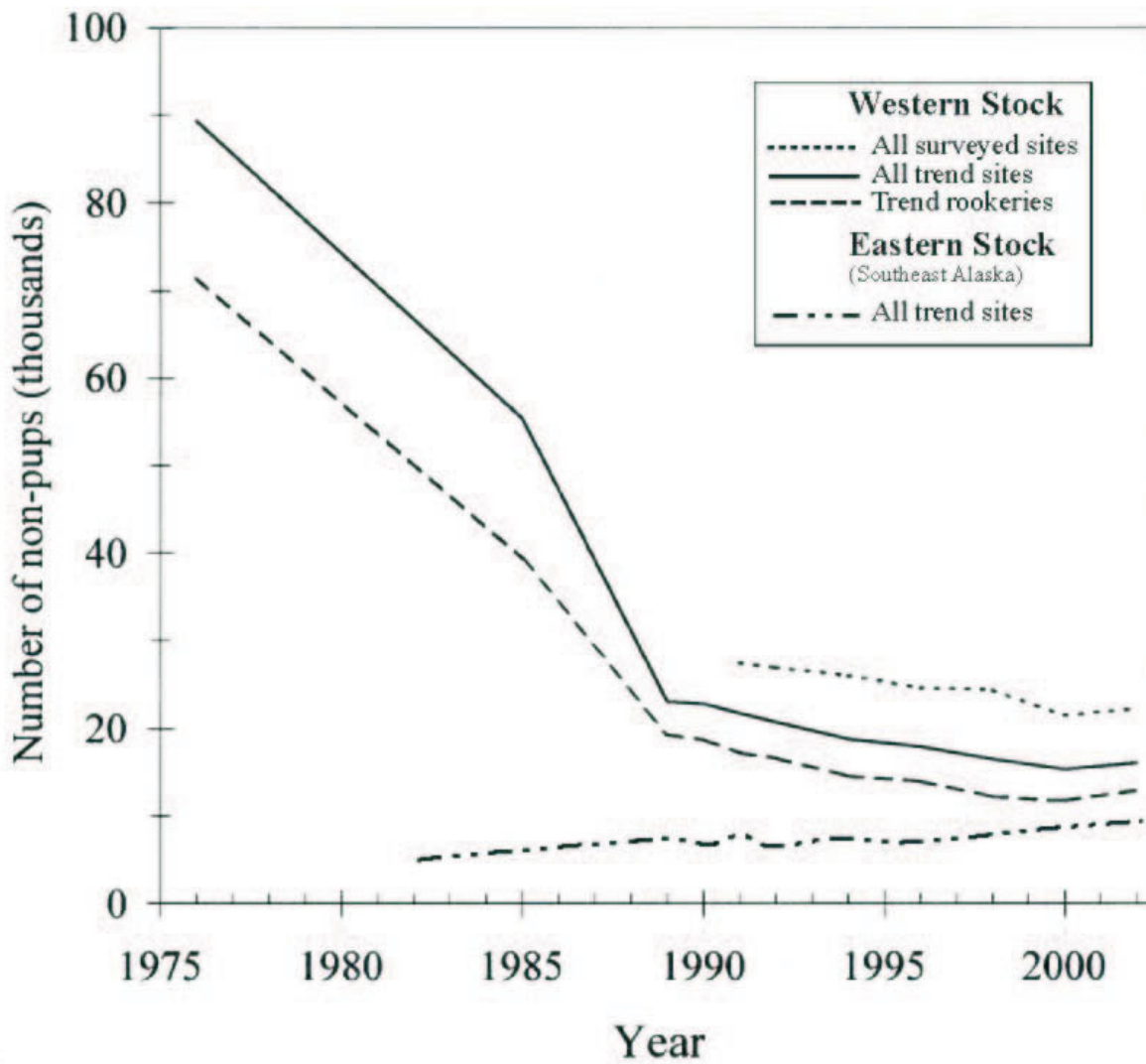


Figure 3.8-2. Steller sea lion western and eastern stock population trends, 1976-2002. Source: SAFE 2002, Appendix C, Ecosystems Considerations for 2003.

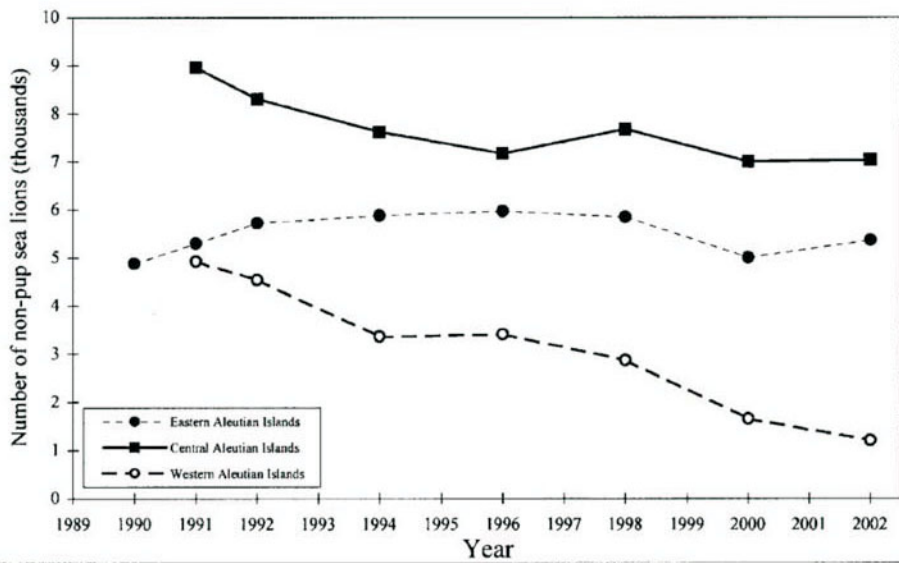
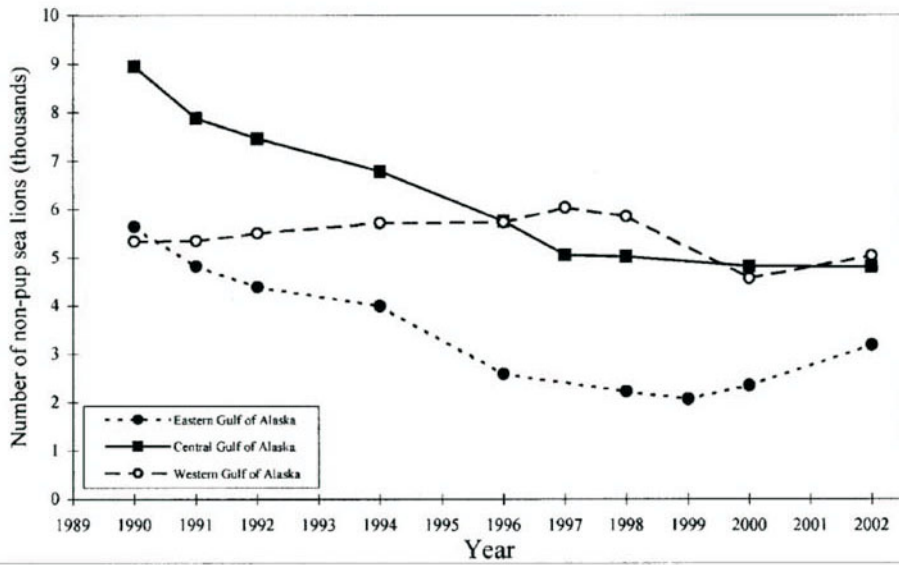


Figure 3.8-3. Counts of adults and juveniles at rookeries and haulouts by year and geographic area: Gulf of Alaska and Aleutian Islands, 1990-2002. Source: SAFE 2002, Appendix C, Ecosystems Considerations for 2003.

Counts of Steller Sea Lions in the Eastern Stock

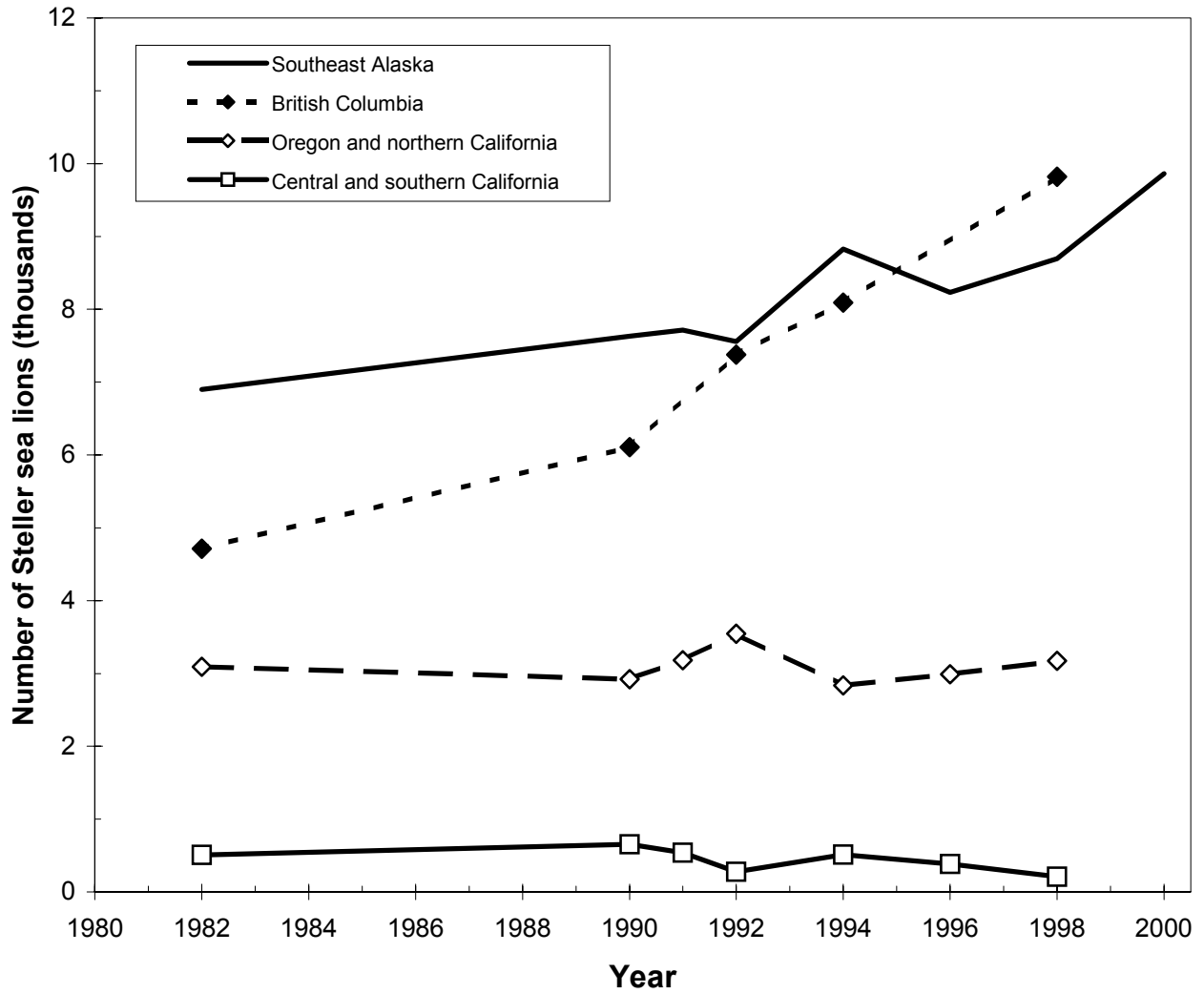


Figure 3.8-4 Counts of Steller sea lions in the eastern stock, 1982-1998. Source: Angliss et al. 2001.

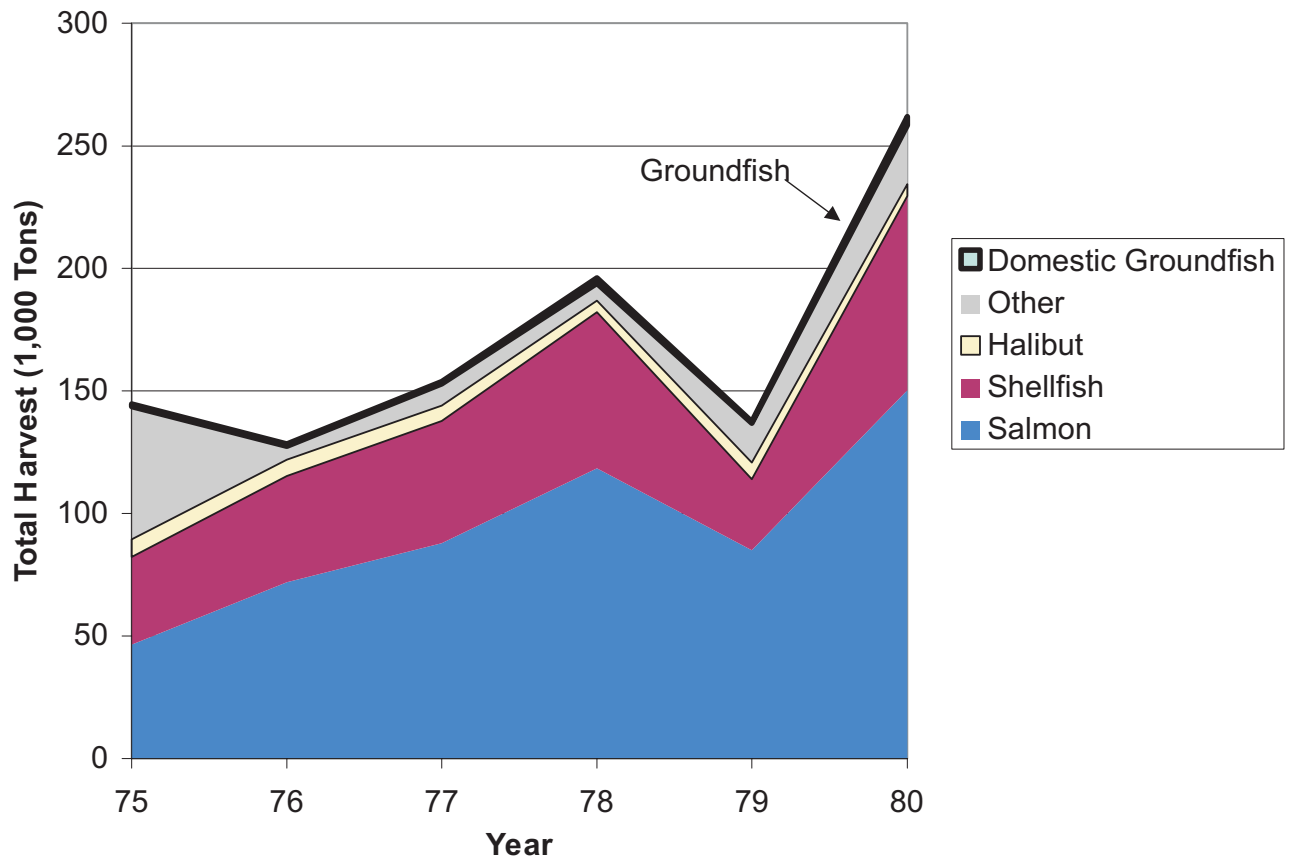


Figure 3.9-1. Domestic harvests in major Alaska fisheries, 1975-1980. Source: Commercial Operator Annual Reports.

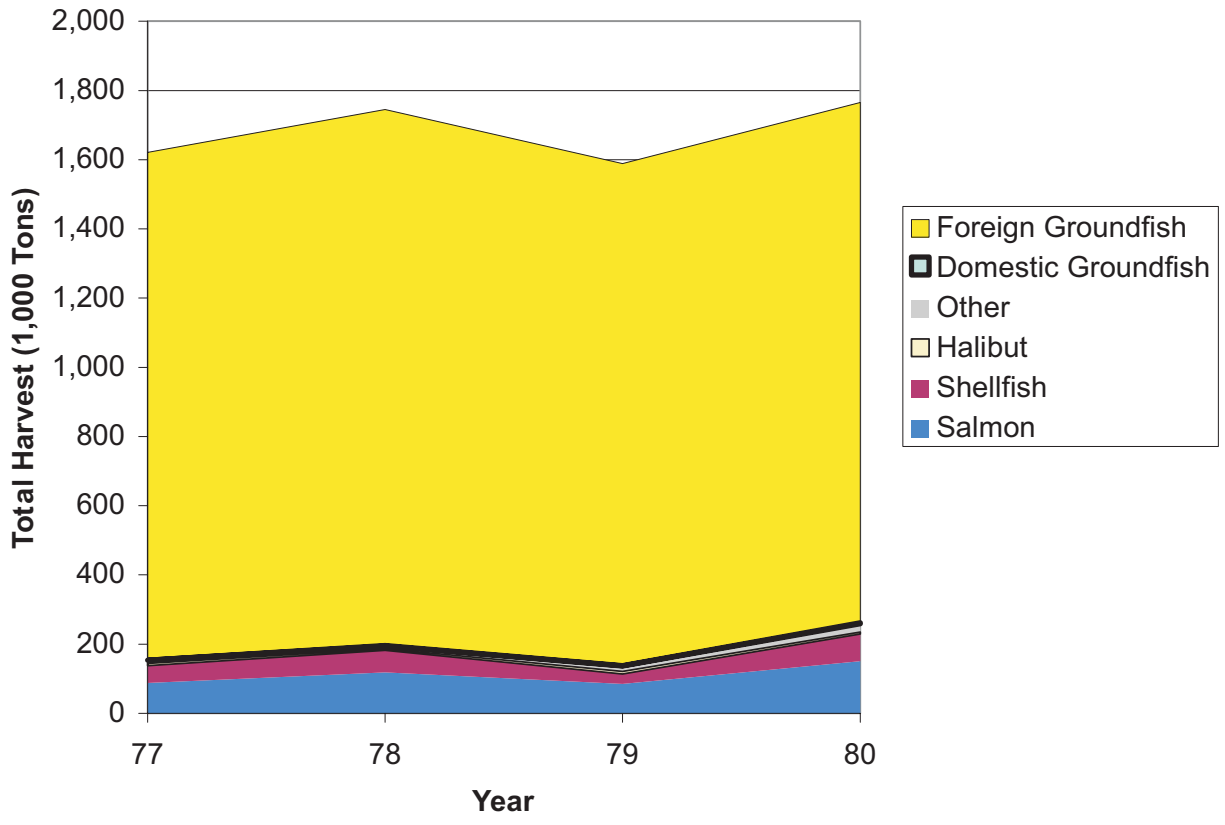


Figure 3.9-2. Foreign and domestic harvests in major Alaska fisheries, 1977-1980. Source: Commercial Operator Annual Reports and the North Pacific Groundfish Observer Program.

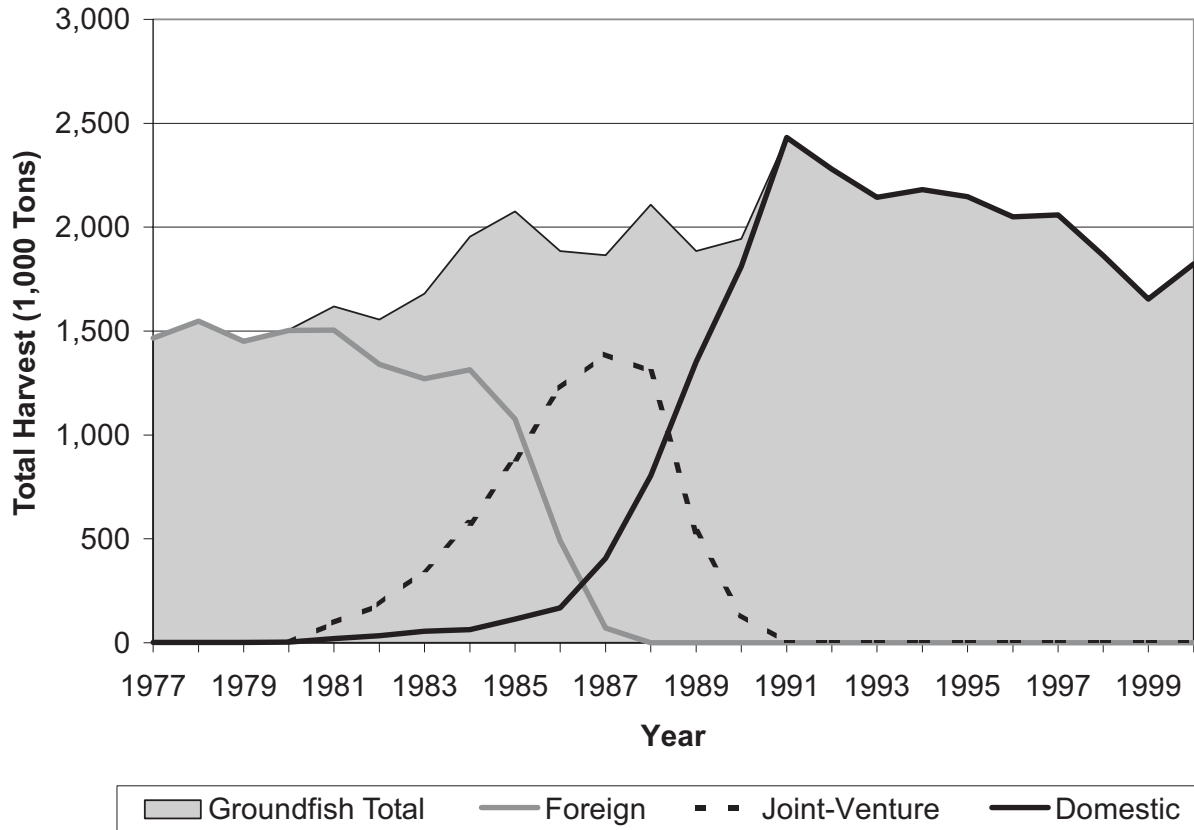


Figure 3.9-3. Foreign, joint venture, and domestic groundfish fishing and processing, 1977-2000.
Source: Economic Status of the Groundfish Fisheries off Alaska and NOAA Fisheries Blend data.

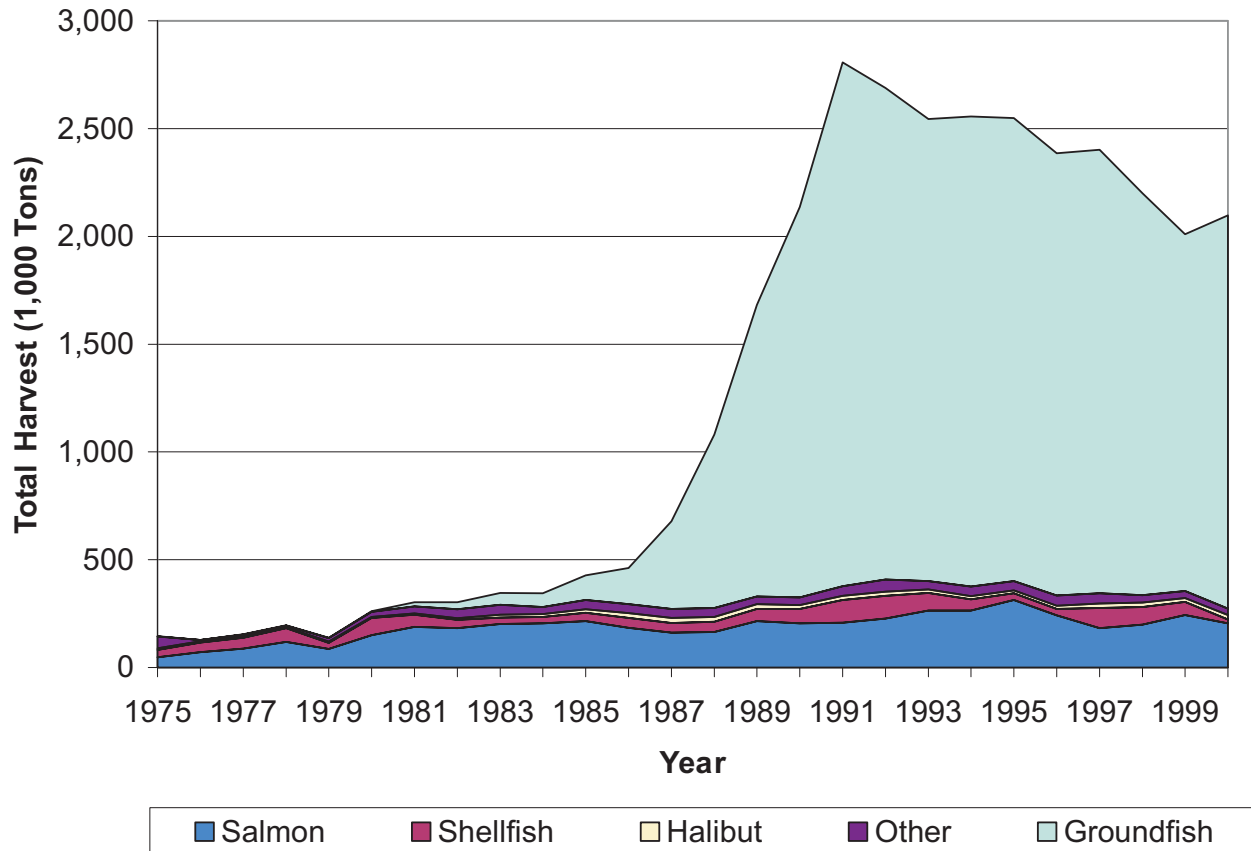


Figure 3.9-4. Volume of domestic processing of groundfish and non-groundfish species from Alaskan waters, 1975-2000. Sources: Commercial Operator Annual Reports and CFEC/ADFG fish ticket data.

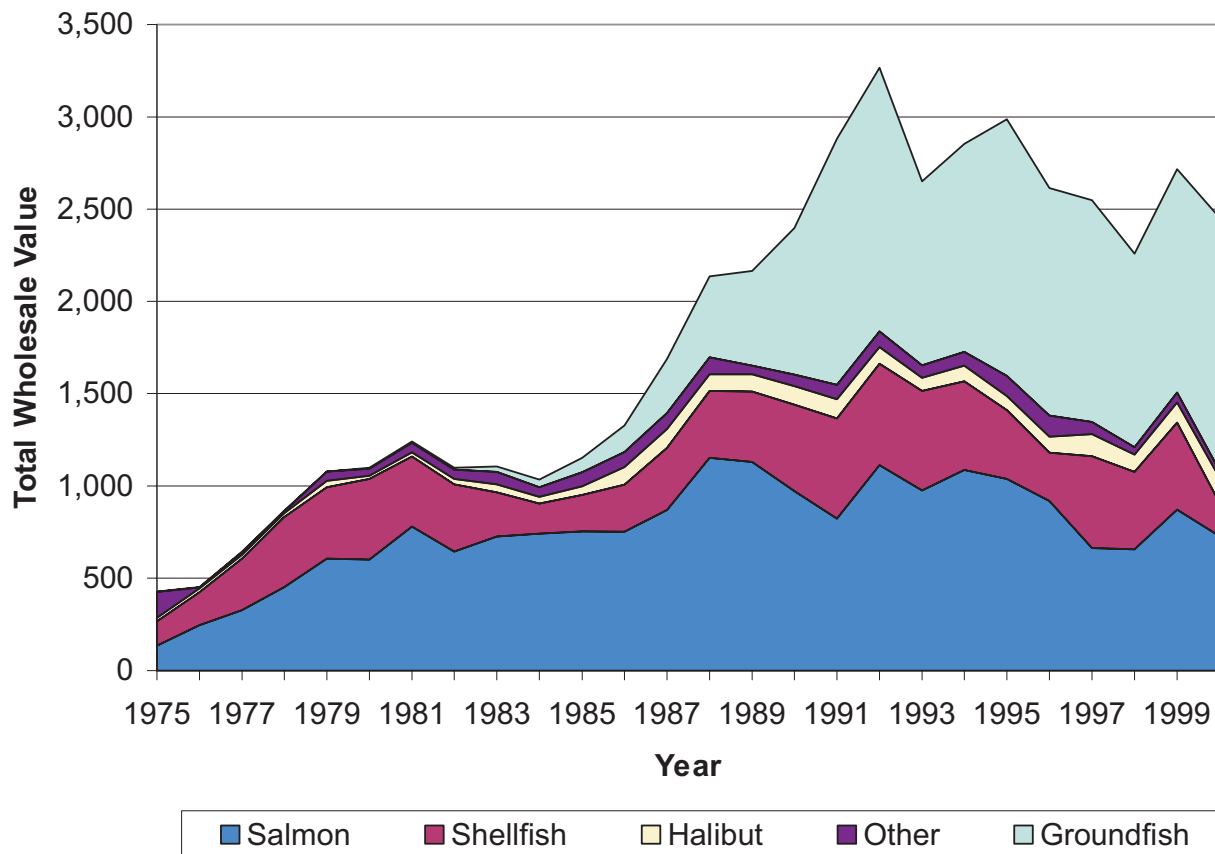


Figure 3.9-5. Value of domestic processing of groundfish and non-groundfish species from Alaskan waters, 1975-2000. Sources: Commercial Operator Annual Reports and CFEC/ADFG fish ticket data.



Source: ESRI, ProximityOne



300 0 300 Miles

Scale: 1" = 300 Miles

Figure 3.9-6. Alaska regions.



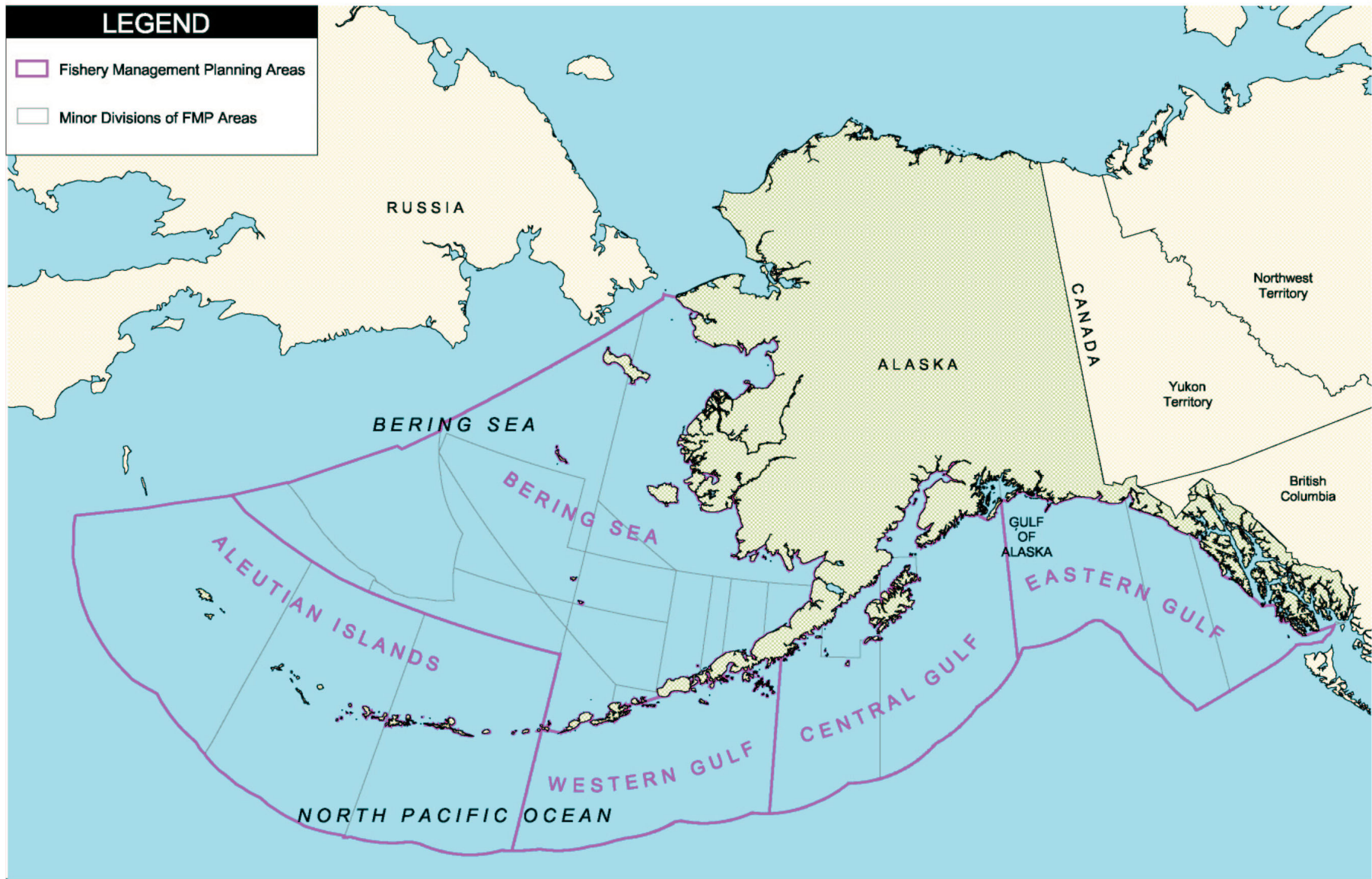
Source: ESRI, ProximityOne



40 0 40 Miles

Scale: 1" = 80 Miles

Figure 3.9-7. Pacific northwest regions.



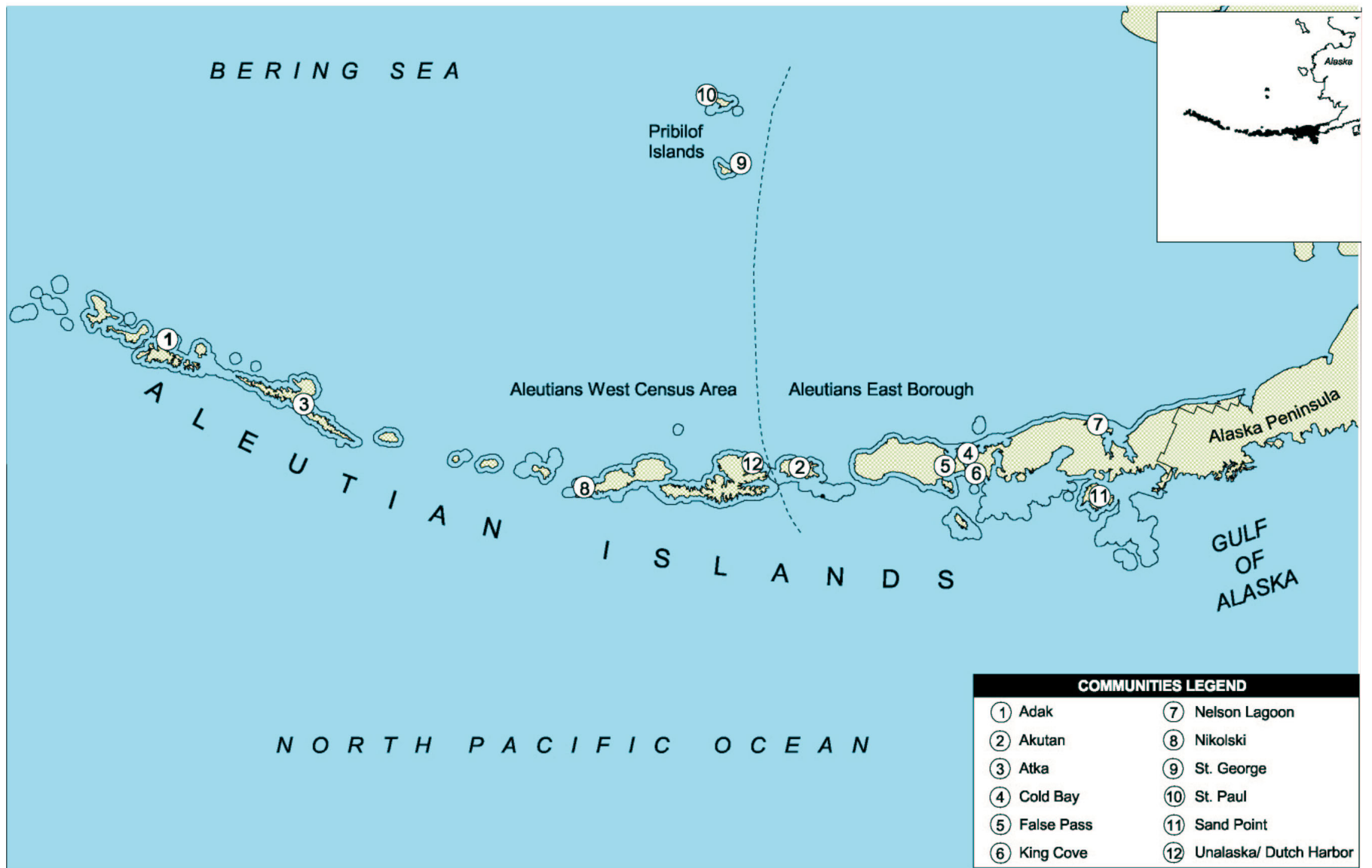
Sources: ESRI, NOAA



300 0 300 600 Miles

Scale: 1"= 300 Miles

Figure 3.9-8. Fishery management planning areas of Alaska.



Sources: ESRI, ProximityOne

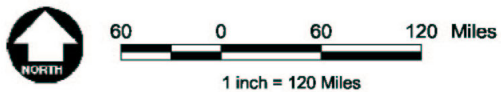


Figure 3.9-9. Alaska Peninsula/Aleutian Islands study region.



Sources: ESRI, ProximityOne

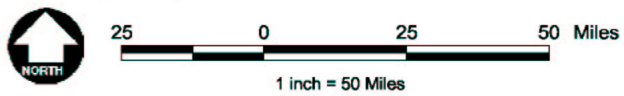


Figure 3.9-10. Kodiak Island study region.



Figure 3.9-11. Southcentral Alaska study region.



Source: ESRI, ProximityOne



40 0 40 80 Miles

Scale: 1" = 80 Miles

Figure 3.9-12. Southeast Alaska study region.



Source: ESRI, ProximityOne

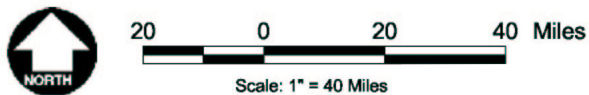


Figure 3.9-13. Washington inland waters study region.



Source: ESRI, ProximityOne



12 0 12 24 Miles
Scale: 1" = 24 Miles

Figure 3.9-14. Oregon coast study region.



Source: Resource Data, 2000; NMFS



No Scale

Figure 3.9-15. Community Development Quota group areas.

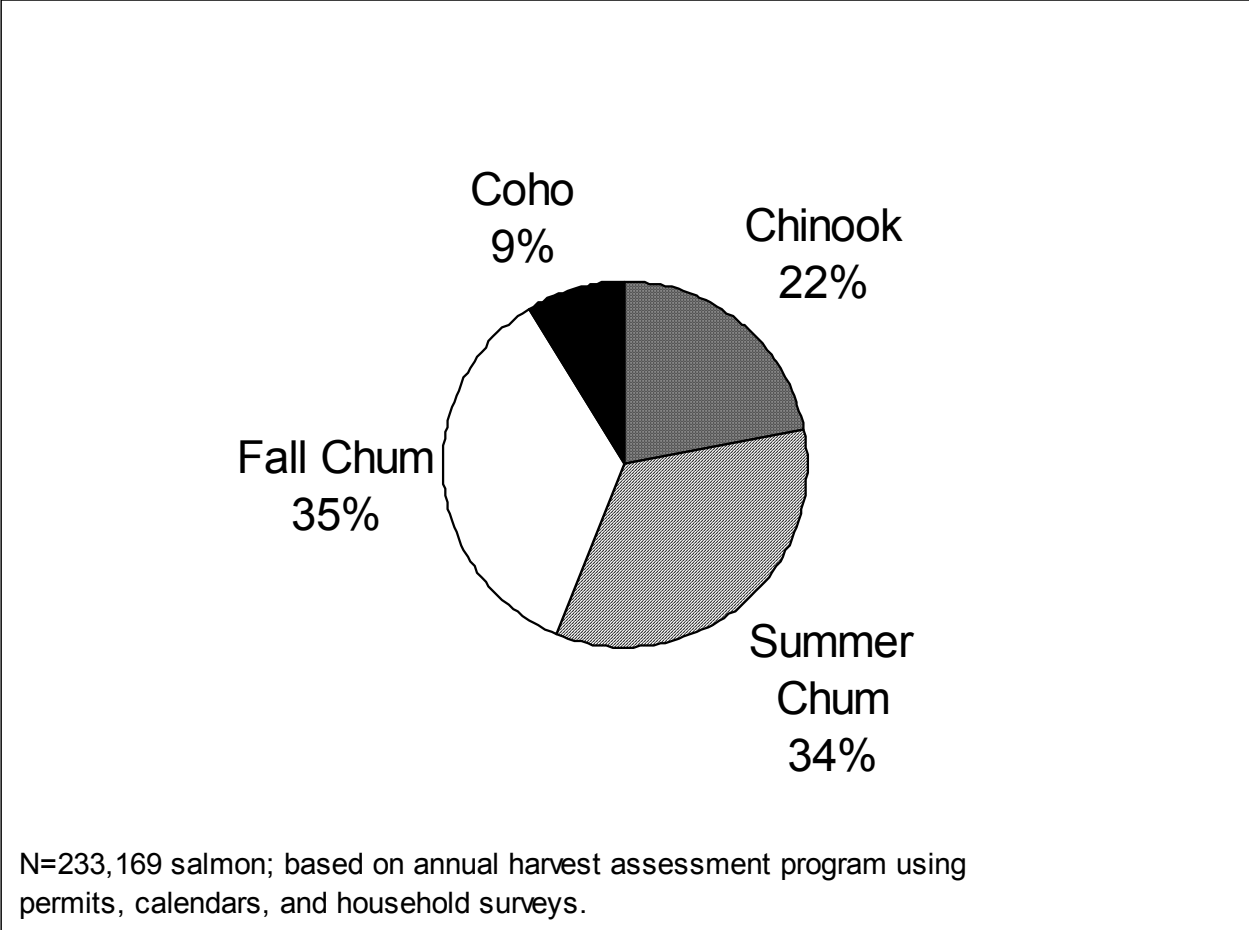


Figure 3.9-16. Yukon area subsistence salmon harvests, 1999.

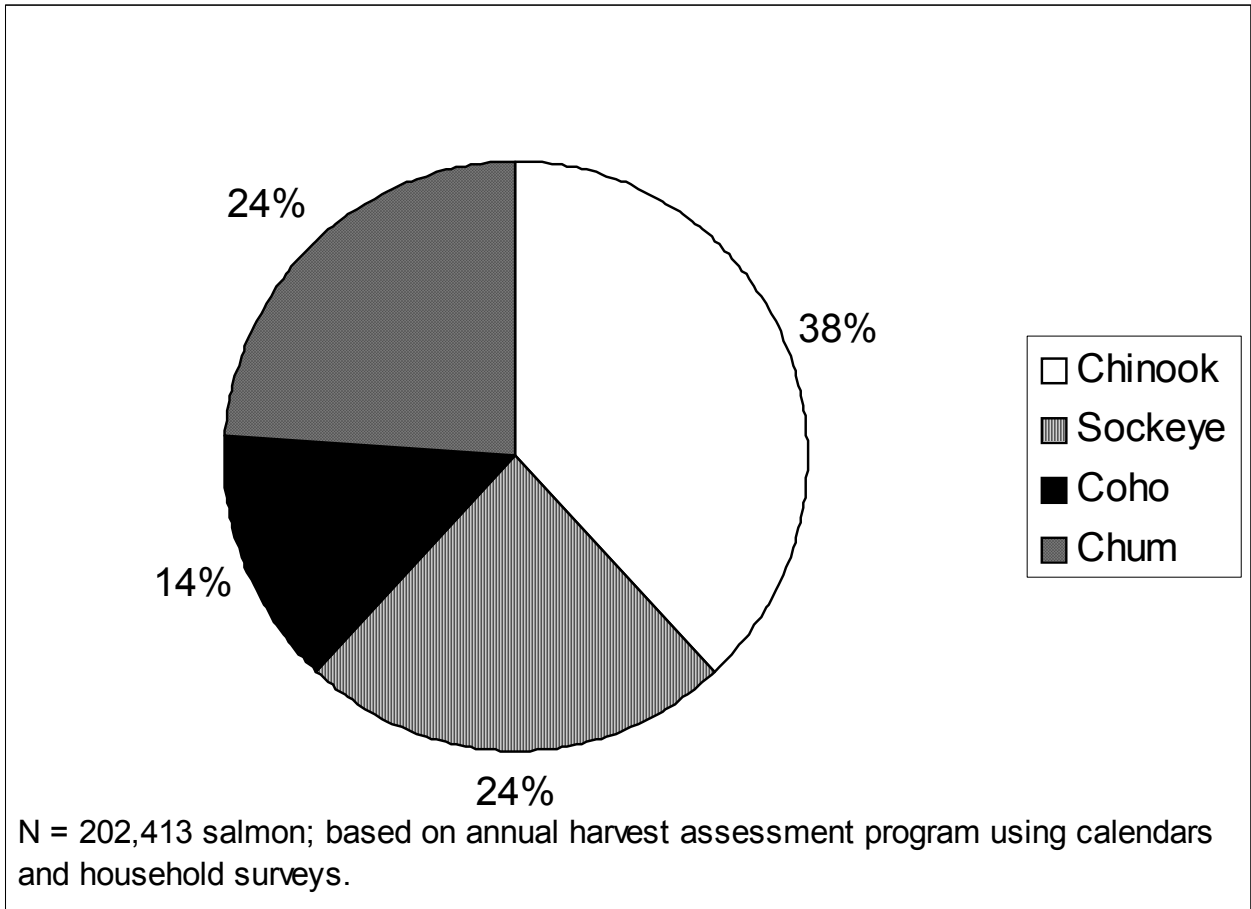
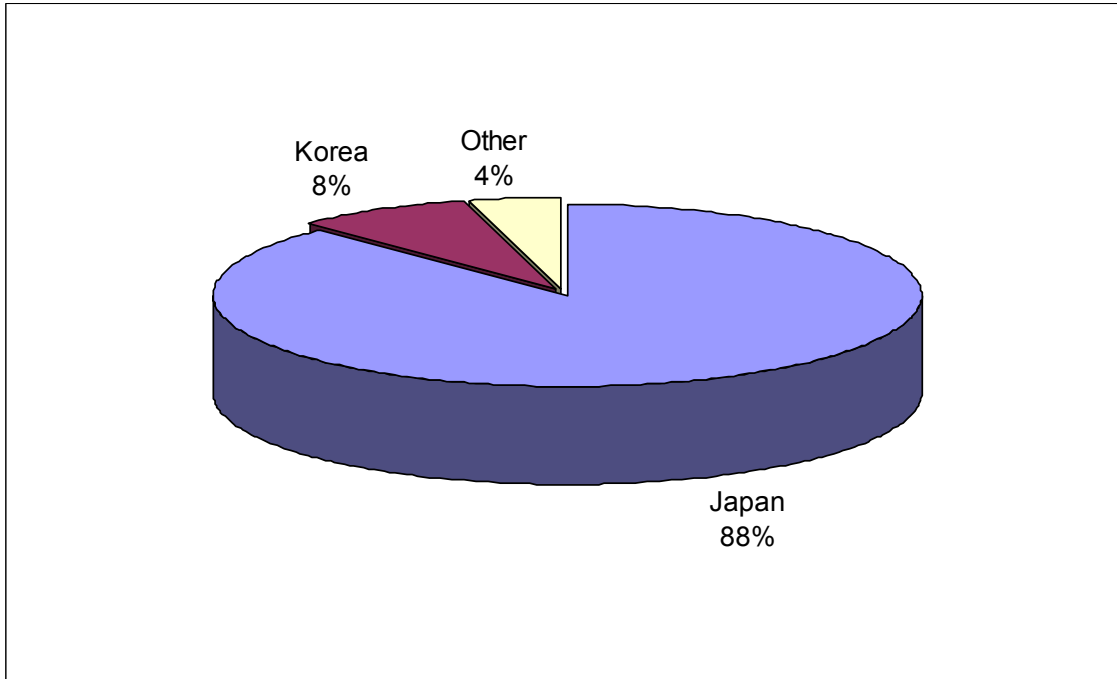


Figure 3.9-17. Composition of subsistence harvest by species, Kuskokwim area, 1999.

1995



2001

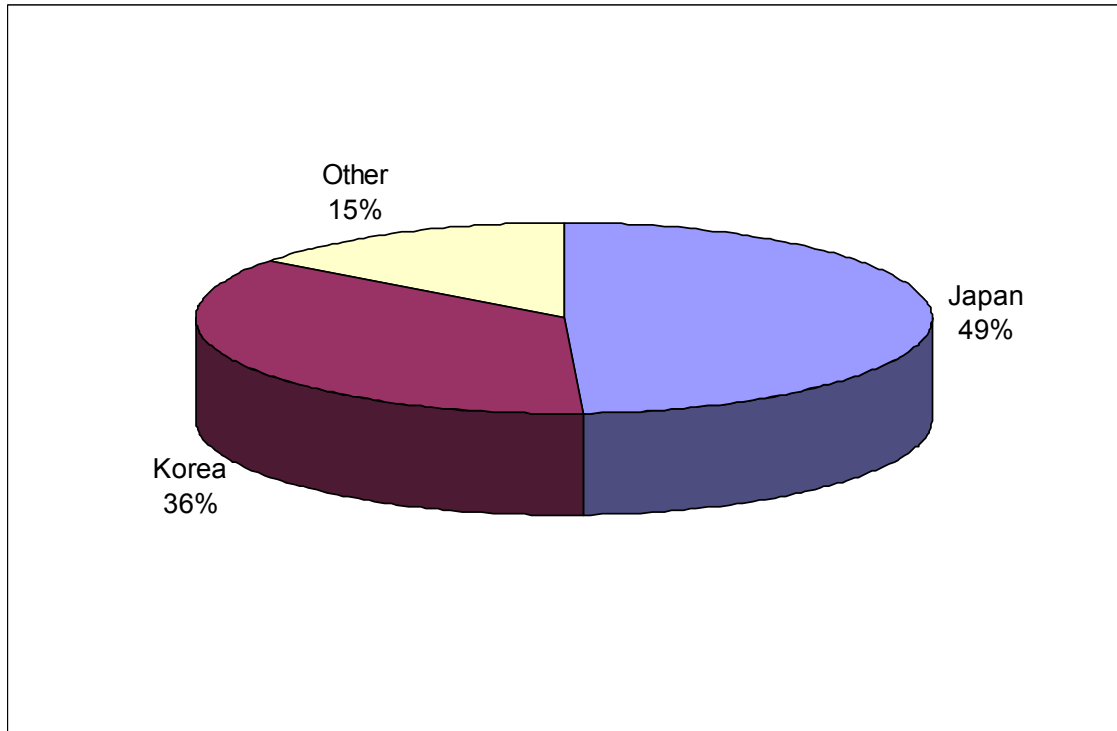
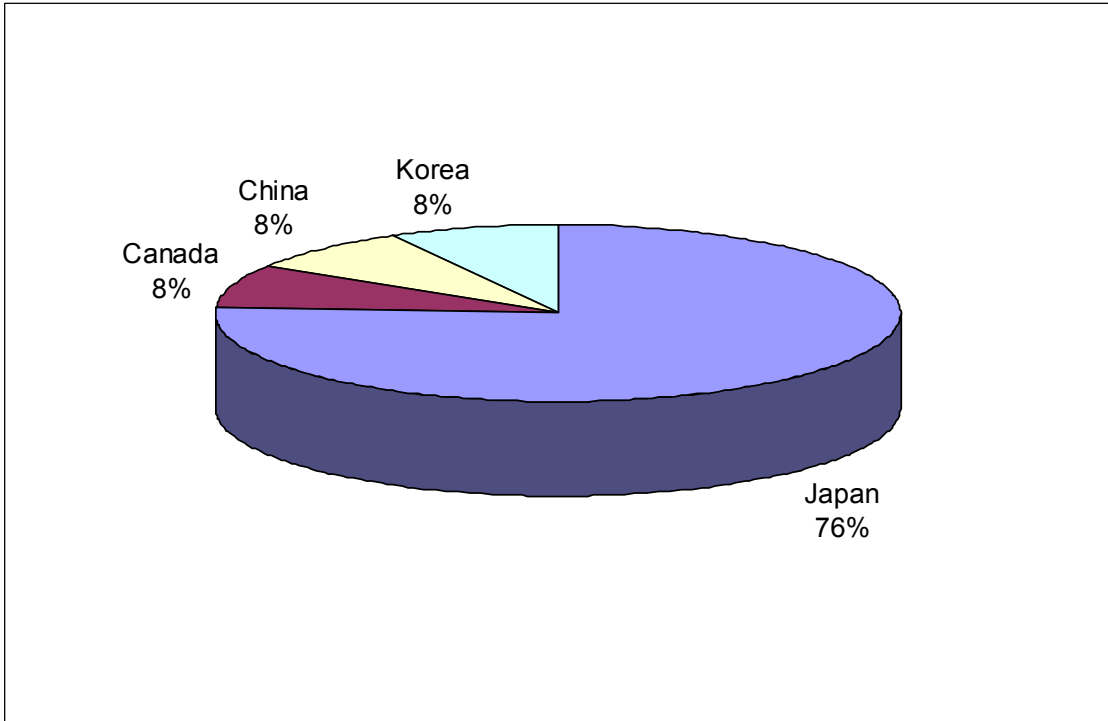


Figure 3.9-18. Destination of exported pollock surimi, 1995 and 2001. Source: U.S. Seafood Trade Report for 1995 and 2001.

1995



2001

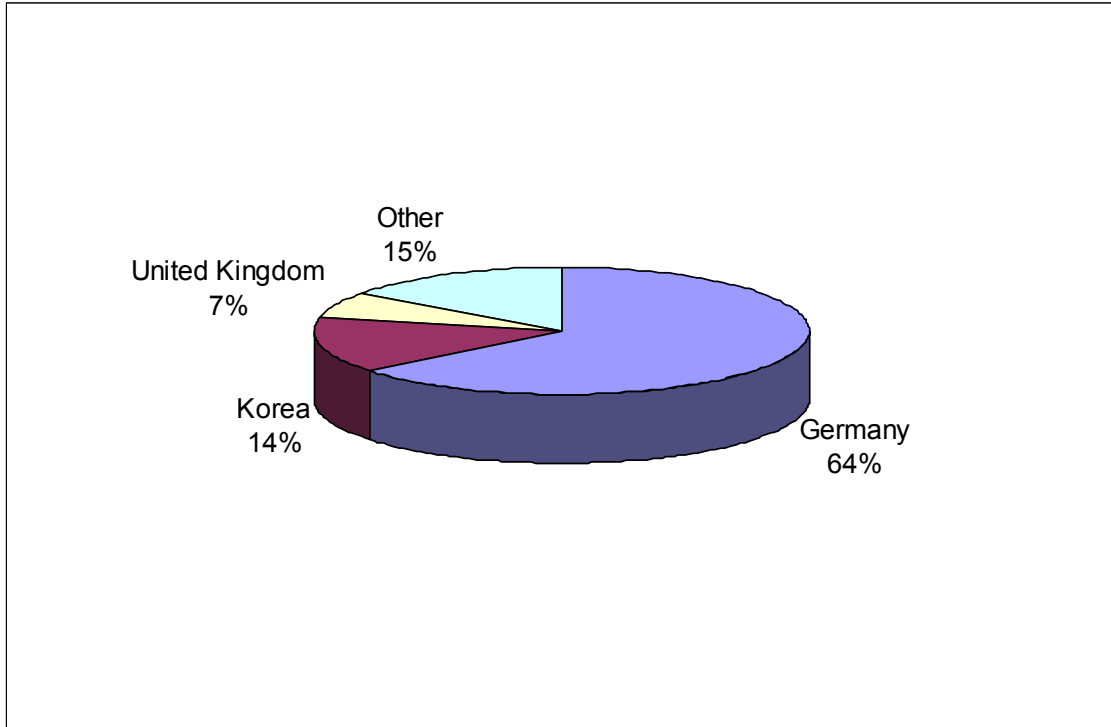


Figure 3.9-19. Destination of exported pollock fillets, 1995 and 2001. Source: U.S. Seafood Trade Report for 1995 and 2001.

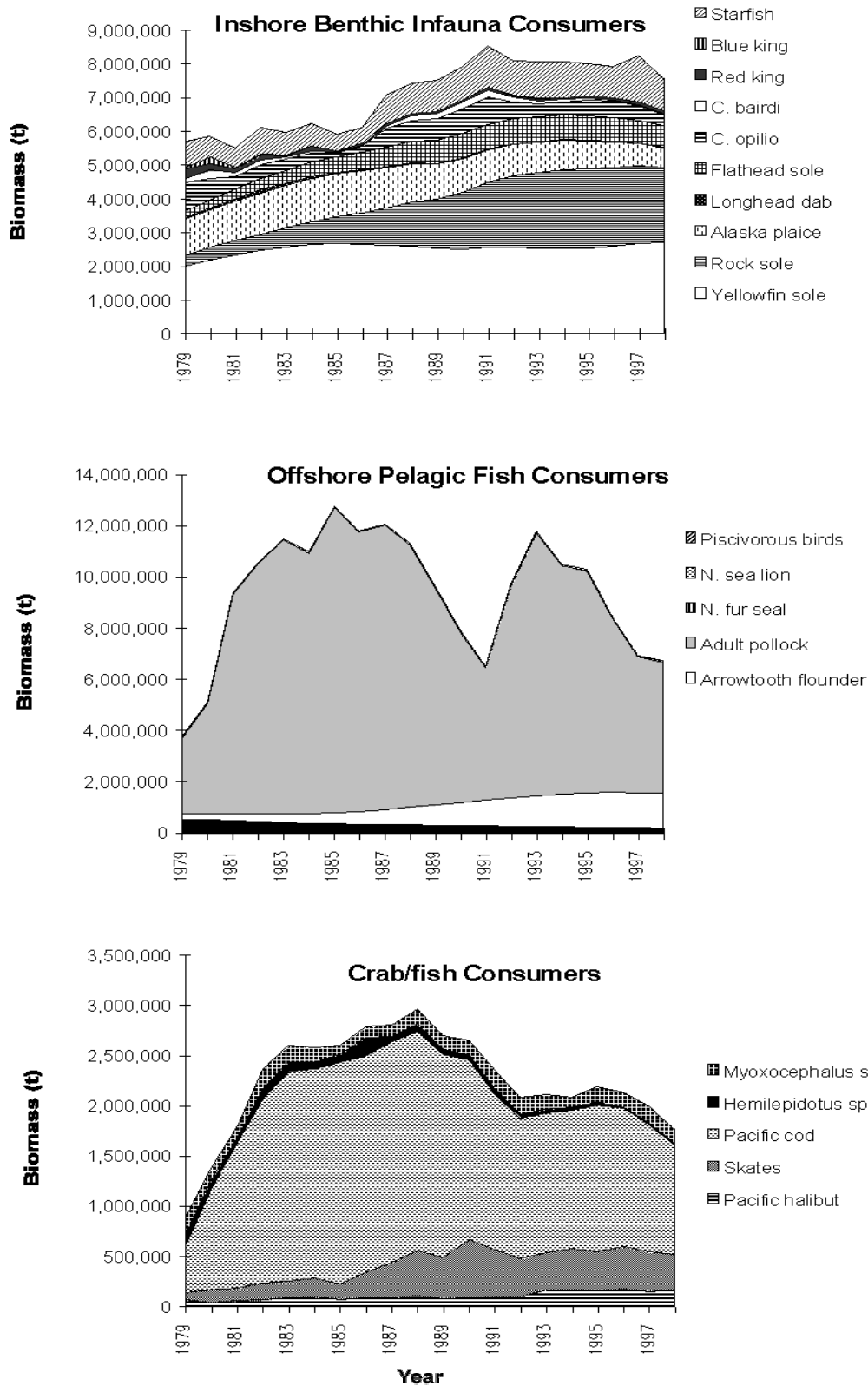


Figure 3.10-1. Biomass trends in Bering Sea trophic guilds, 1979-1998.

Multispecies, $(F_{abc})-(F_{ref})$

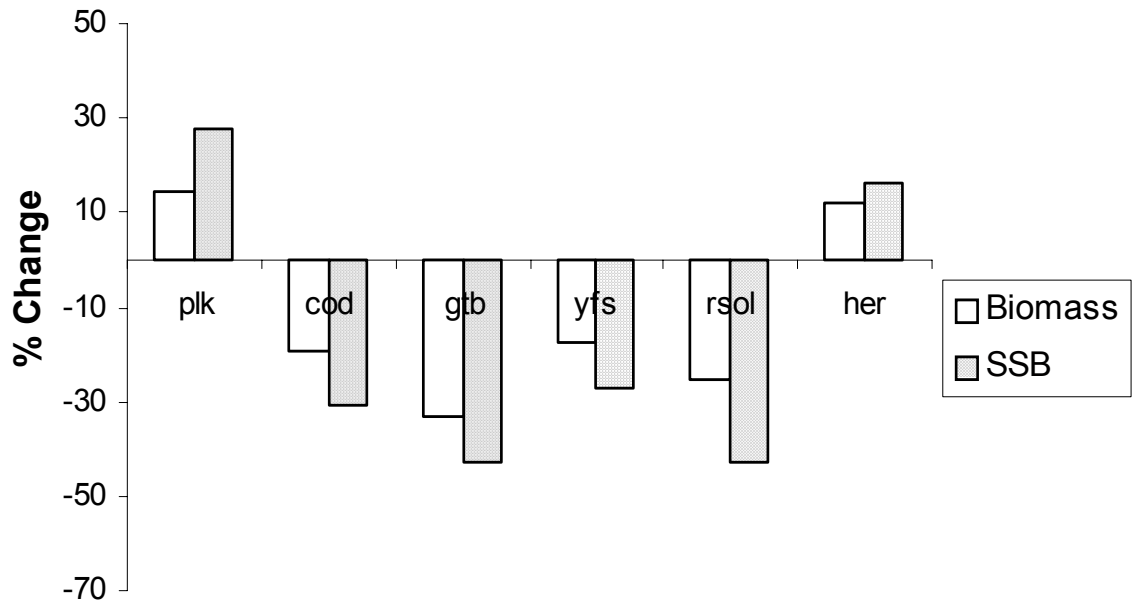


Figure 3.10-2. Results from the multispecies and single-species models for change in equilibrium biomass between the present fishing rates (F_{ref}) and more even harvesting of all species (F_{abc}).

Single Species, (F_{ref})- $F=0$

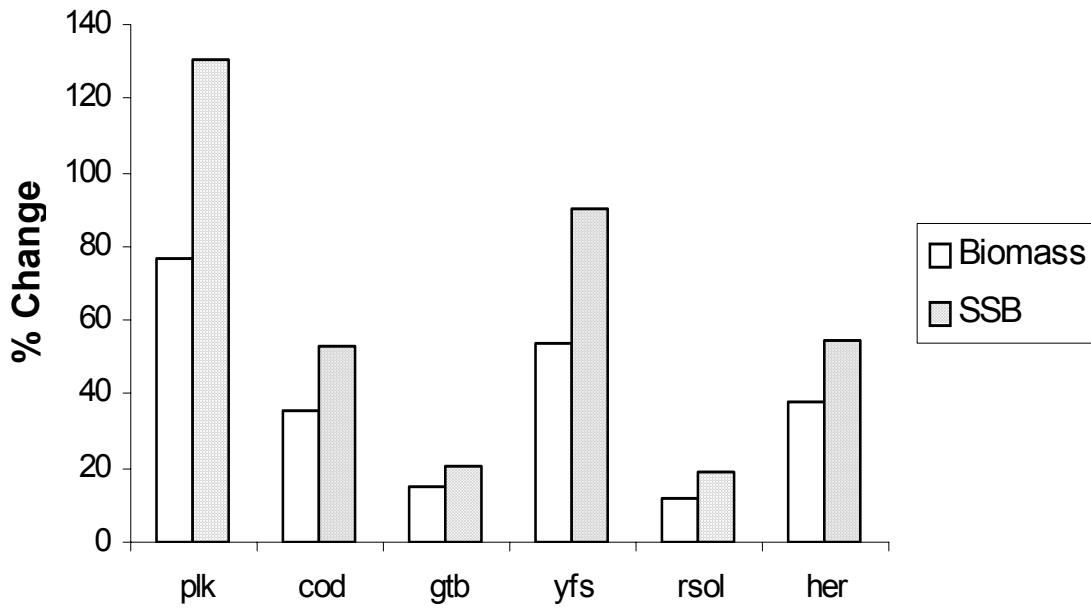


Figure 3.10-3. Percent change in single-species and multispecies model predictions of biomass between the present fishing strategy (F_{ref}) and a no-fishing scenario.

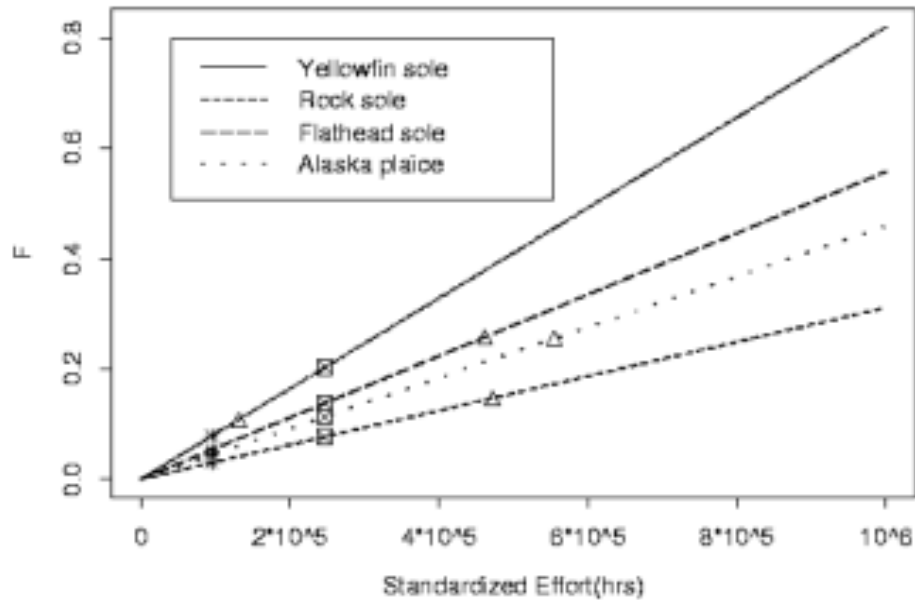


Figure 3.10-4. Eastern Bering Sea flatfish instantaneous fishing mortality rates as a function of total standardized trawling effort. Results were obtained from a multispecies yield per recruit model, and each species incorporates the contribution of all eastern Bering Sea trawl fisheries. Triangles indicate the $F_{40\%}$ single-species reference points, asterisks indicate the recent average F_s and total trawl standardized effort, and squares indicate the $F_{40\%}$ multi-species reference point for the flatfish complex as a whole. Source: NMFS.

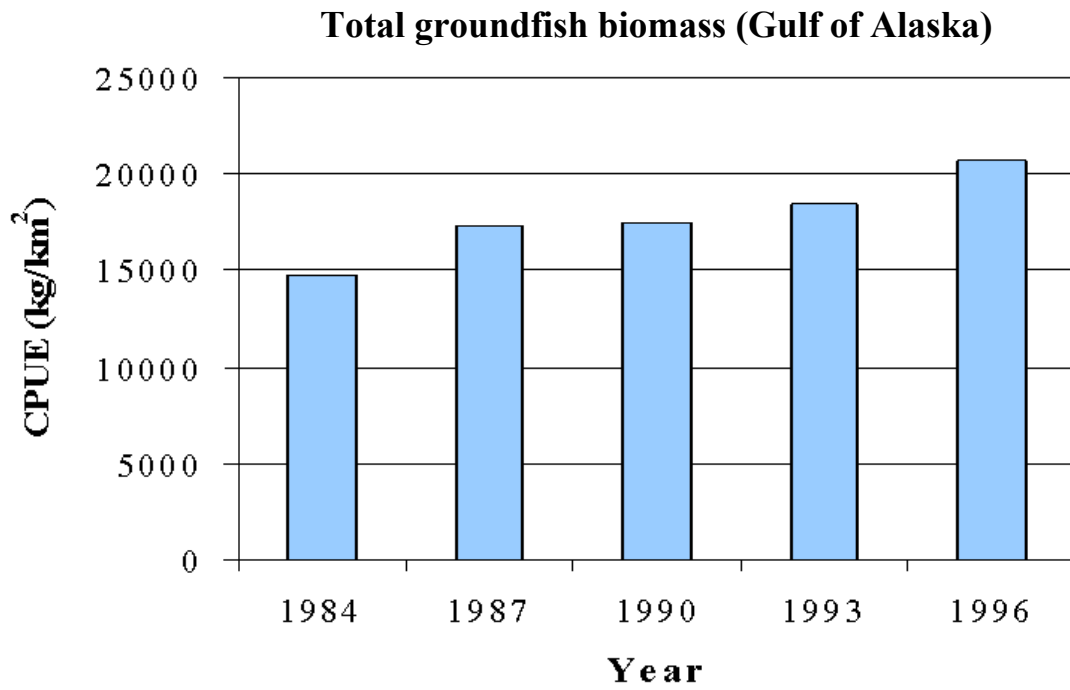


Figure 3.10-5. Estimated trend in the combined catch per unit of effort of 72 groundfish taxa from 1984-1996, averaged over Gulf of Alaska shelf and upper slope to 500 meters.

**Index of species composition
(Gulf of Alaska shelf and slope)**

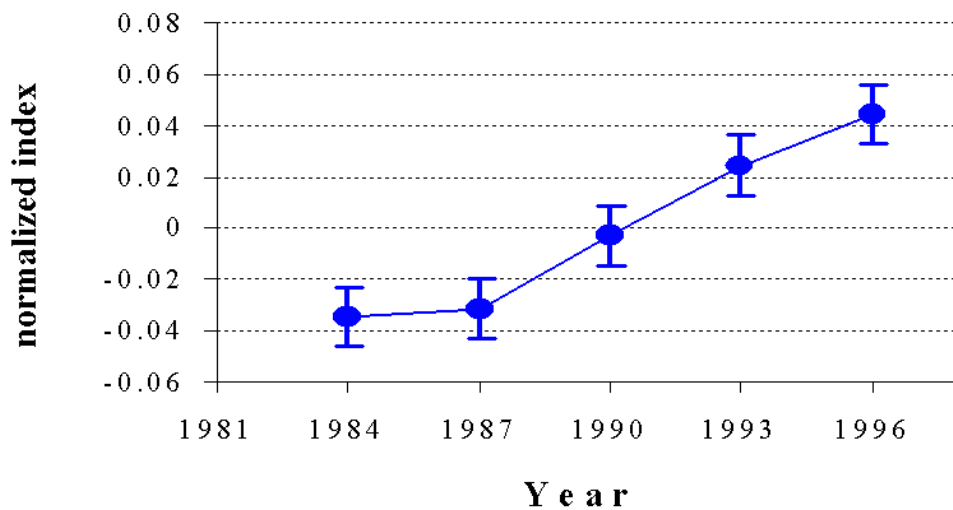


Figure 3.10-6. Trend index of species composition based on ordination of species abundance data from five triennial surveys on Gulf of Alaska shelf and slope with approximate 95 percent confidence interval. Source: NMFS.

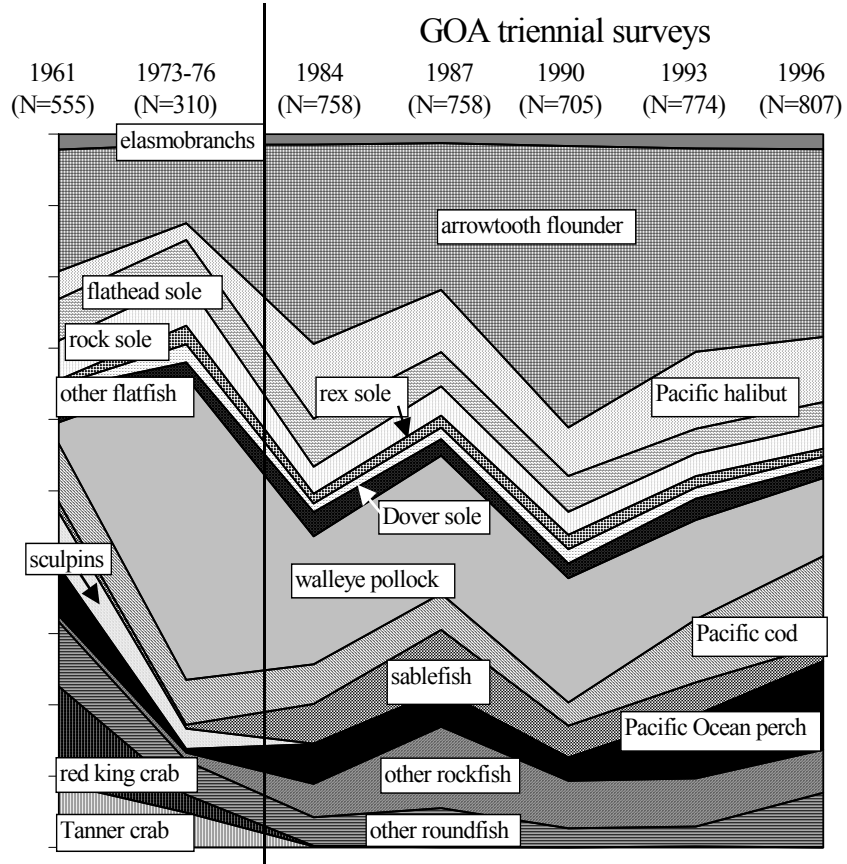


Figure 3.10-7. Relative species composition for major groundfish taxa in the Gulf of Alaska from 1961 through 1996. Source: NMFS.