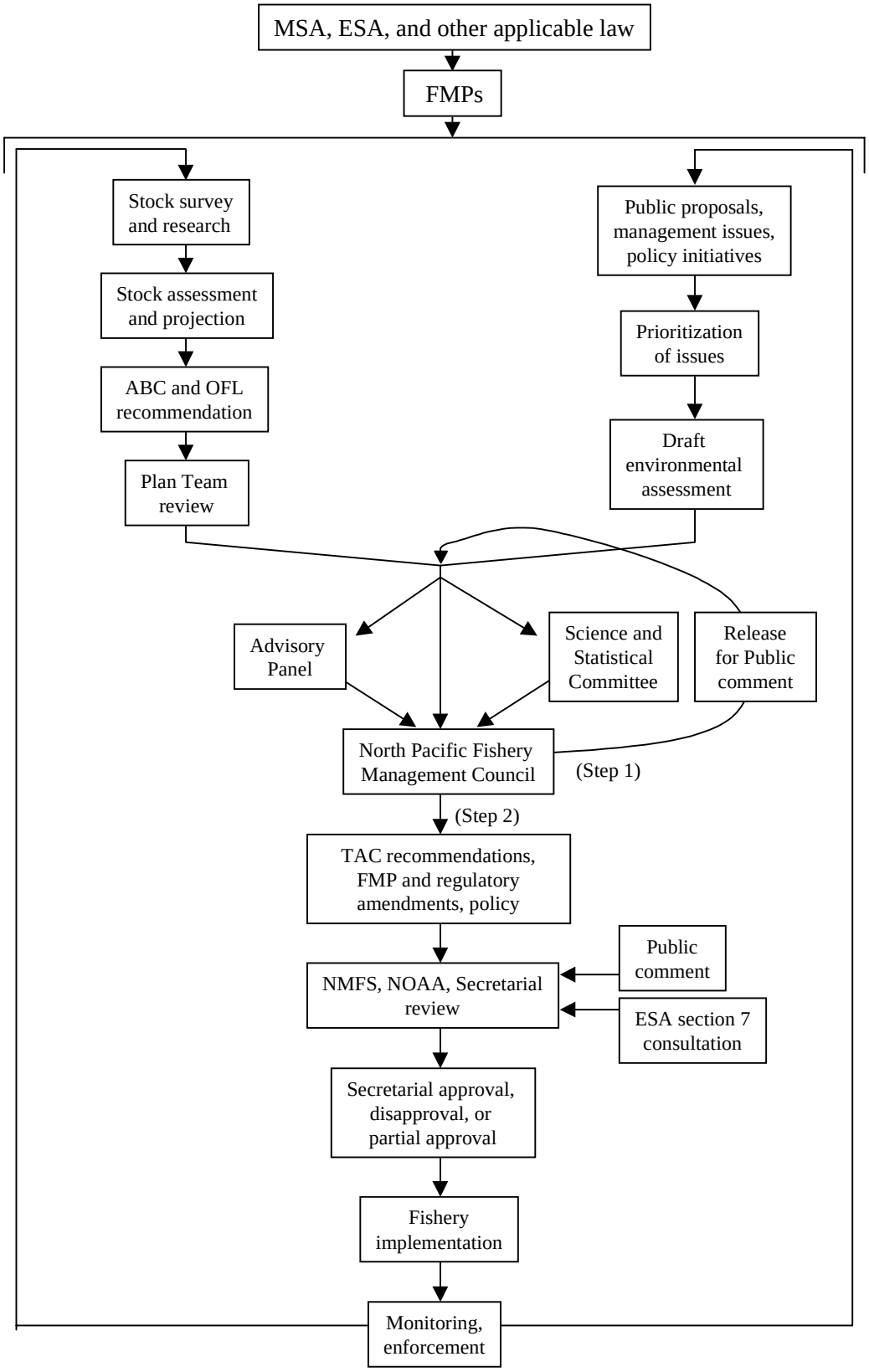


Figure 2.1. Management process for the Alaska groundfish fisheries.

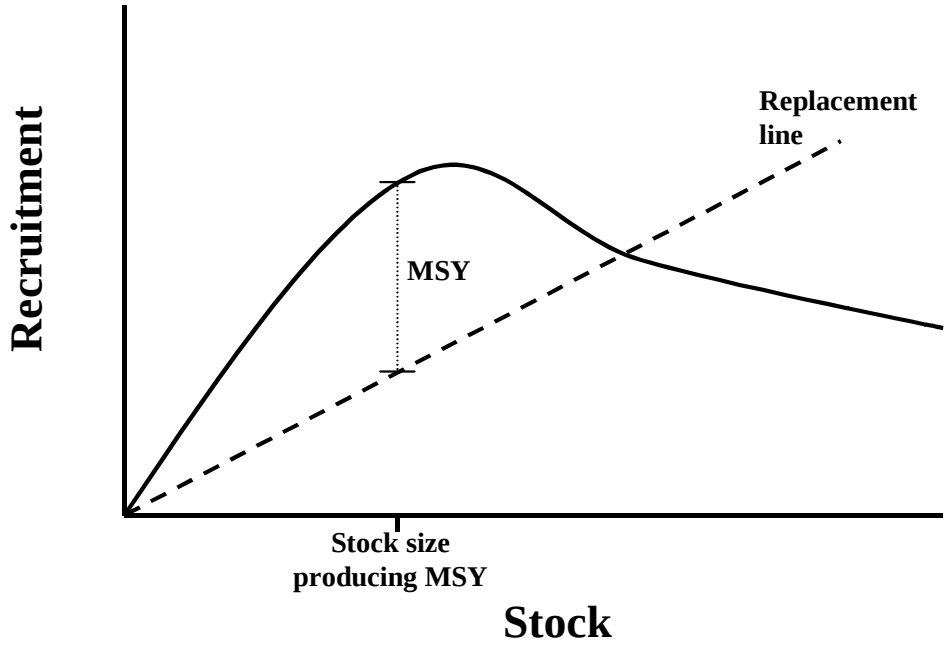


Figure 2.2. Hypothetical Ricker curve showing expected recruitment as a function of stock size. The replacement line indicates the level of recruitment necessary to sustain the population at any particular size. The positive difference between recruitment and the replacement line (to the left of the point where the two cross) indicates recruitment in excess of that needed to replace the stock, and is considered surplus in an single-species context. The maximum excess is the maximum sustainable yield (MSY) and the stock size that results in the maximum excess is the stock size producing MSY.

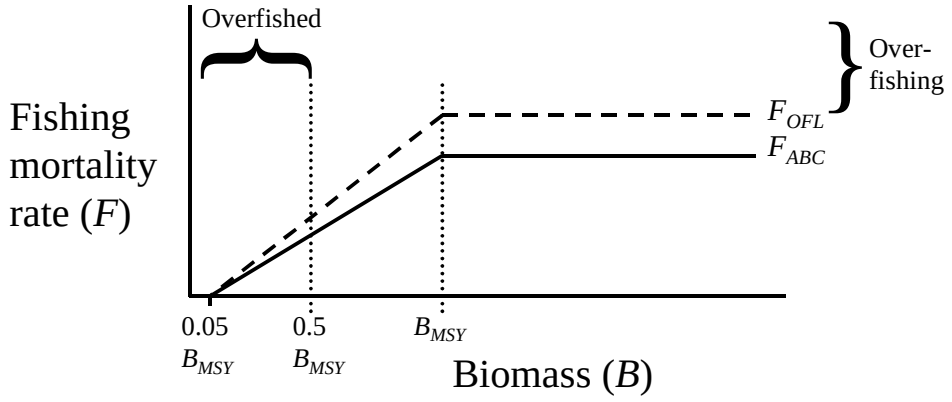


Figure 2.3. Graphic illustration of "overfishing" and "overfished." Overfishing occurs when the fishing mortality rate exceeds a prescribed maximum rate. Overfished indicates that the fished stock has declined below a certain level. The illustration indicates that the level is ½ B_{MSY}, which may or may not be the actual level. The actual level is determined as the maximum of either ½ B_{MSY} or the smallest level at which the population would be expected to recover to B_{MSY} within 10 years of random recruitment and fishing at F_{OFL}.

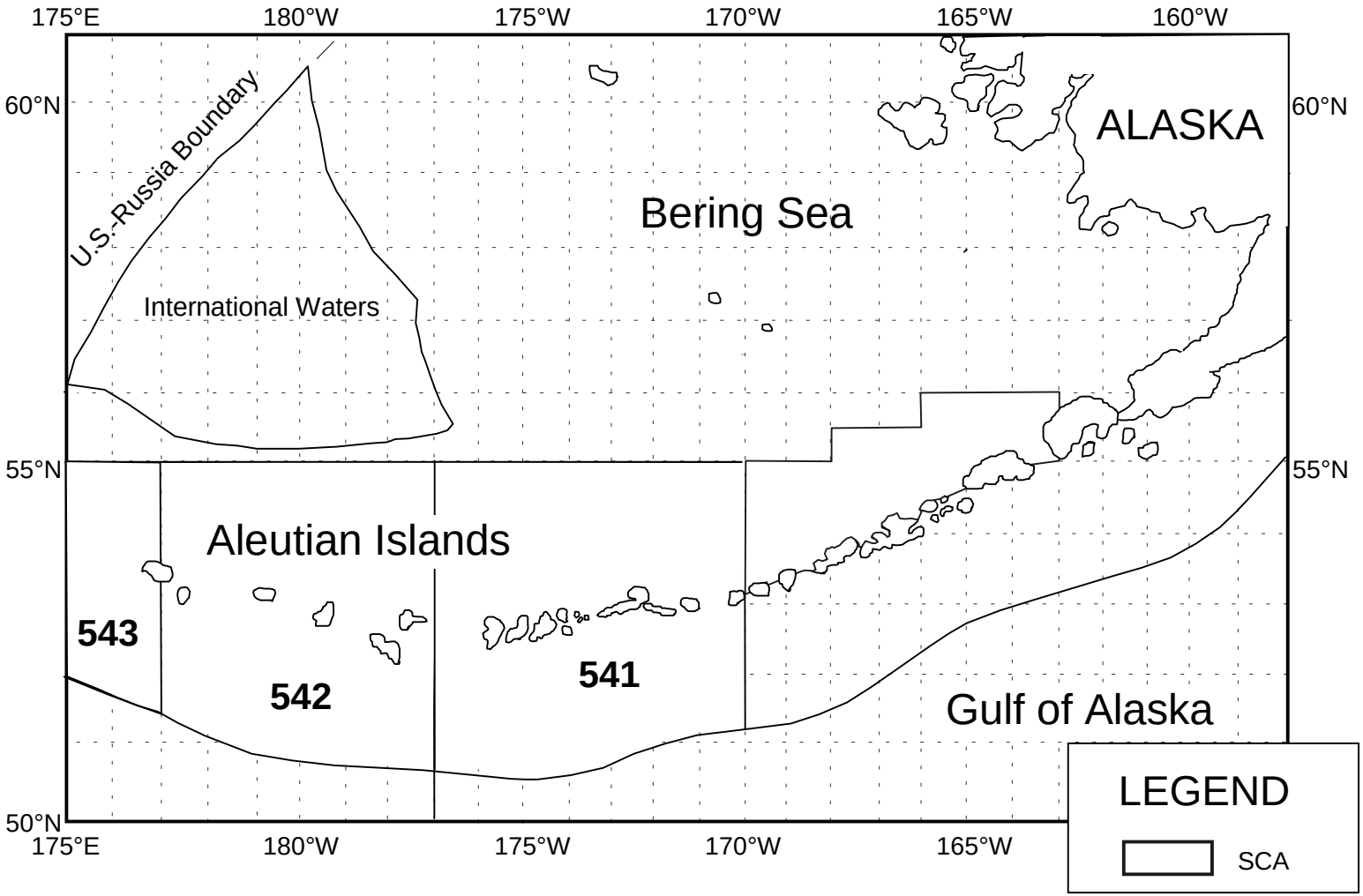


Figure 2.4. Management areas for the BSAI groundfish fishery. The SCA is used for pollock fishing only.

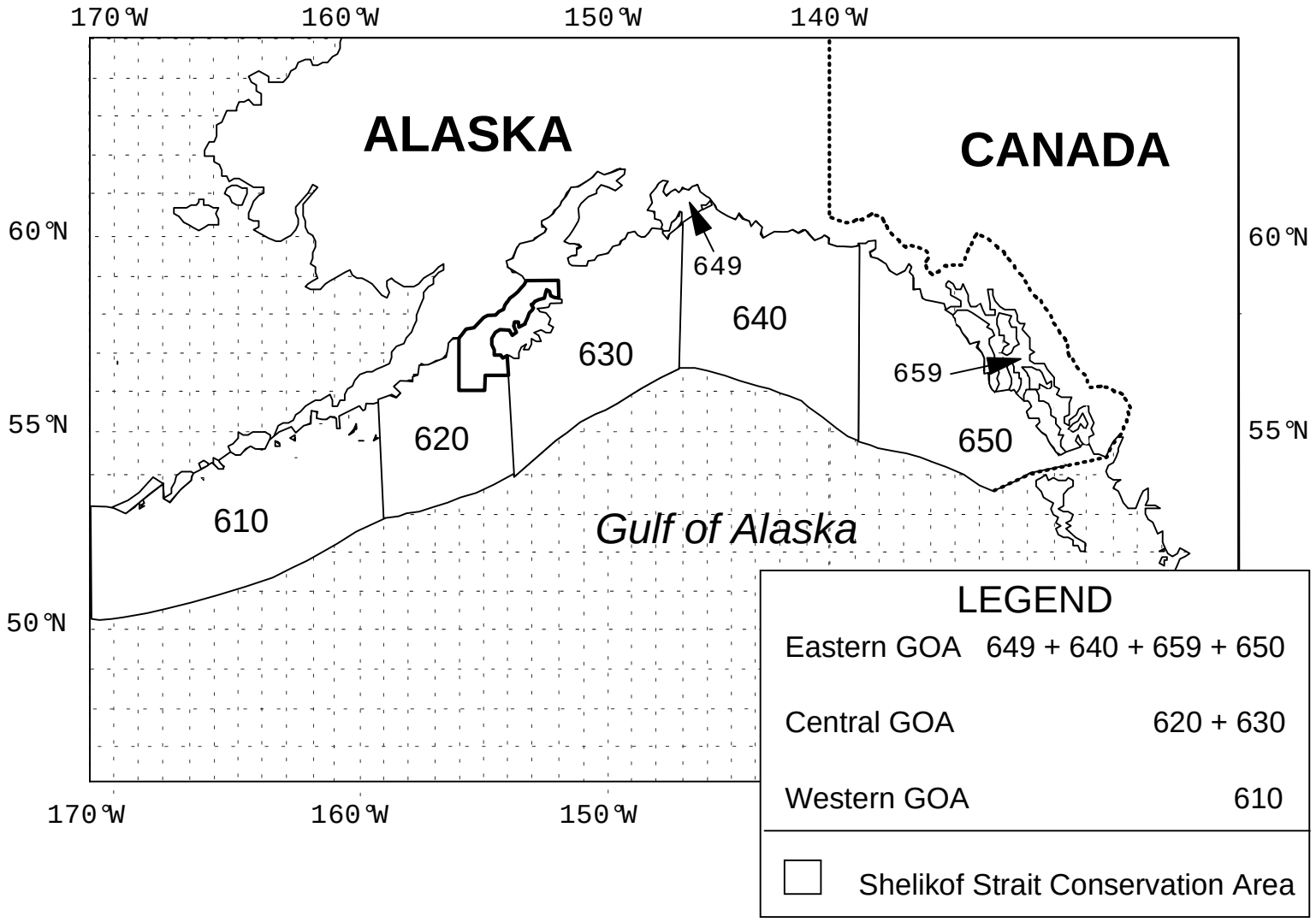
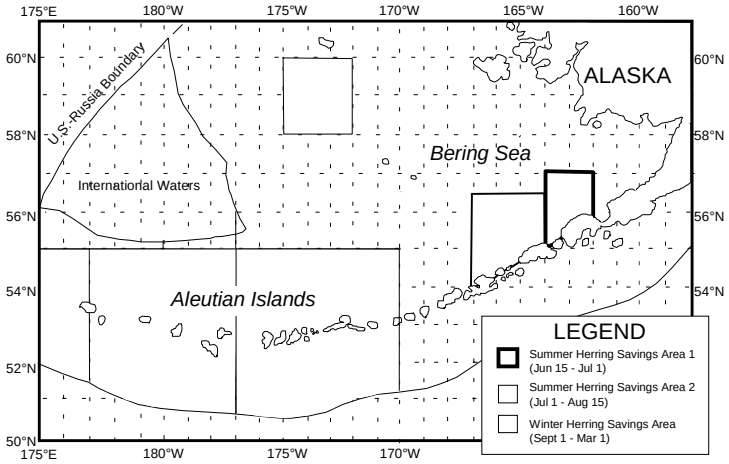
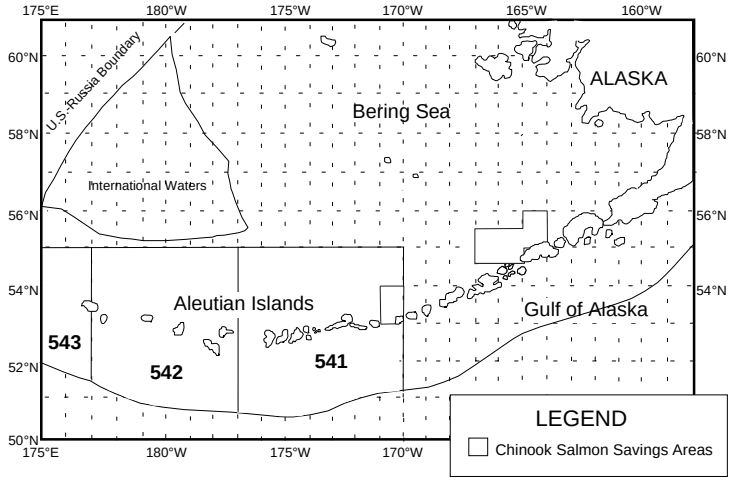
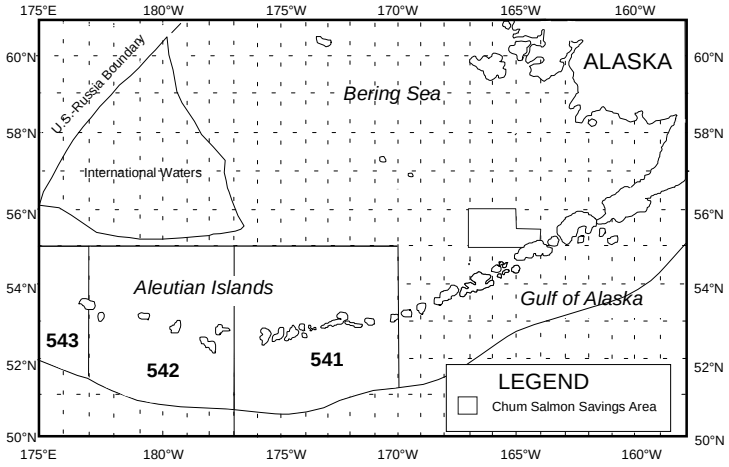


Figure 2.5. Management areas for the GOA groundfish fishery. The Shelikof Strait area is used for pollock fishing in the A and B seasons only.







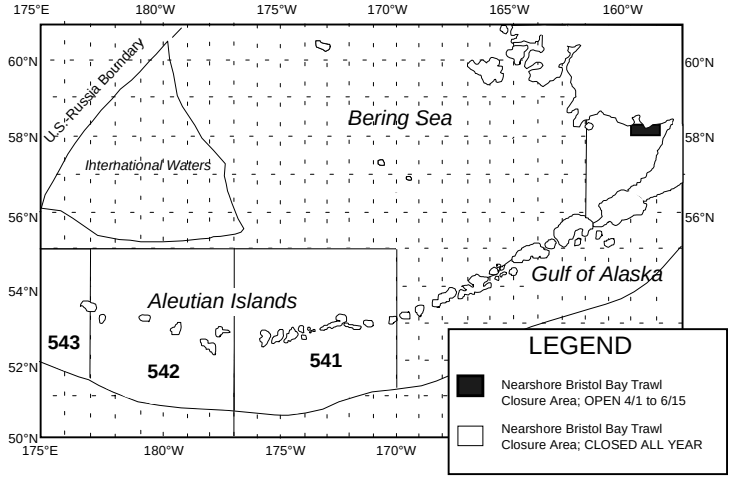
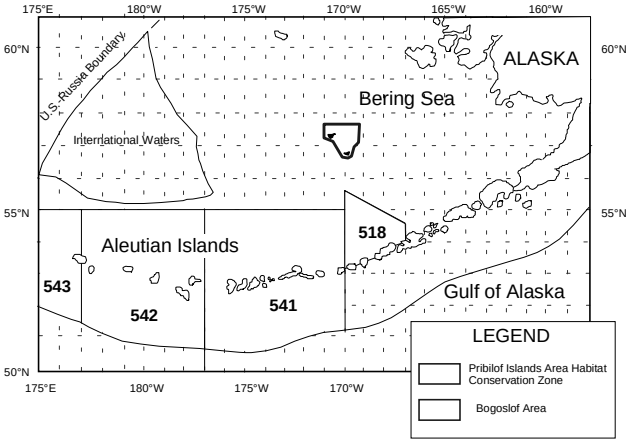
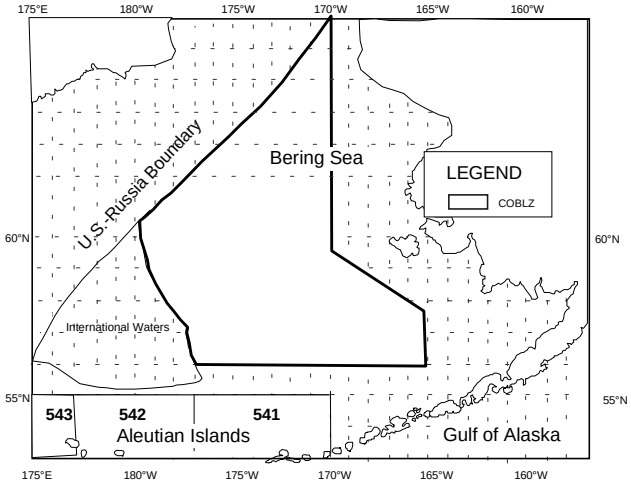
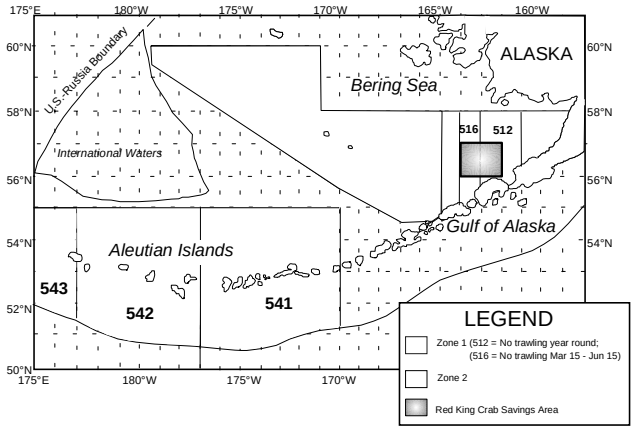


Figure 2.6. Locations used for time/area management of the BSAI and GOA groundfish fisheries: Herring Savings Areas (upper left), Chinook Salmon Savings Area (upper right), Chum Salmon Savings Area (lower left), and Bristol Bay Trawl Closure Areas (lower right). (continued next page)







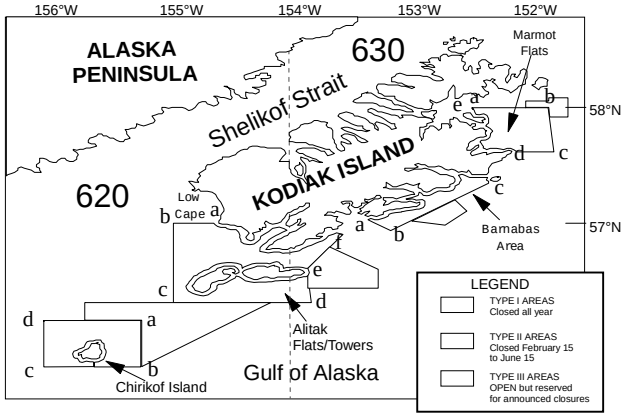


Figure 2.6. (continued) Locations used for time/area management of the BSAI and GOA groundfish fisheries: Pribilof Islands Habitat Conservation Area and Bogoslof area (Bogoslof closed to pollock fishing only; upper left), C. Opilio Bycatch Limitation Zone (upper right), Prohibited Species Bycatch Limitation Zones (for red king crab and C. bairdi Tanner crab; lower left), and Kodiak Island Areas for crab protection (lower right).

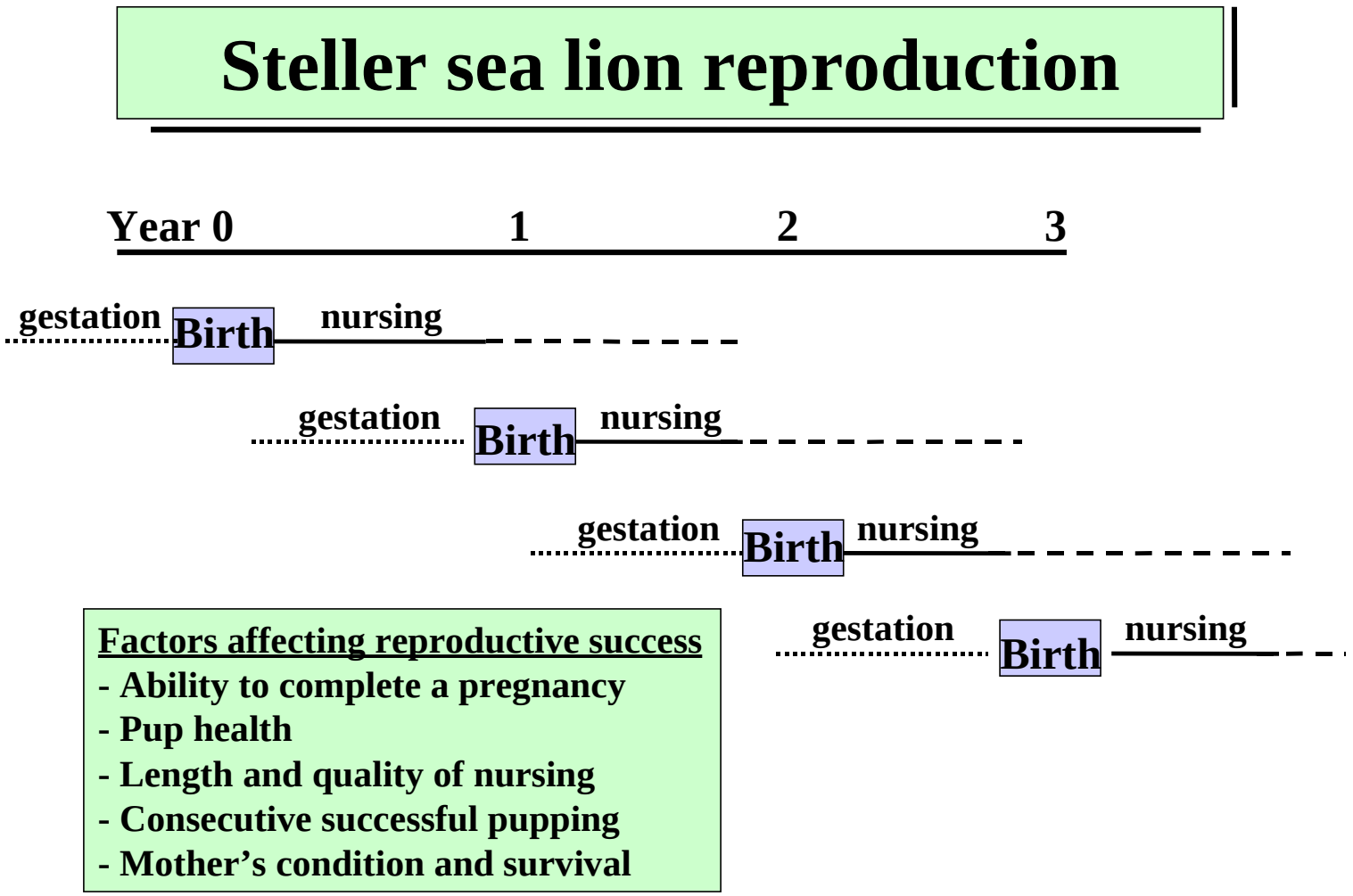
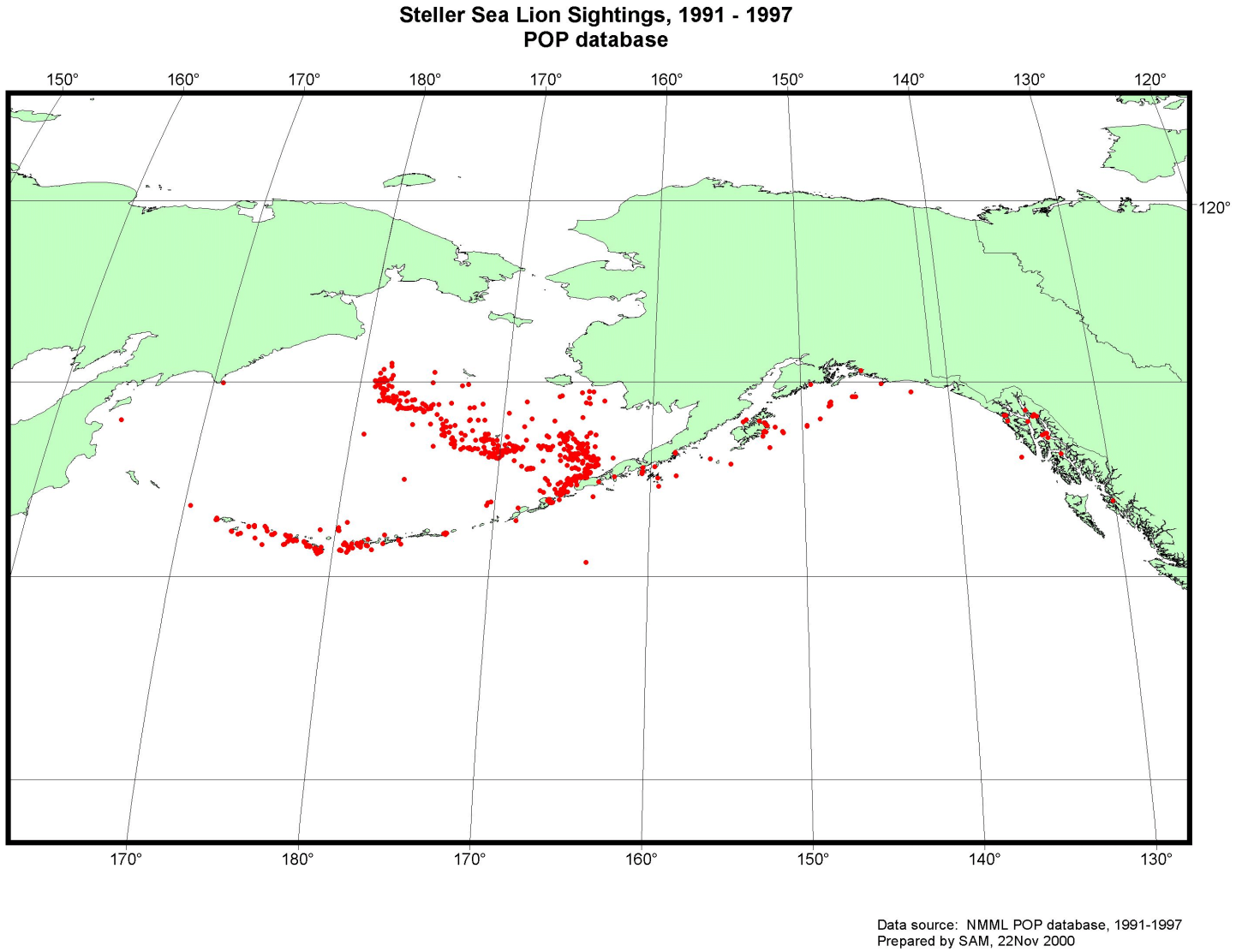


Figure 4.1. Schematic representation of the reproductive cycle of an adult female Steller sea lion over a period of years, indicating the elements of the cycle that 1) contribute to overall reproductive success and 2) may be affected by nutritional stress.

Figure 4.2. Sighting locations for Steller sea lions in the BSAI and GOA based on data from the Platforms-of-Opportunity Program, 1958-1995.



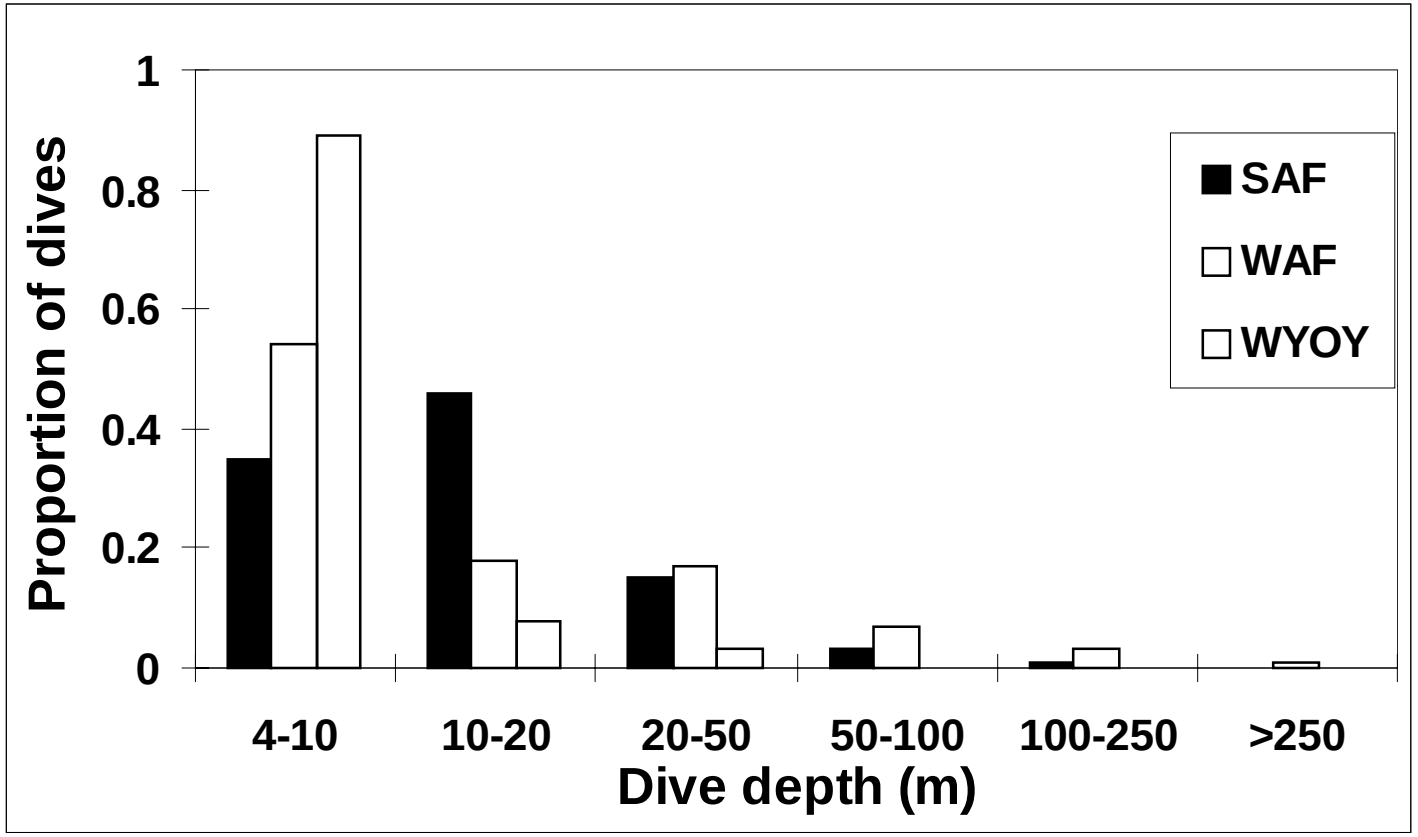


Figure 4.3. Portion of dives by depth range for young-of-the-year (WYOY) and adult female Steller sea lions in summer (SAF) and winter (WAF) tracked during 1990-1993 (from Merrick and Loughlin 1997).

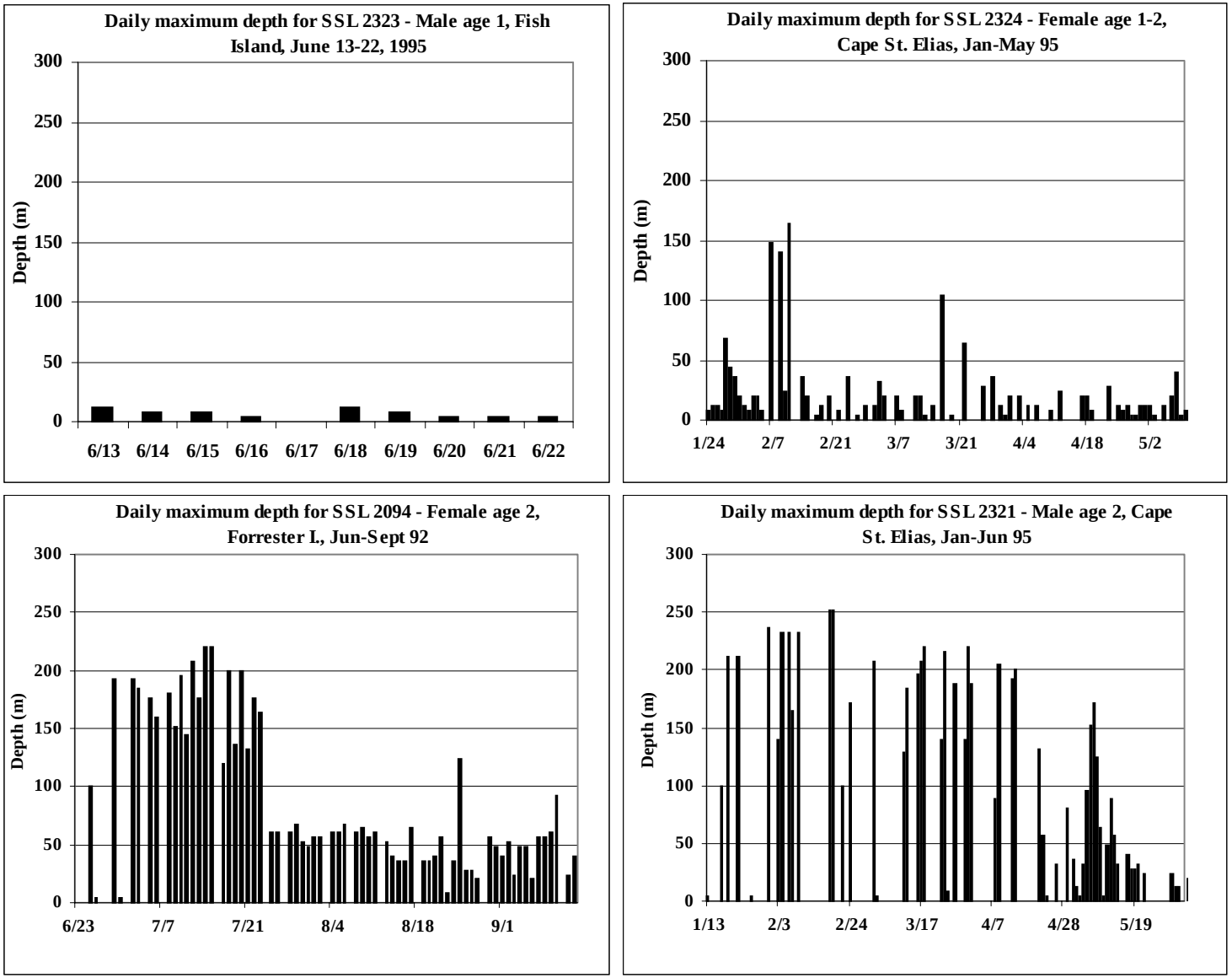


Figure 4.4. Maximum daily dive depths for four juvenile Steller sea lions (based on data from U. Swain, Alaska Department of Fish and Game).

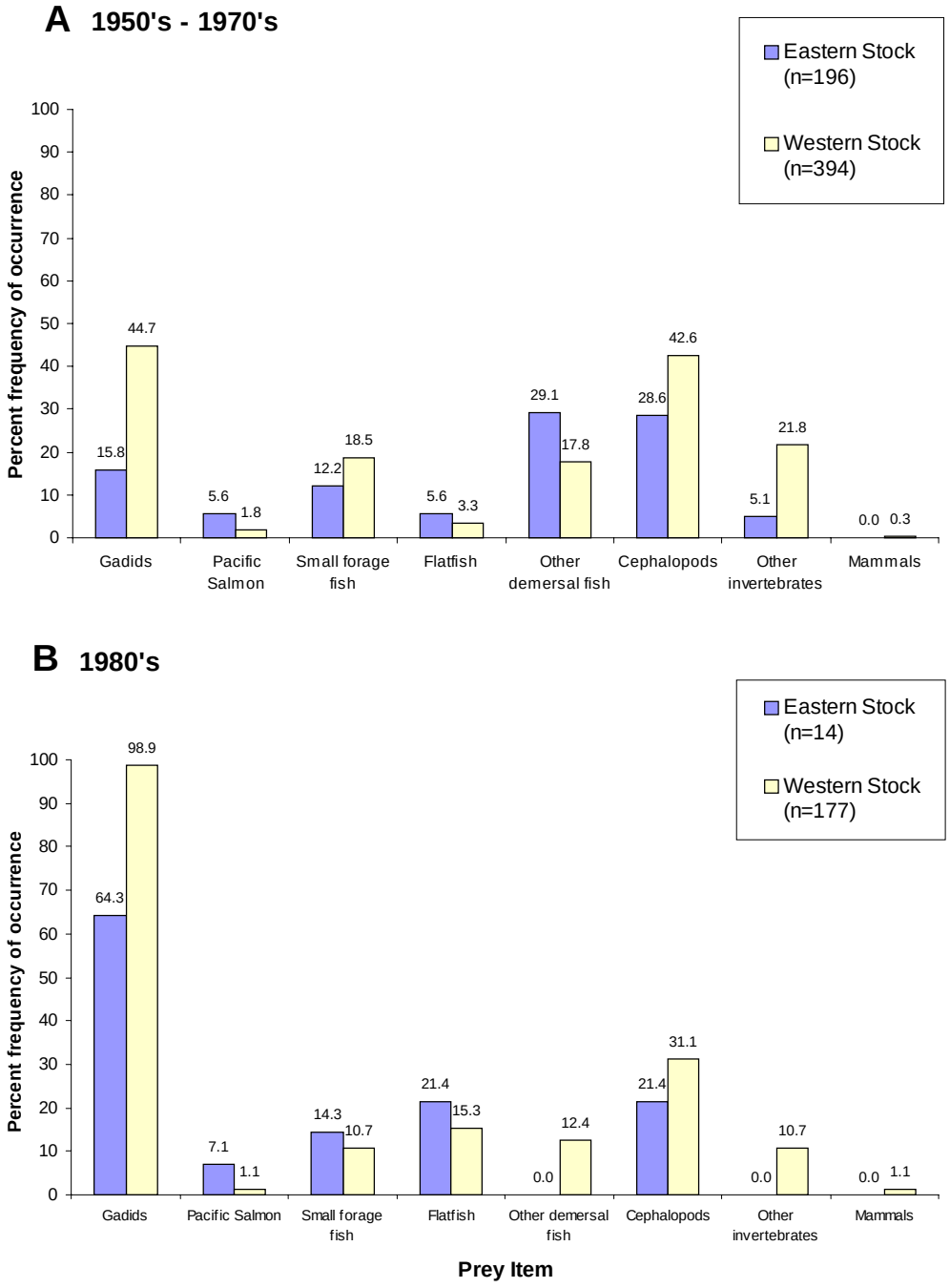
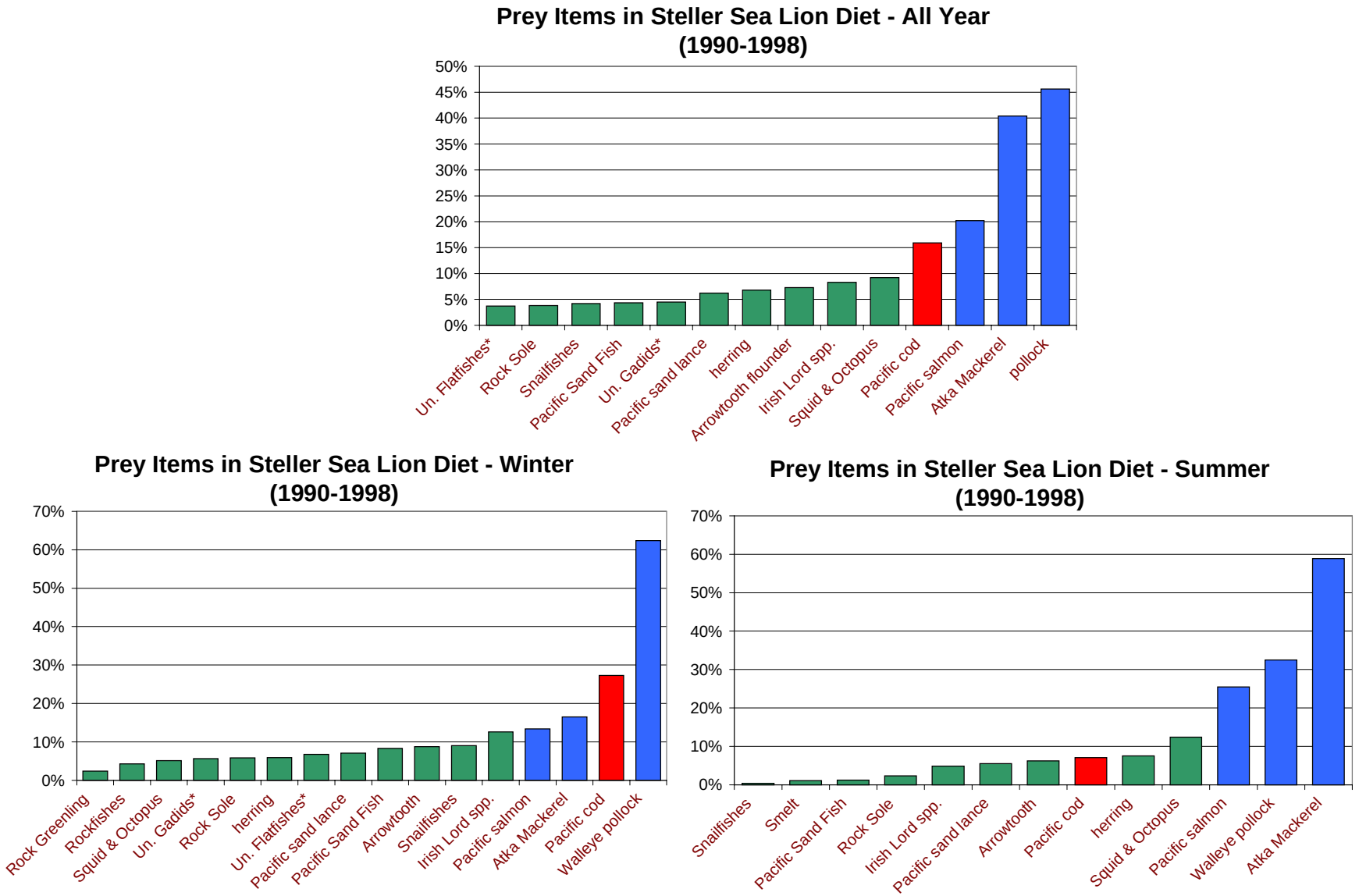


Figure 4.5. Frequency of occurrence of Steller sea lion prey items found in stomach samples (n= 781 stomachs with prey remains) collected in studies conducted from 1956 to 1986 in locations ranging from the Kuril Islands to California. Prey taxa are grouped following Merrick and Calkins (1996) with the addition of the Other invertebrate and Mammal catagories. Panel A shows the eastern and western portions of the range from the 1950's through the 1970's. Panel B shows the the same geographic areas during the 1980's.

Figure 4.6. Percent frequency of occurrence of prey items identified in Steller sea lion scat samples form 1990-1998.



Winter

Percent Frequency of Occurrence of Top Three Prey Items found in Steller Scats collected December through April, 1990 – 1998
(n = number of scats collected containing identifiable prey items.)

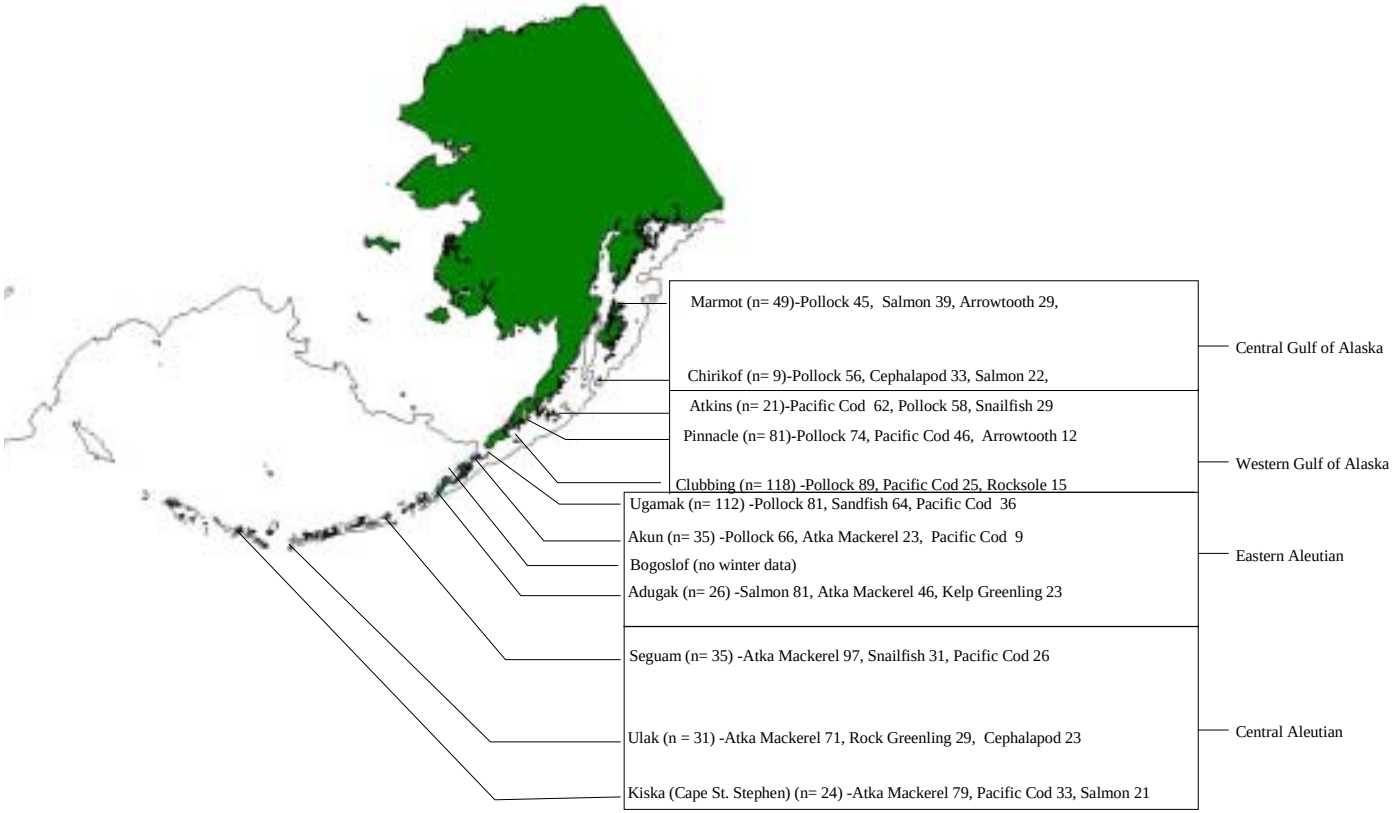


Figure 4.7a. Percent frequency of occurrence of prey items identified in Steller sea lion scat collections in winter from 1990-1998.

Summer

Percent Frequency of Occurrence of Top Three Prey Items found in Steller Scats collected June through August, 1990 – 1998
(n = number of scats collected containing unidentifiable prey items.)

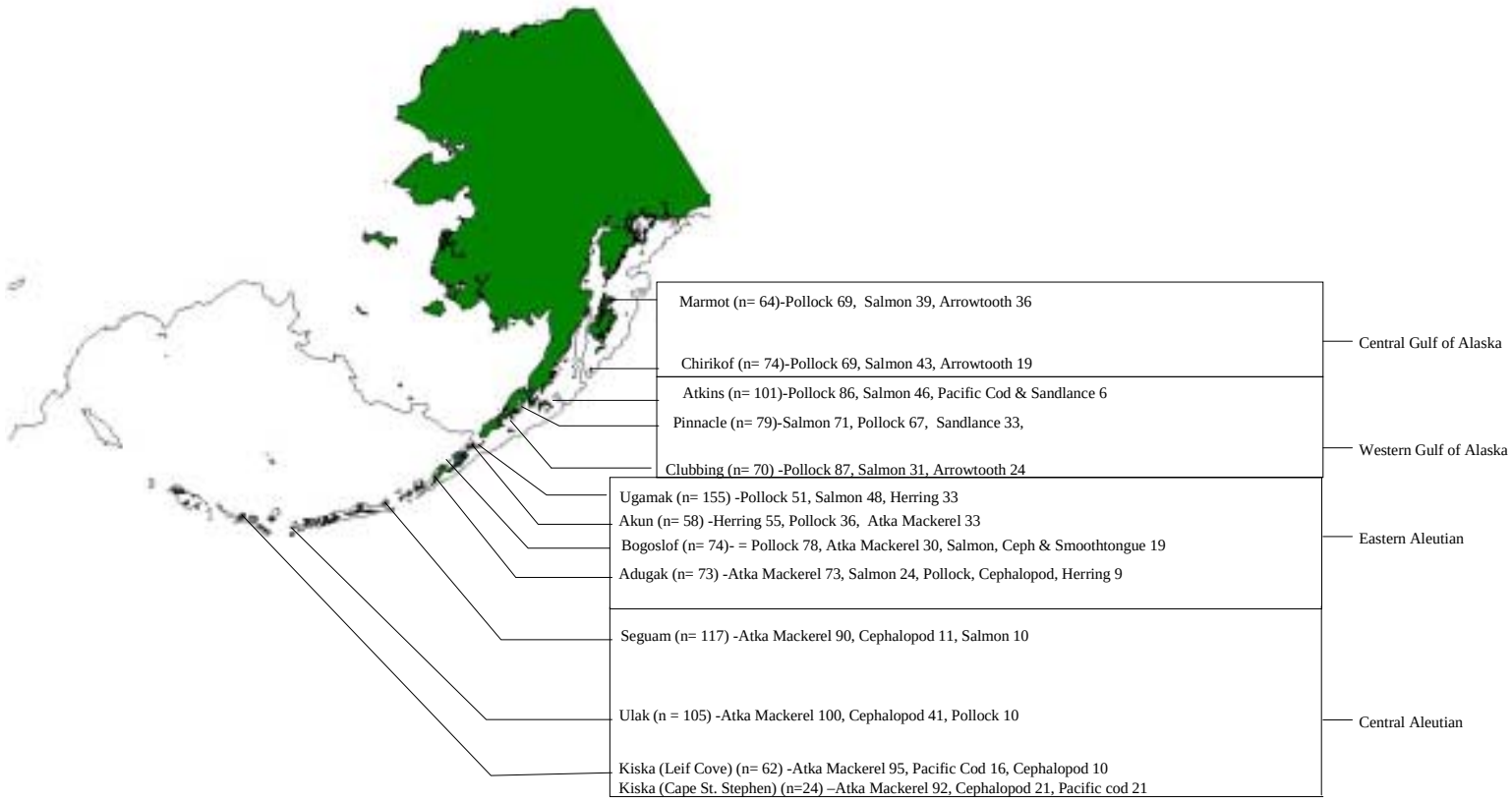


Figure 4.7b. Percent frequency of occurrence of prey items identified in Steller sea lion scat collections in summer from 1990-1998.

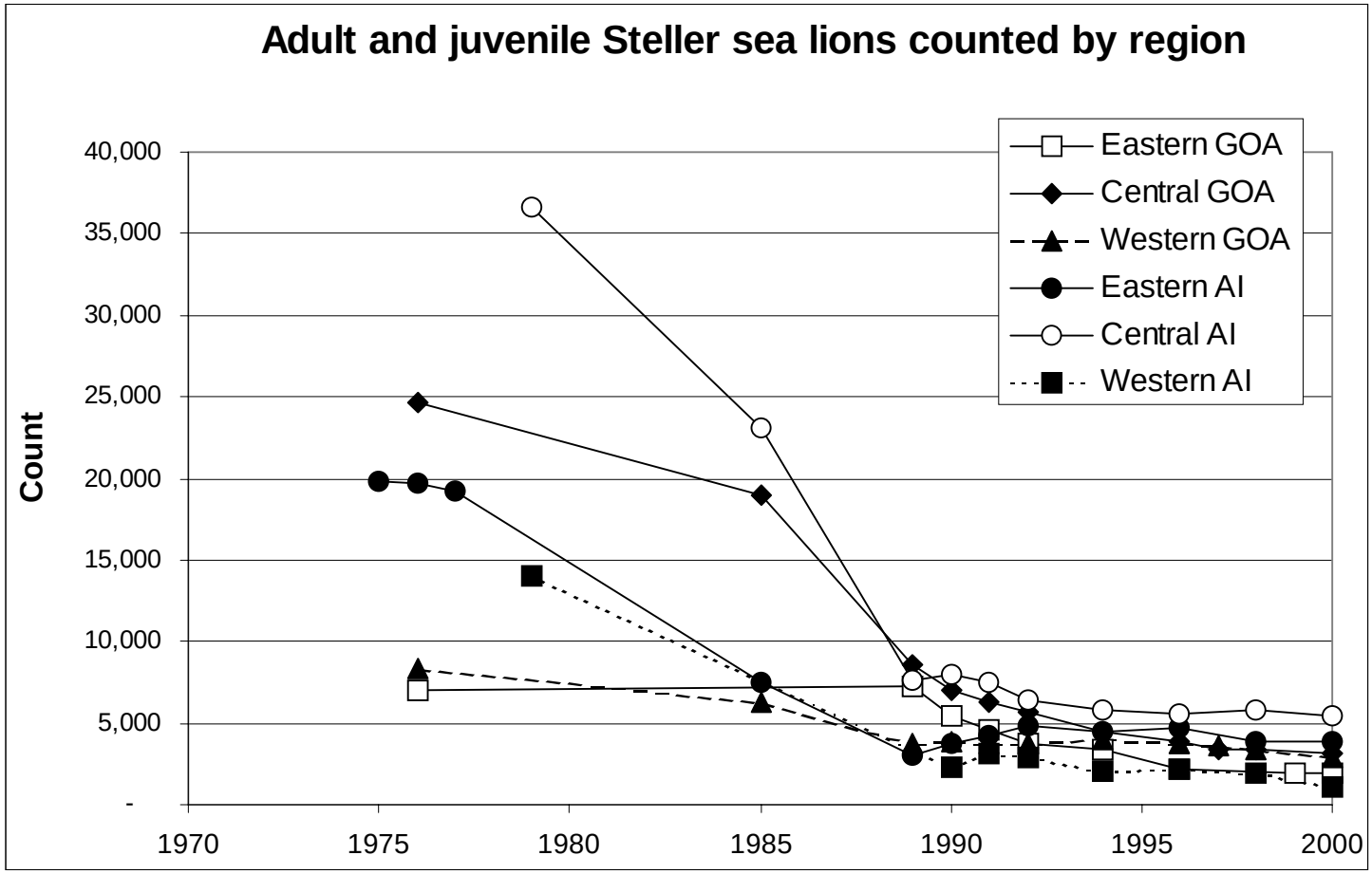


Figure 4.8. Counts of adult and juvenile Steller sea lions in the western population (by region) from the late 1970s to 2000.

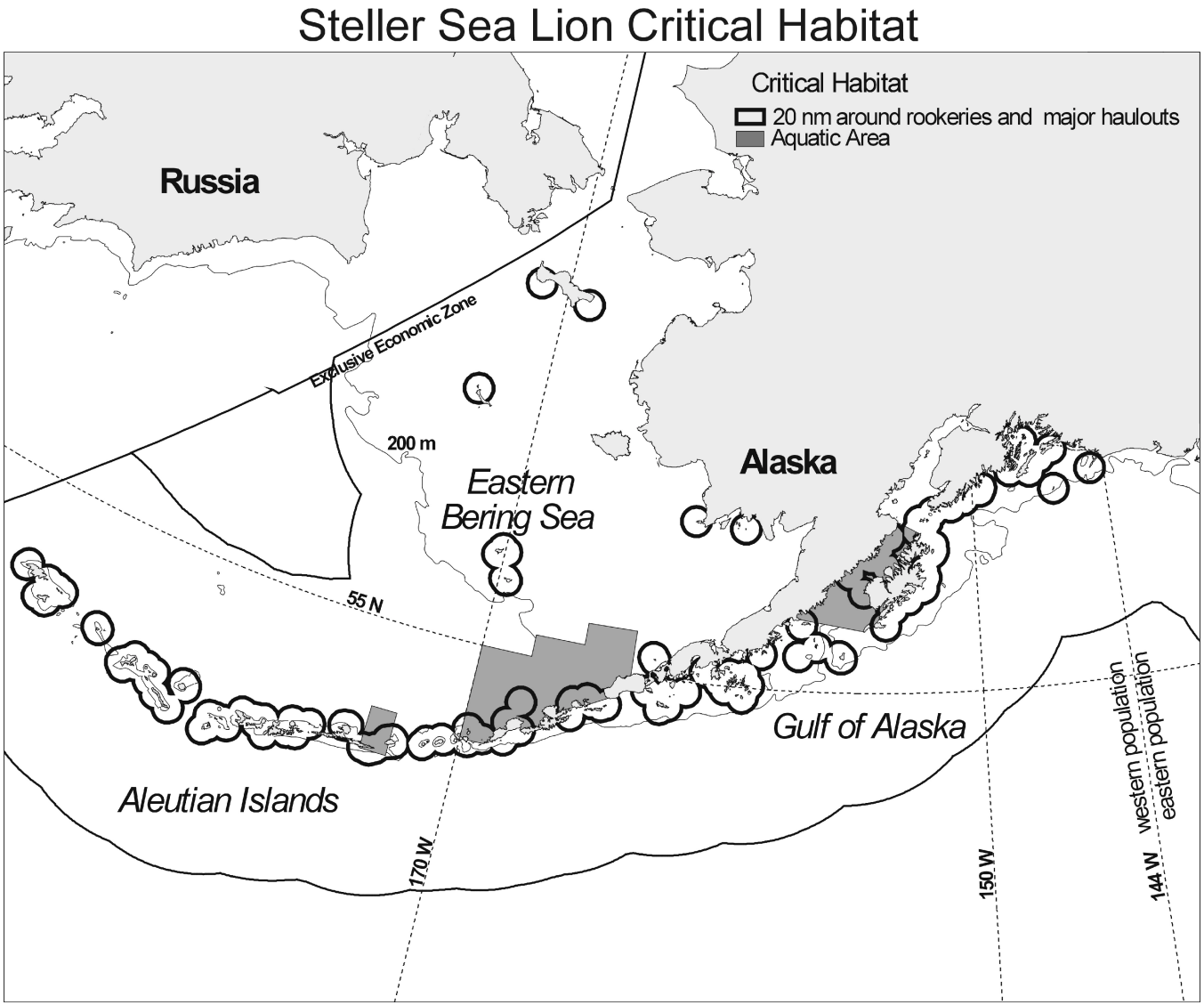


Figure 4.9. Critical habitat for the western population of Steller sea lions.

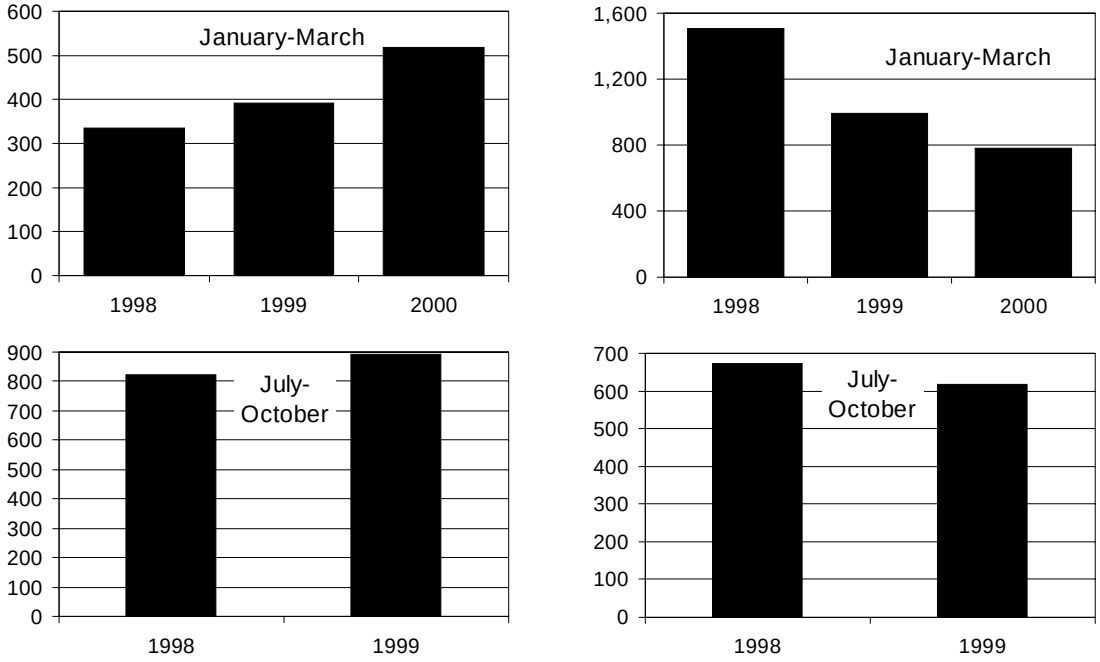


Figure 5.1. Number of 100 km^2 cells fished by the eastern Bering Sea pollock fishery (left panels), and average pollock catch per 100 km^2 cell in the eastern Bering Sea (right panels).

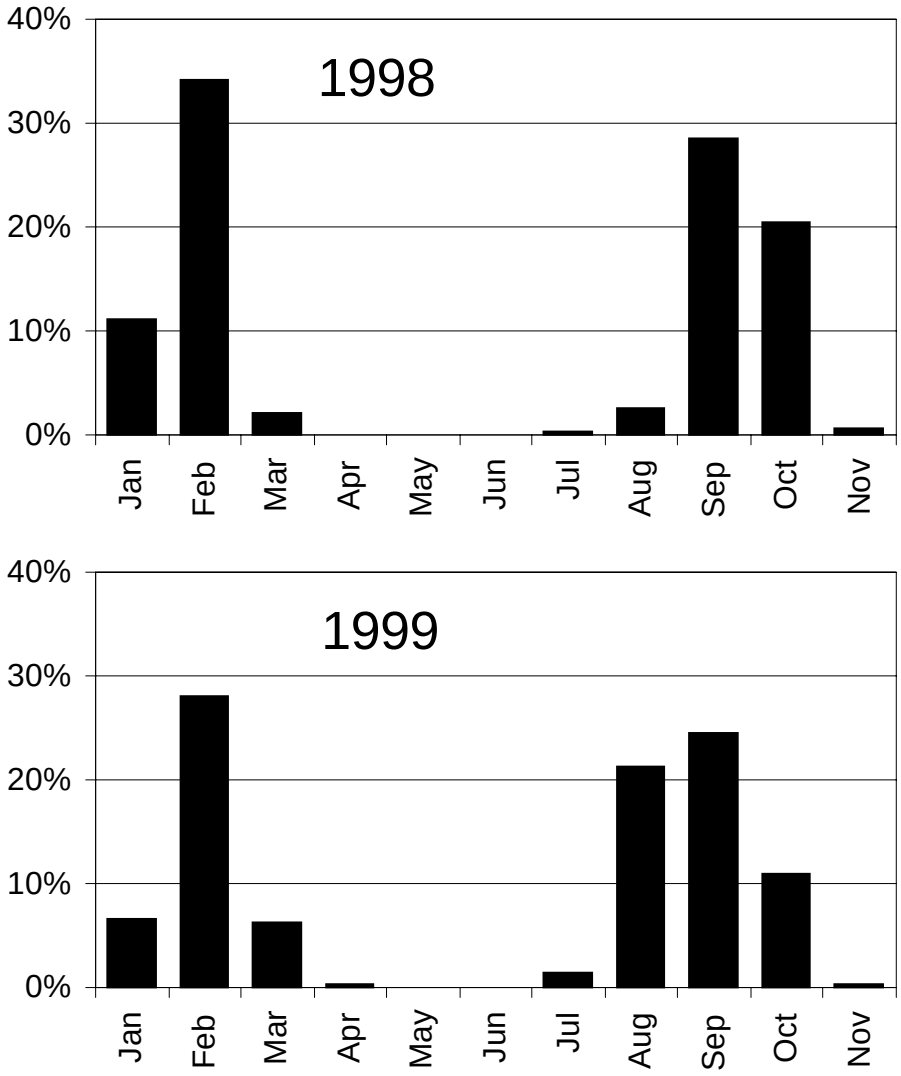


Figure 5.2. Percent of annual pollock catch in the eastern Bering Sea by month in 1998 and 1999.

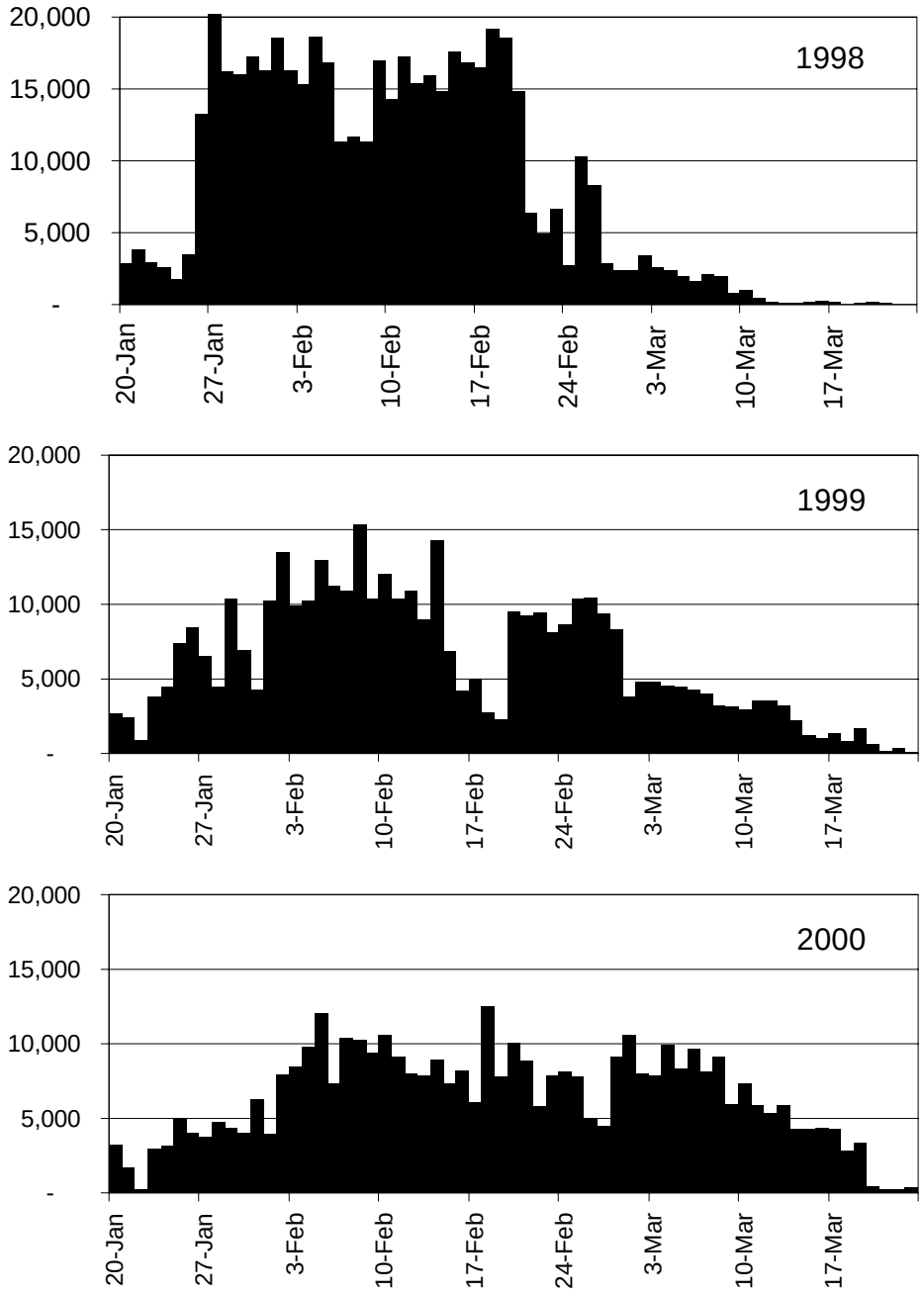


Figure 5.3. Estimated daily catch rates of pollock by the EBS pollock fishery in January-March 1998-2000.

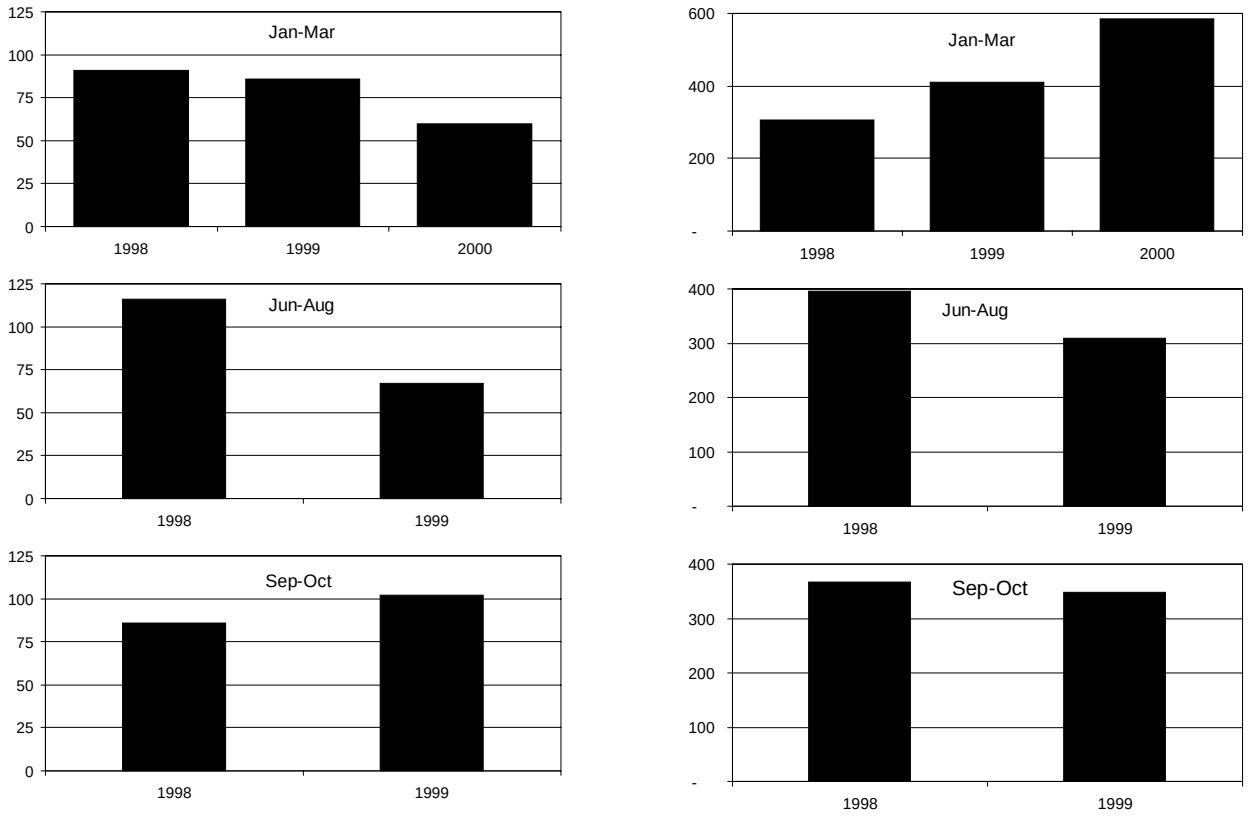


Figure 5.4. Number of 100-km^2 areas fished by the GOA pollock fishery from 1998 to 2000 (left panel), and average pollock catch per 100-km^2 area in the GOA (right panel). The data suggest that the fishery became increasing concentrated spatially in the period from January to March, with fewer areas fished and increasing mean catch per area. The opposite trend was observed for the September and October period, with mixed results in June to August.

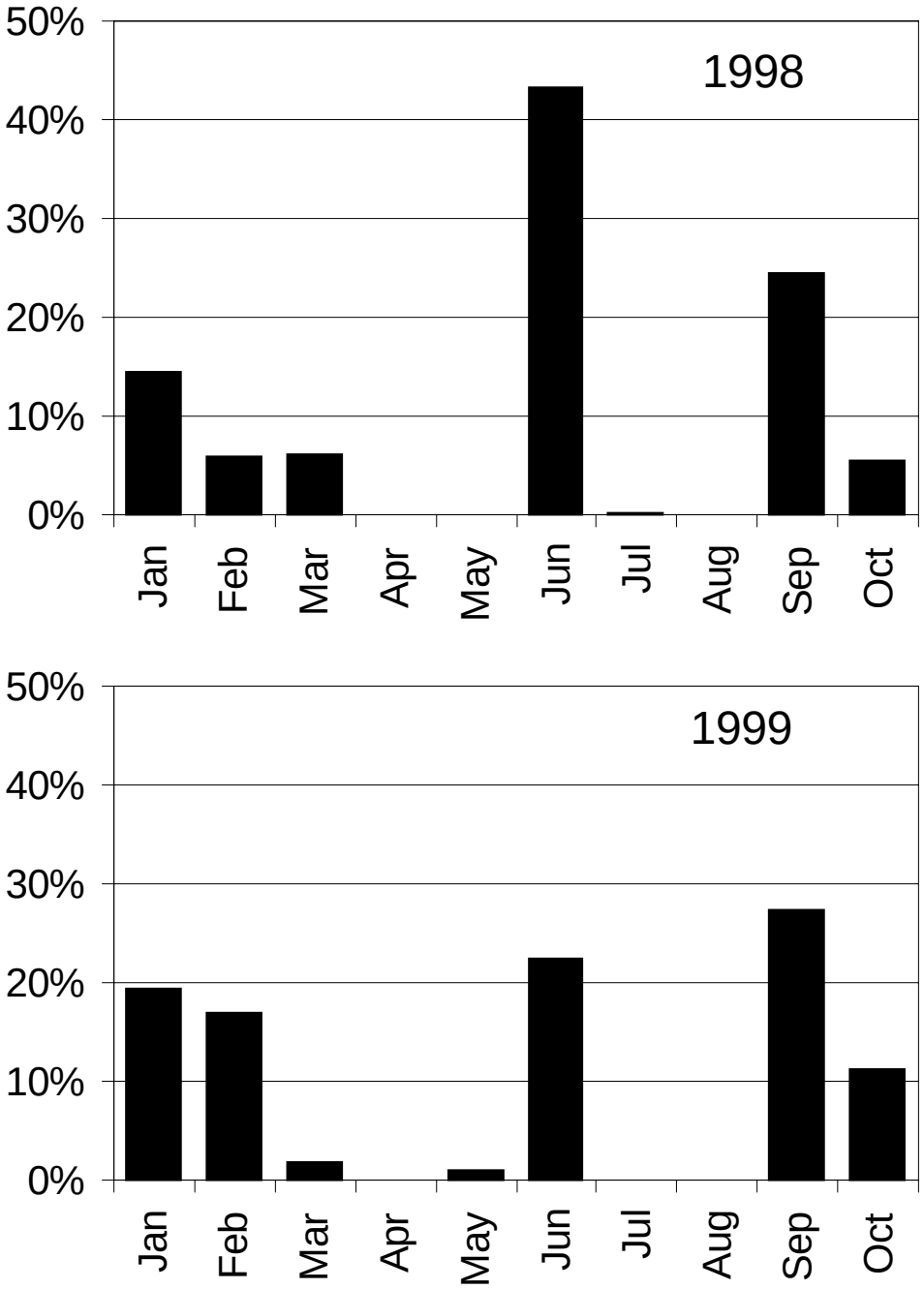


Figure 5.5. Percent of annual pollock catch caught each month in the GOA, 1998 and 1999.

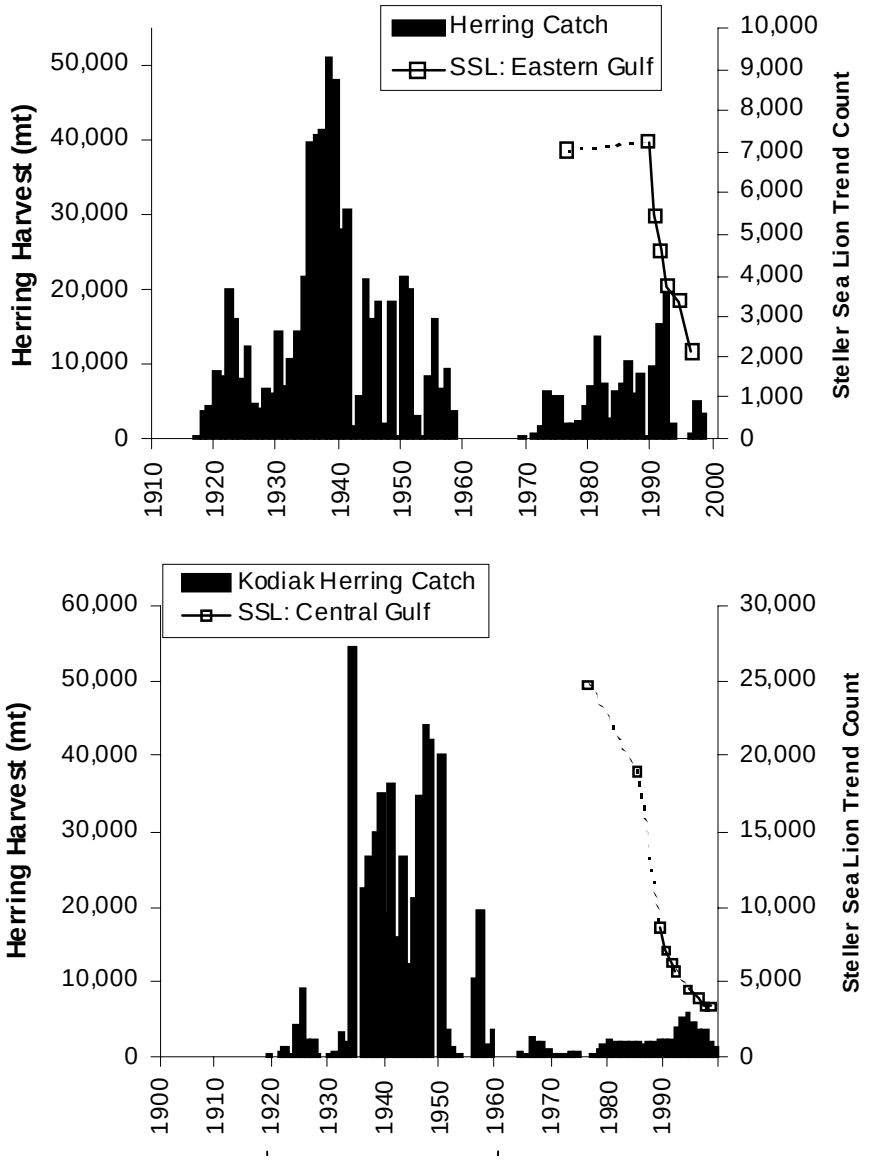


Figure 5.6. Historical harvest of herring in the central and eastern GOA and counts of Steller sea lions.

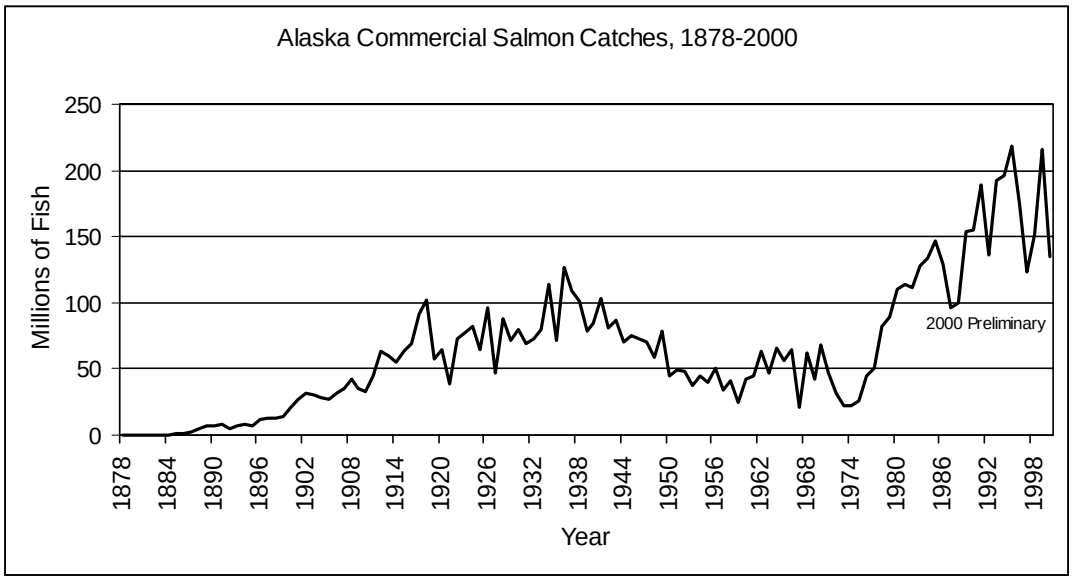


Figure 5.7. Historical salmon catches in Alaska from 1878-2000.

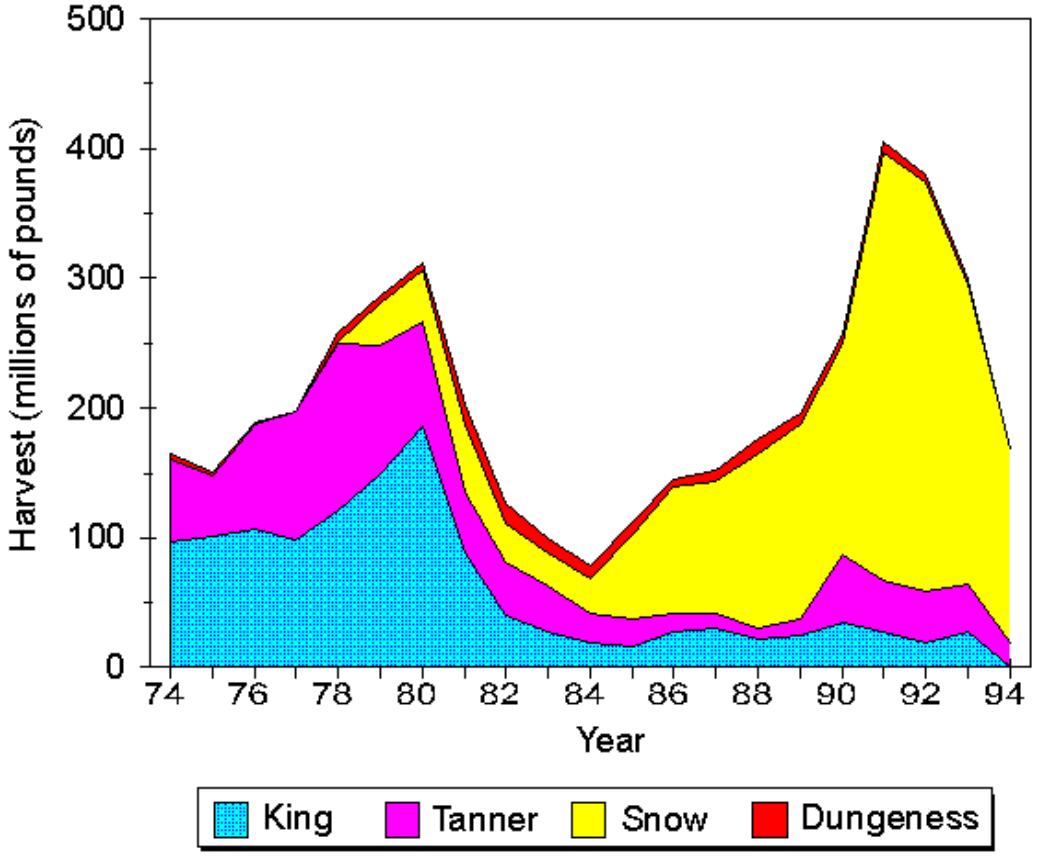


Figure 5.8. Landings of King, Tanner, snow, and Dungeness crabs in Alaska during 1974-1994. Since 1994, the catch of crab in Alaska has continued to decline due to depressed stocks.

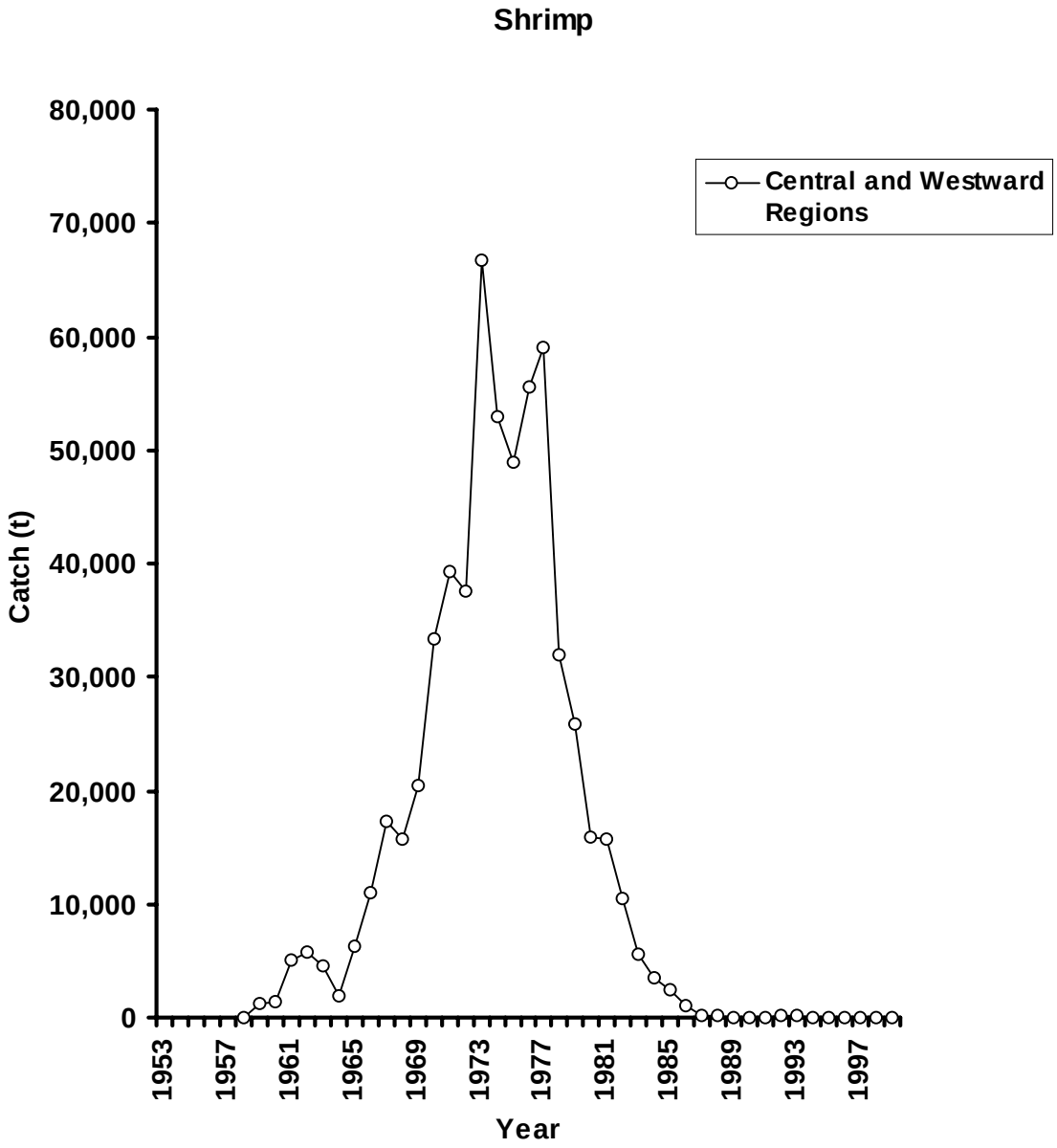


Figure 5.9. Historical annual shrimp catch (t) in the central and westward regions (west of 144° W). Landings from PWS, Cook Inlet, Kodiak, Alaska Peninsula, Chignik, Aleutian Islands, and Bering Sea contributed to the total catch.

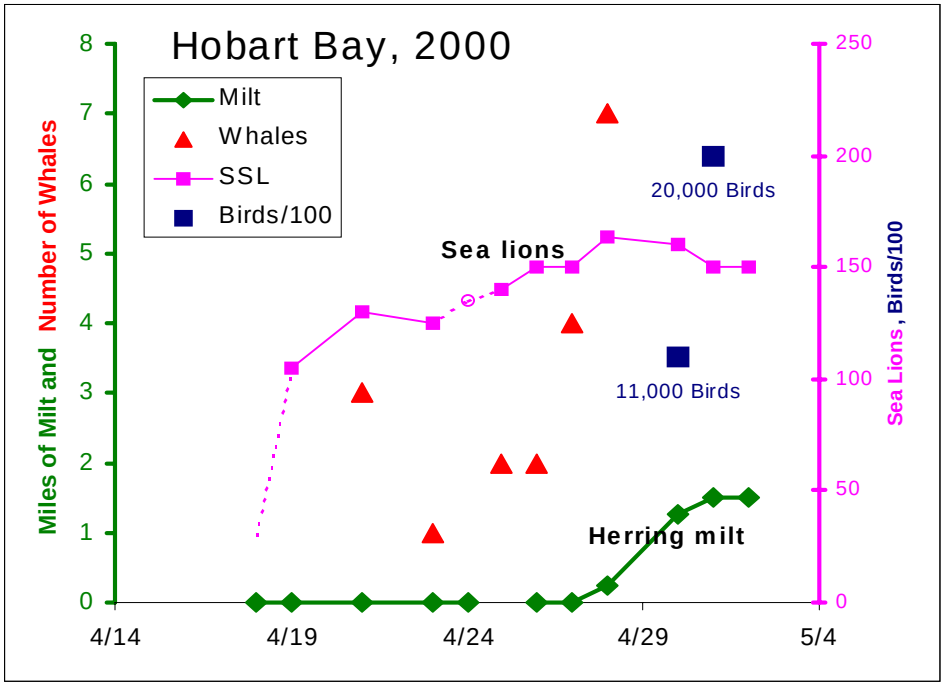


Figure 5.10. Timing of herring spawning and bird and mammal presence at Hobart Bay, southeast Alaska, in the spring of 2000.

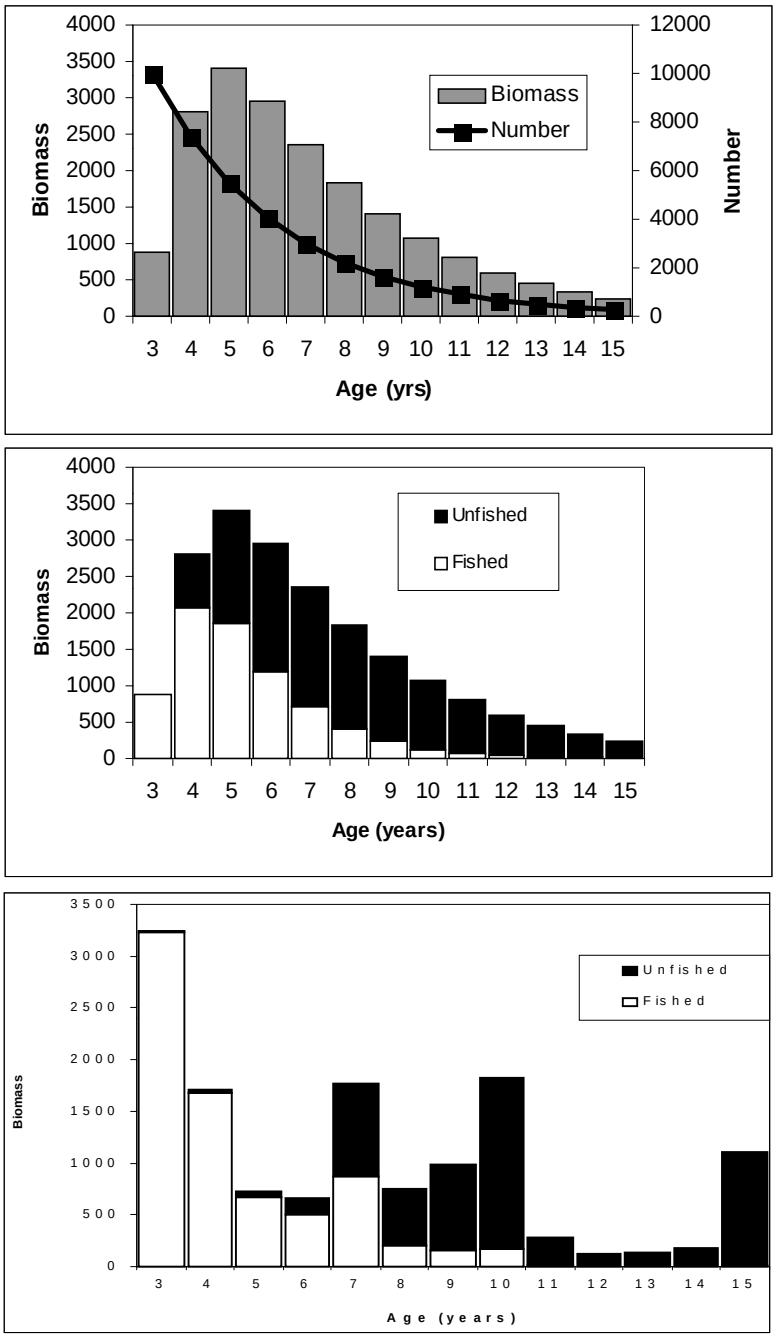


Figure 6.1. Figure 6.1a (top panel) represents a theoretical unfished population showing female spawning biomass and numbers at age from age 3. Figure 6.1b (middle panel), shows a theoretical female spawning stock biomass by age in a population fished at $F_{40\%}$ (white portion of each bar) and in an unfished population (black and white portions combined). Figure 6.1c (bottom panel) illustrates the biomass at age for the eastern Bering Sea pollock stock in 1999. Again, the white portion of each bar indicates the biomass available in the fished portion of the population, and the black portion represents the portion that was removed in previous years and would have been available if the stock had not been fished.

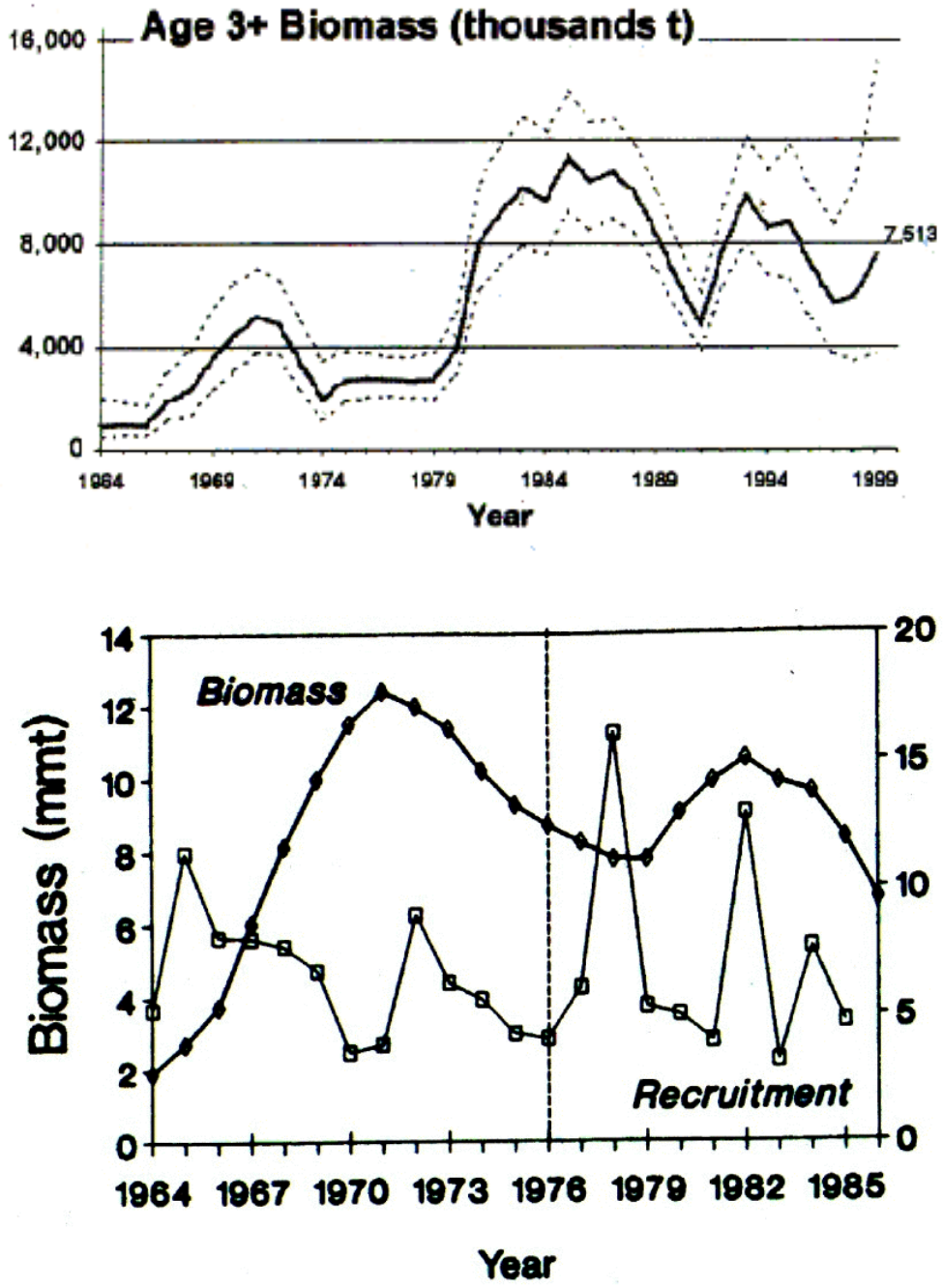


Figure 6.2. (6.2a Top) Estimated biomass of eastern Bering Sea pollock (age 3+) as described in Ianelli et. al. (1999). (6.2b Bottom) Estimated biomass of eastern Bering Sea pollock (age 3+) for the period from 1964-1985 as presented in Megrey and Wespestad, 1990.

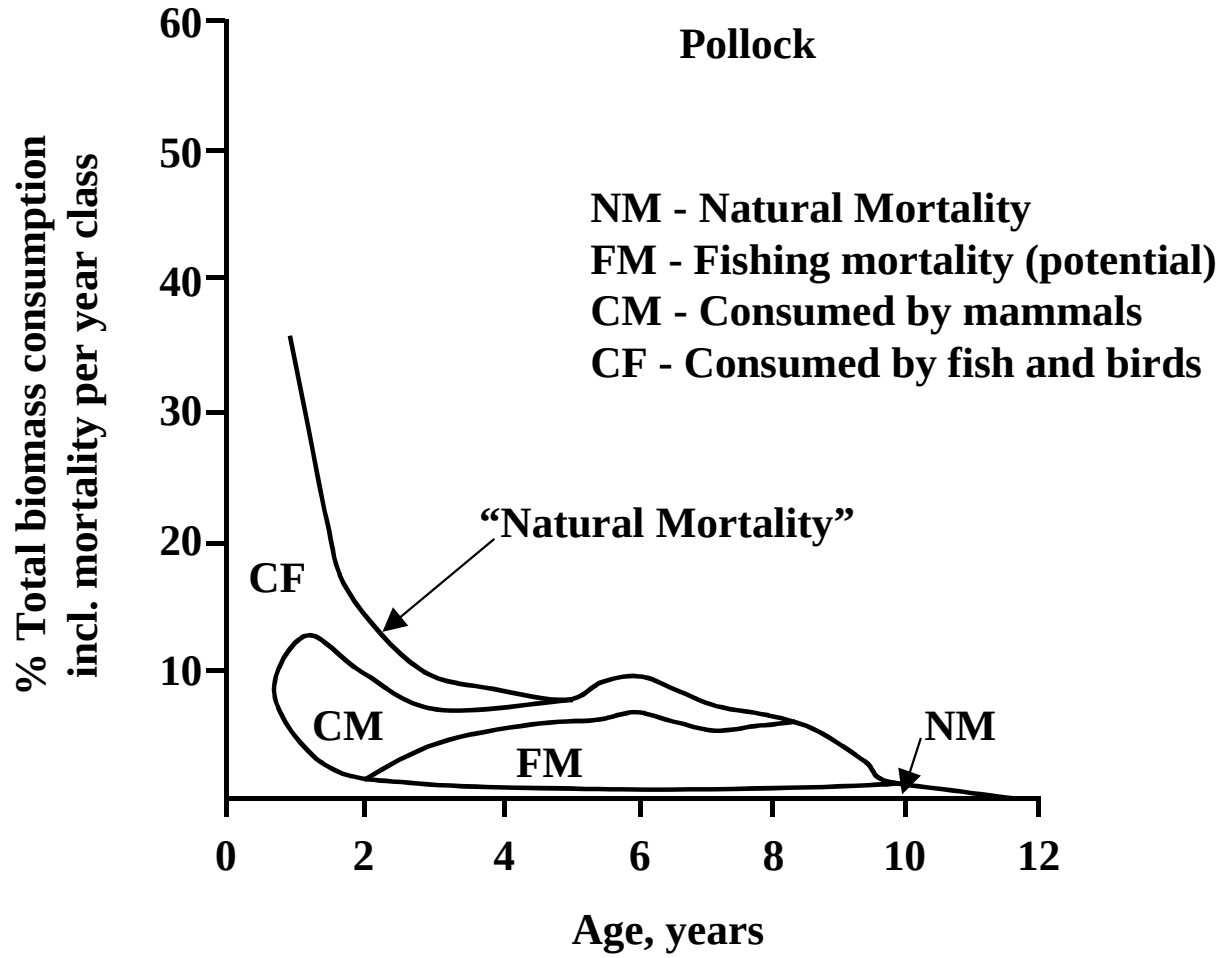


Figure 6.3. Distribution of "consumption" with age of walleye pollock, as percent of total biomass. (From BSAI FMP, p. 179.)

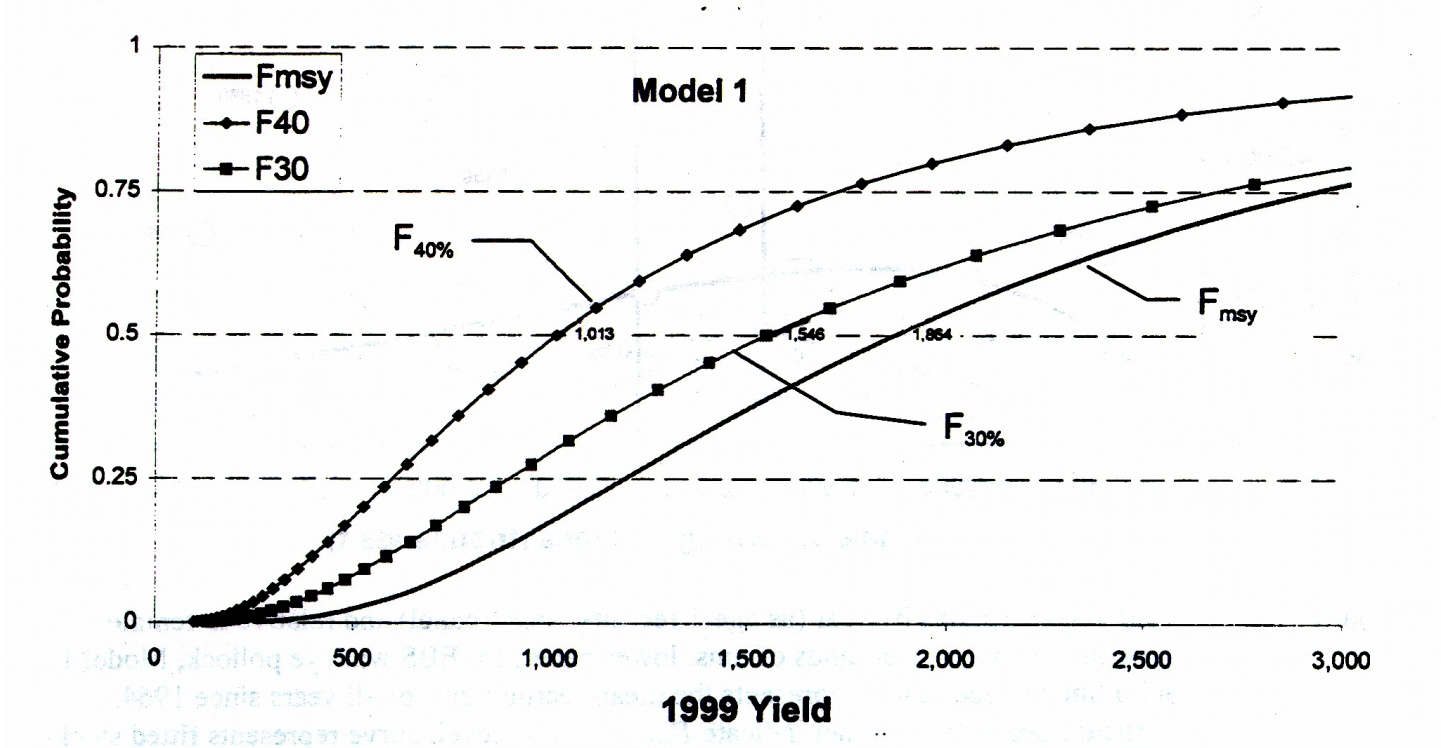


Figure 6.4. Measures of uncertainty in 1999 (unadjusted) yield for EBS pollock as a cumulative distribution. Values along the curve represent the estimated probability (vertical axis) that the 1999 yield will be lower than the corresponding value on the horizontal axis (reprinted from Ianelli et. al., 1998).

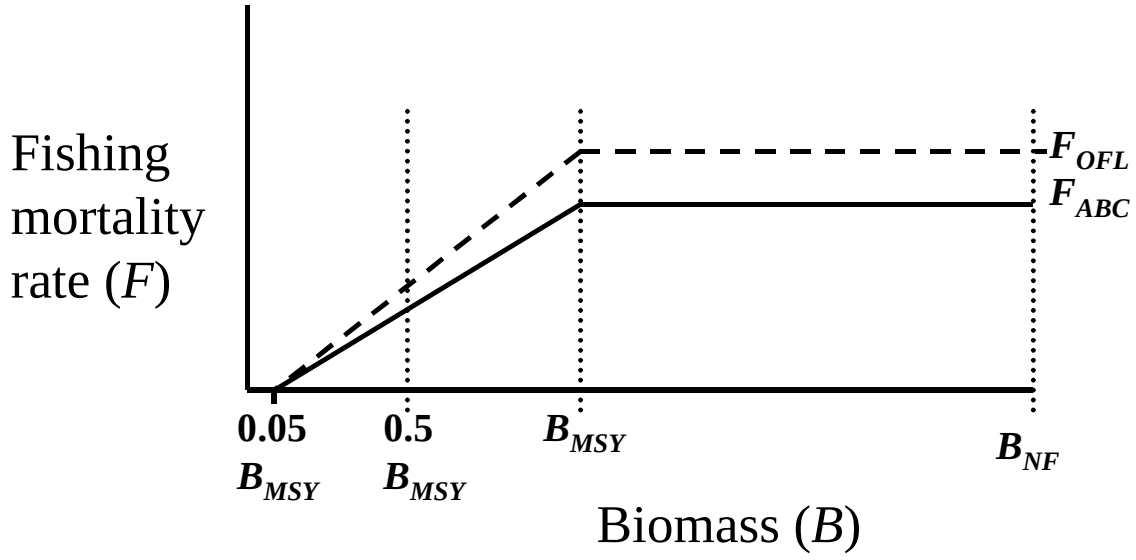


Figure 6.5. Theoretical framework for setting fishery mortality rates to achieve ABC (and avoid OFL) based on stock biomass as determined relative to the estimated size of the stock if it had not been fished (B_{NF}).

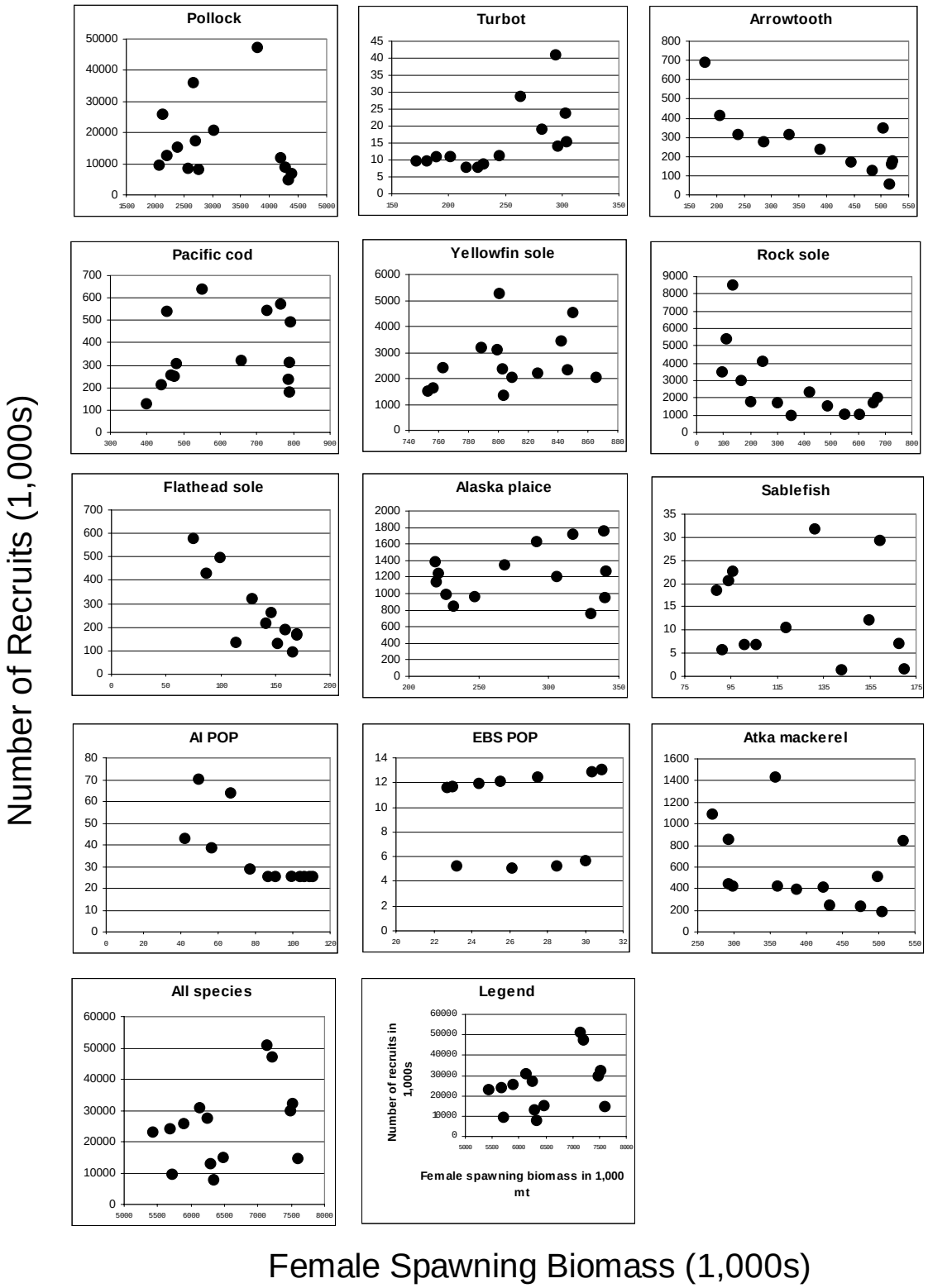


Figure 6.6. Number of recruits as a function of female spawning biomass in the EBS, 1985-1999.

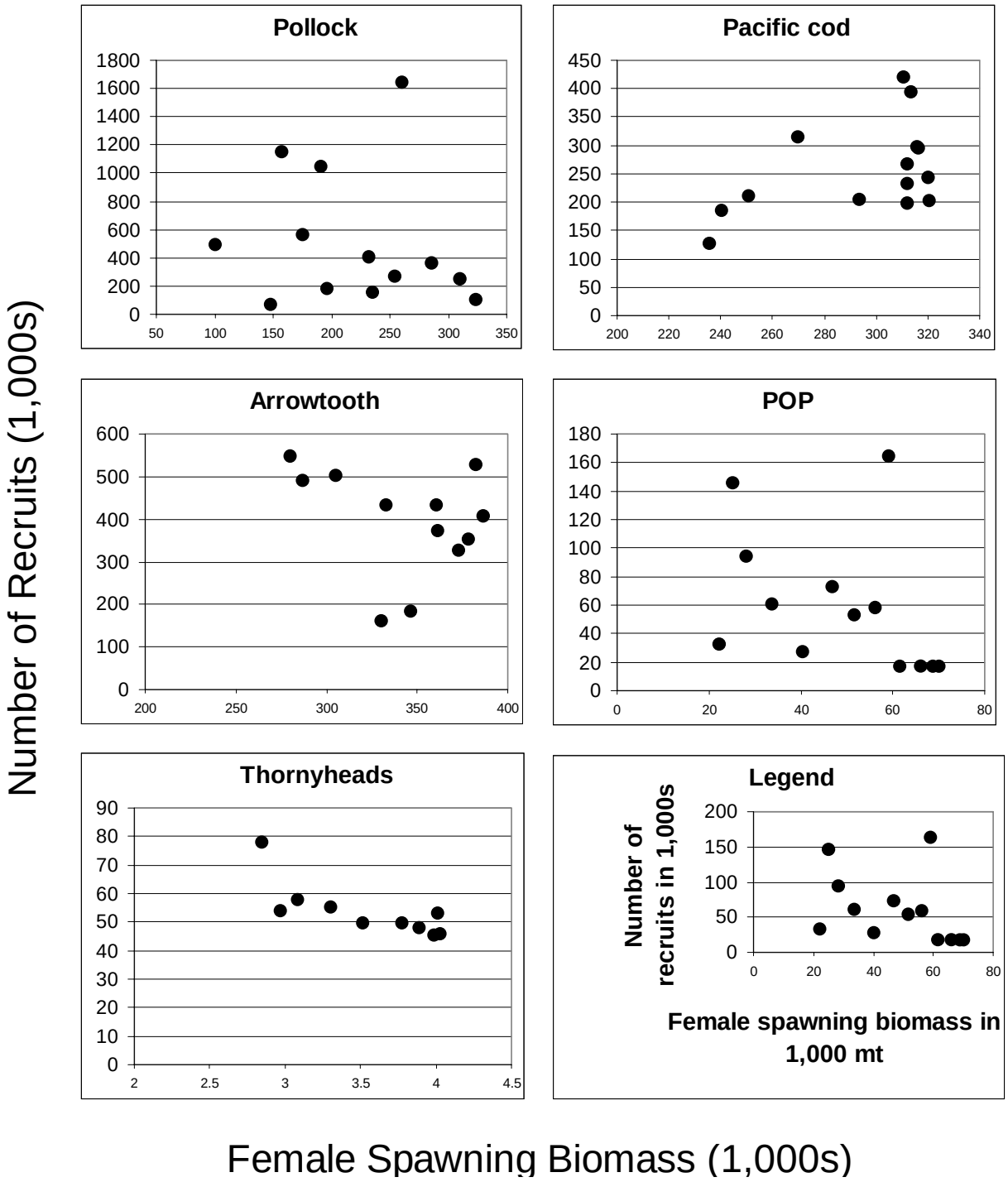


Figure 6.7. Number of recruits as a function of female spawning biomass in the GOA, 1985-1999.

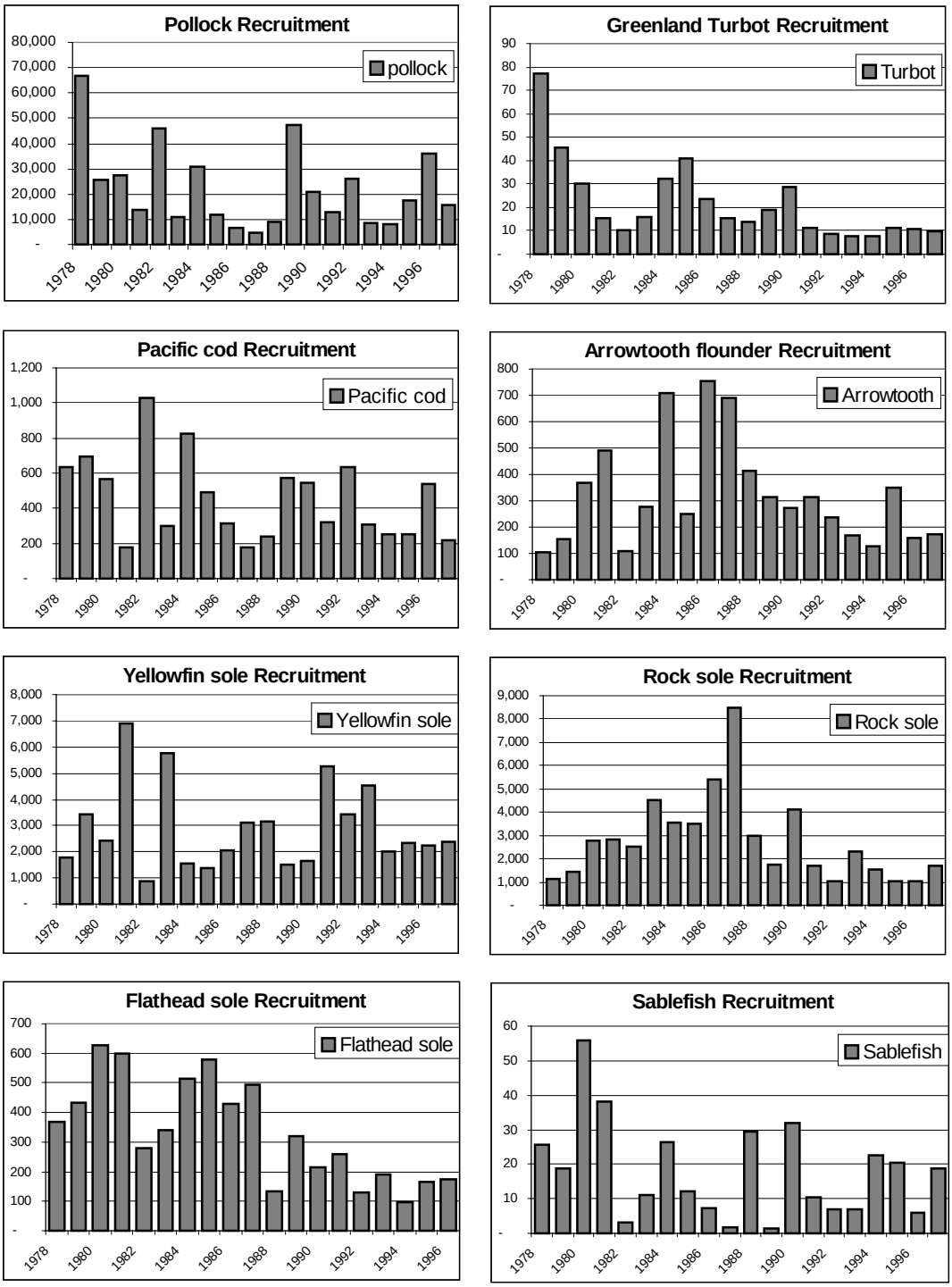
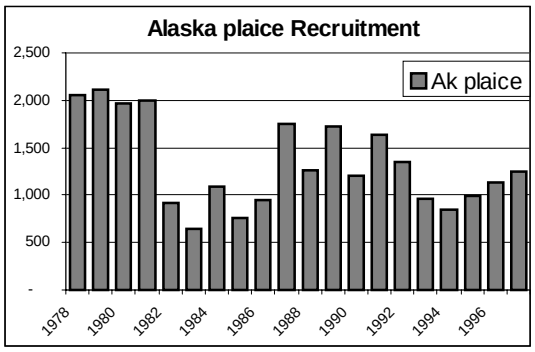
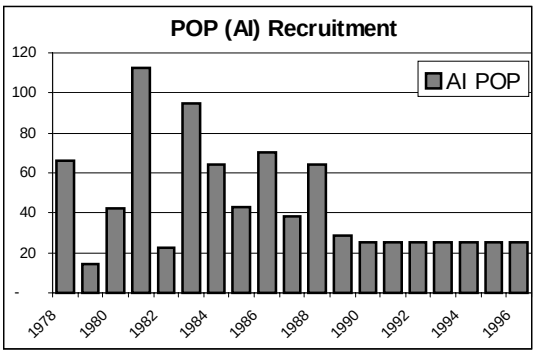
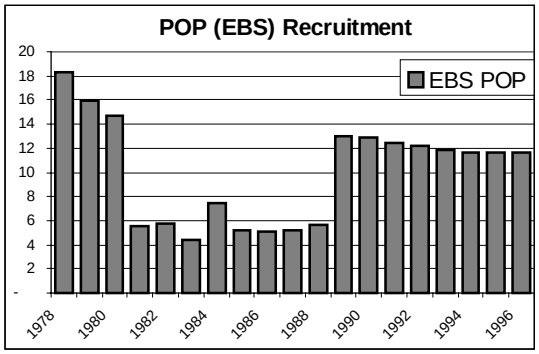
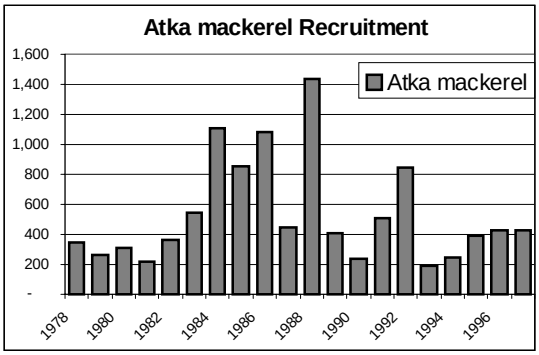


Figure 6.8. Number of recruits (by 1,000) of each species in the BSAI (age of recruitment to the fishery varies by species).









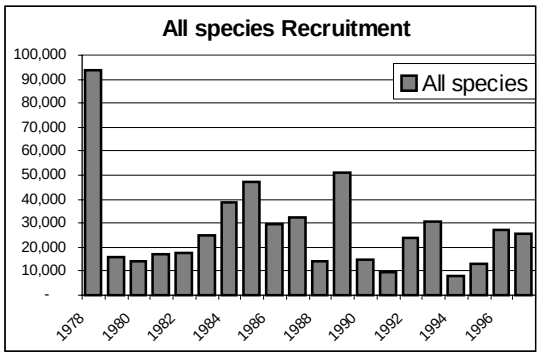


Figure 6.8. Continued.

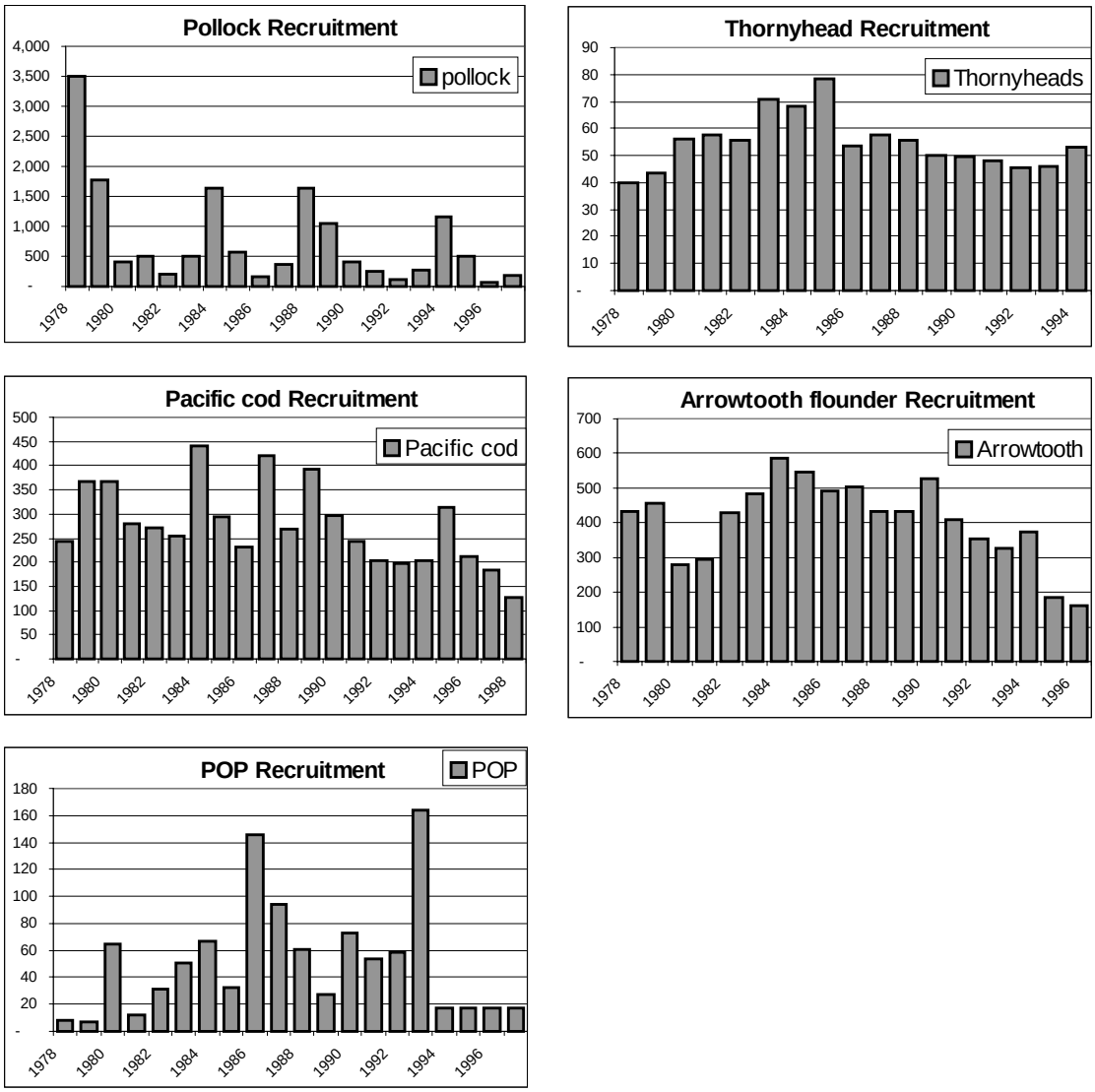


Figure 6.9. Number of recruits (by 1,000) of each species in the GOA (age of recruitment to the fishery varies by species).

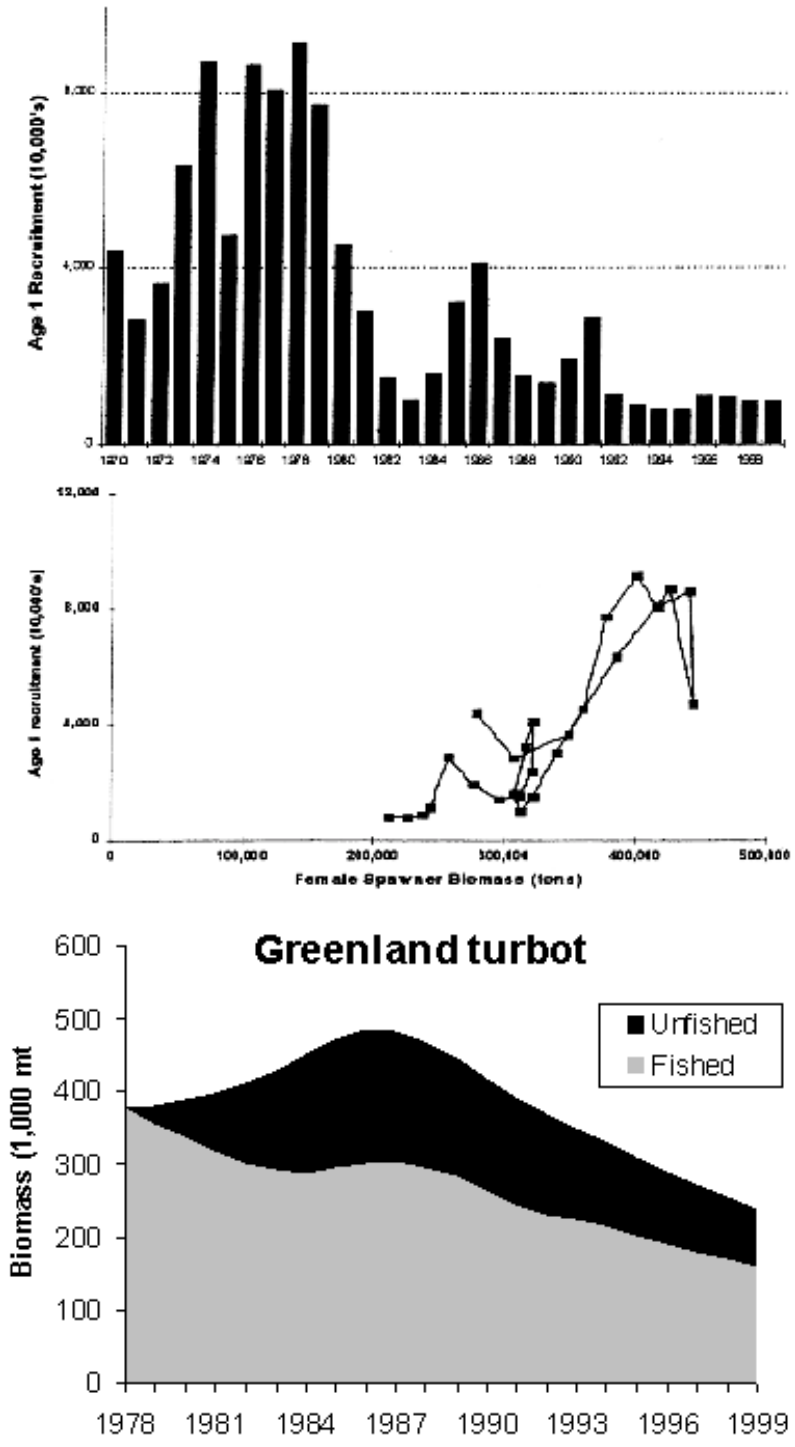


Figure 6.10. Estimated recruitment to age 1 (6.10a upper panel) and the observed sock-recruitment pattern (6.10b middle panel) of Greenland turbot in the EBS/AI region, 1970-1999 (reprinted from Ianelli et. al., 1999; their Figure 4.9), and estimated Greenland turbot biomass at fished and theoretical unfished levels (6.10c bottom panel).

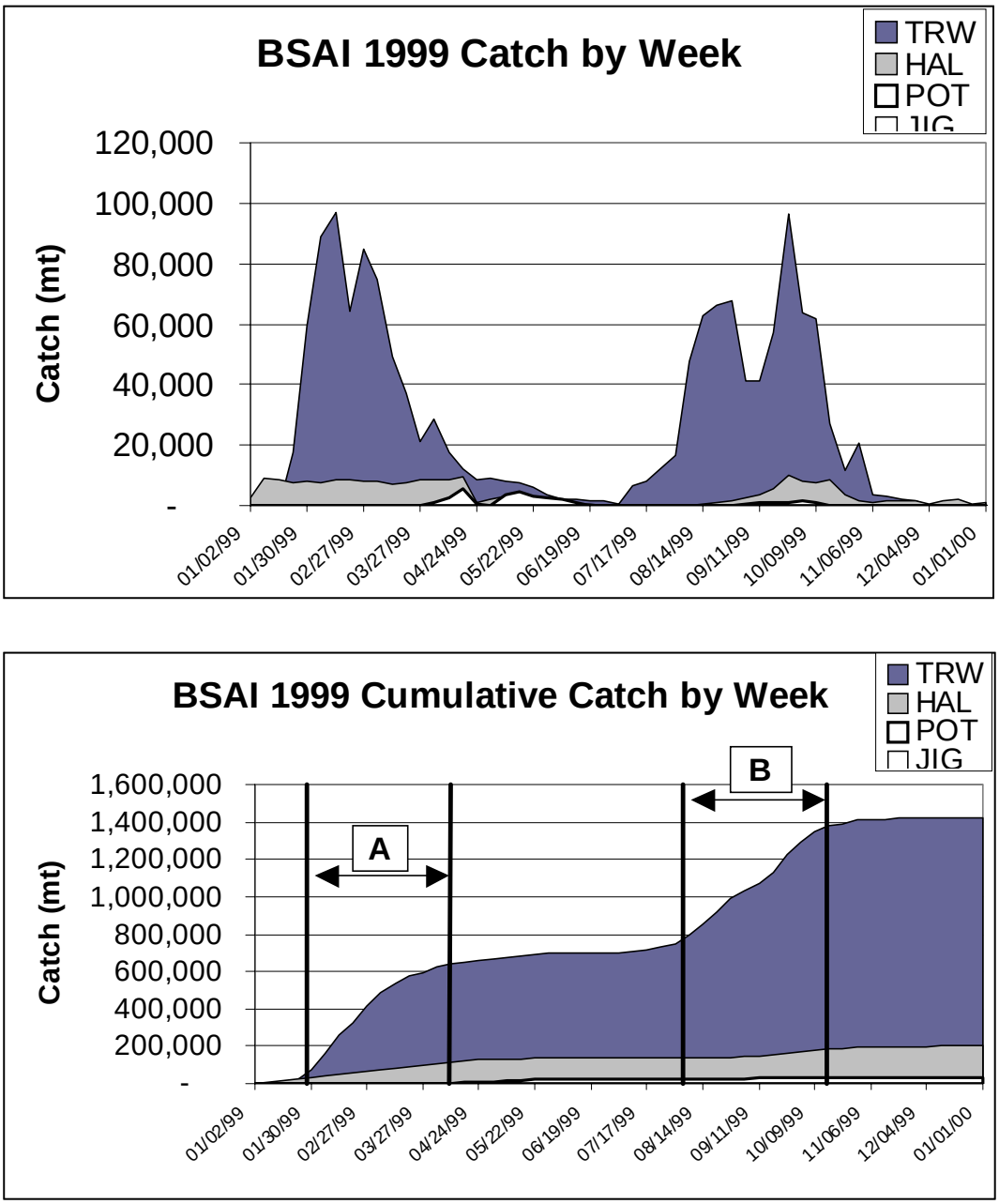
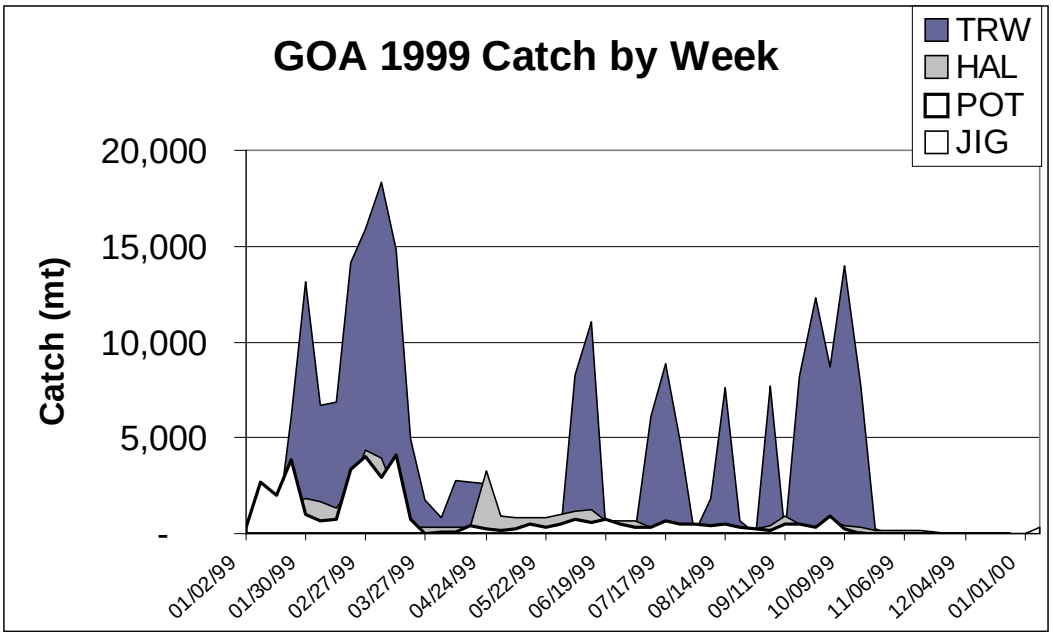


Figure 6.11. Figure 6.11a (top panel) displays the weekly catch rates in the BSAI by gear type for all groundfish species. Figure 6.11b (bottom panel) displays the cumulative catch by week. This figure reveals the two time periods (A and B) in which the majority of groundfish are harvested.



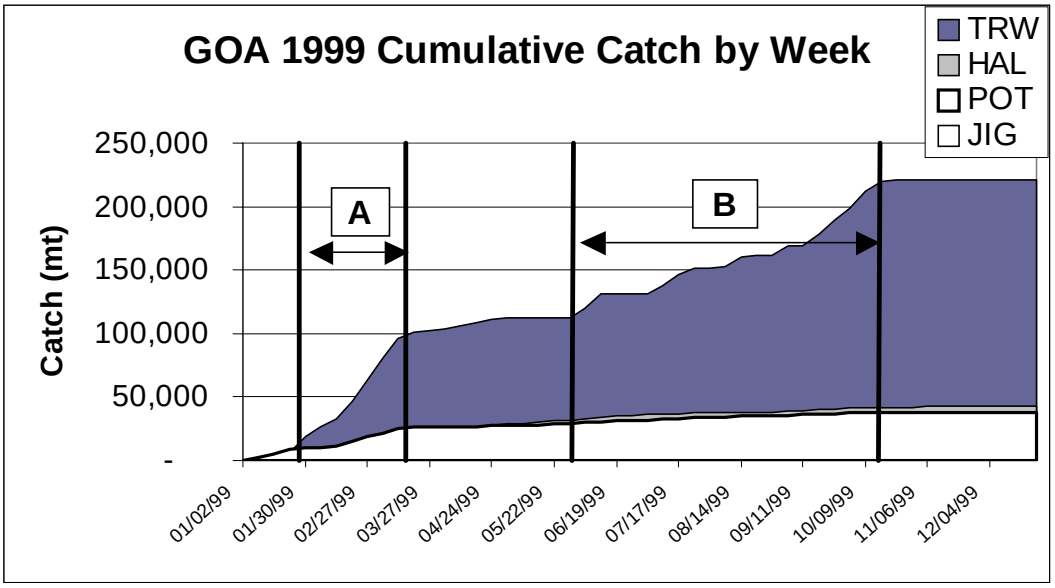


Figure 6.12. Figure 6.12a (top panel) displays the weekly catch rates in the GOA by gear type for all groundfish species. Figure 6.12b (bottom panel) displays the cumulative catch by week. This figure reveals the two time periods (A and B) in which the majority of groundfish are harvested.

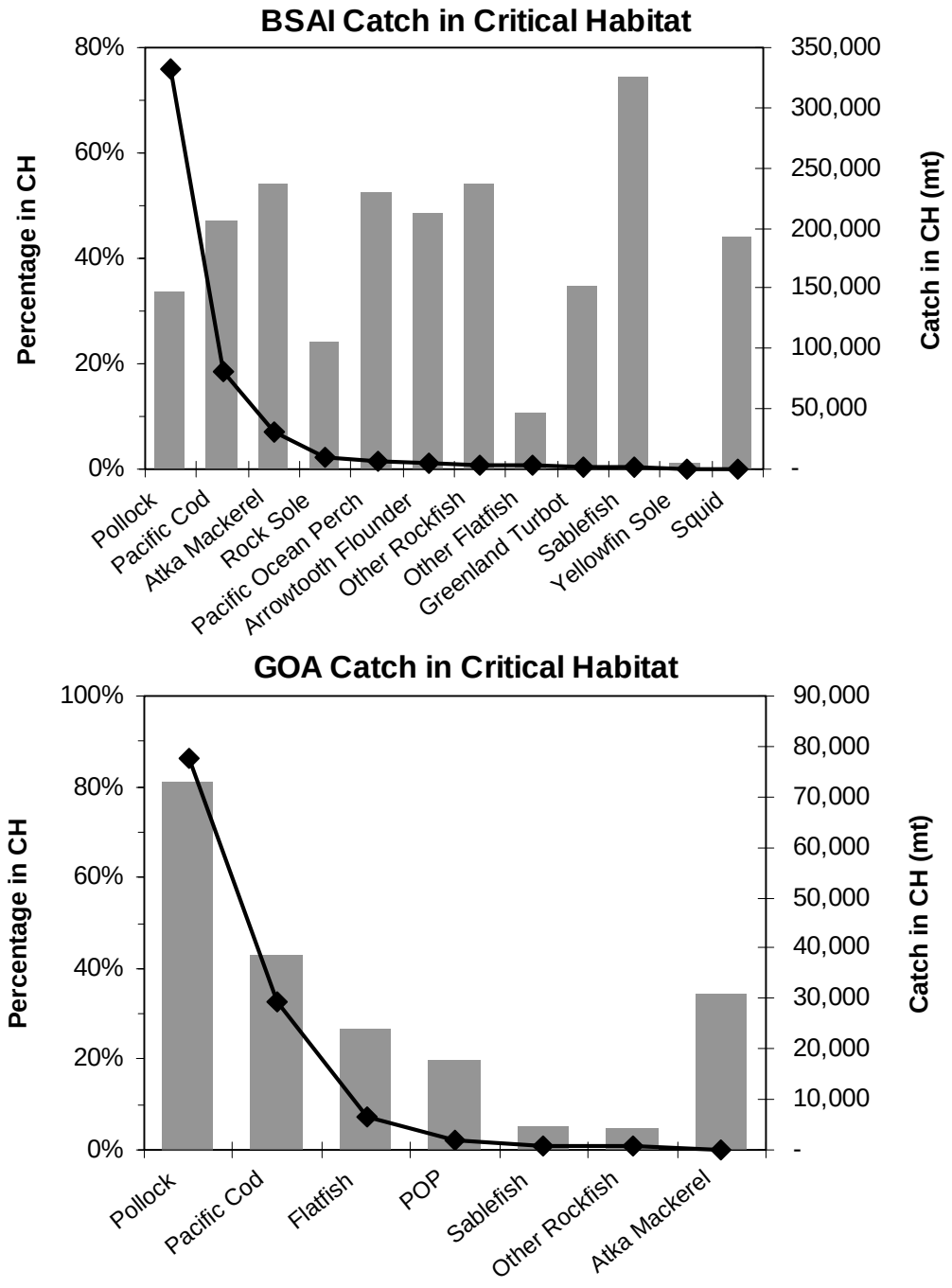


Figure 6.13. BSAI (top panel) and GOA (bottom panel) catch in critical habitat in percent (bars, left Y axis) and amount (line graph in mt, right Y axis).

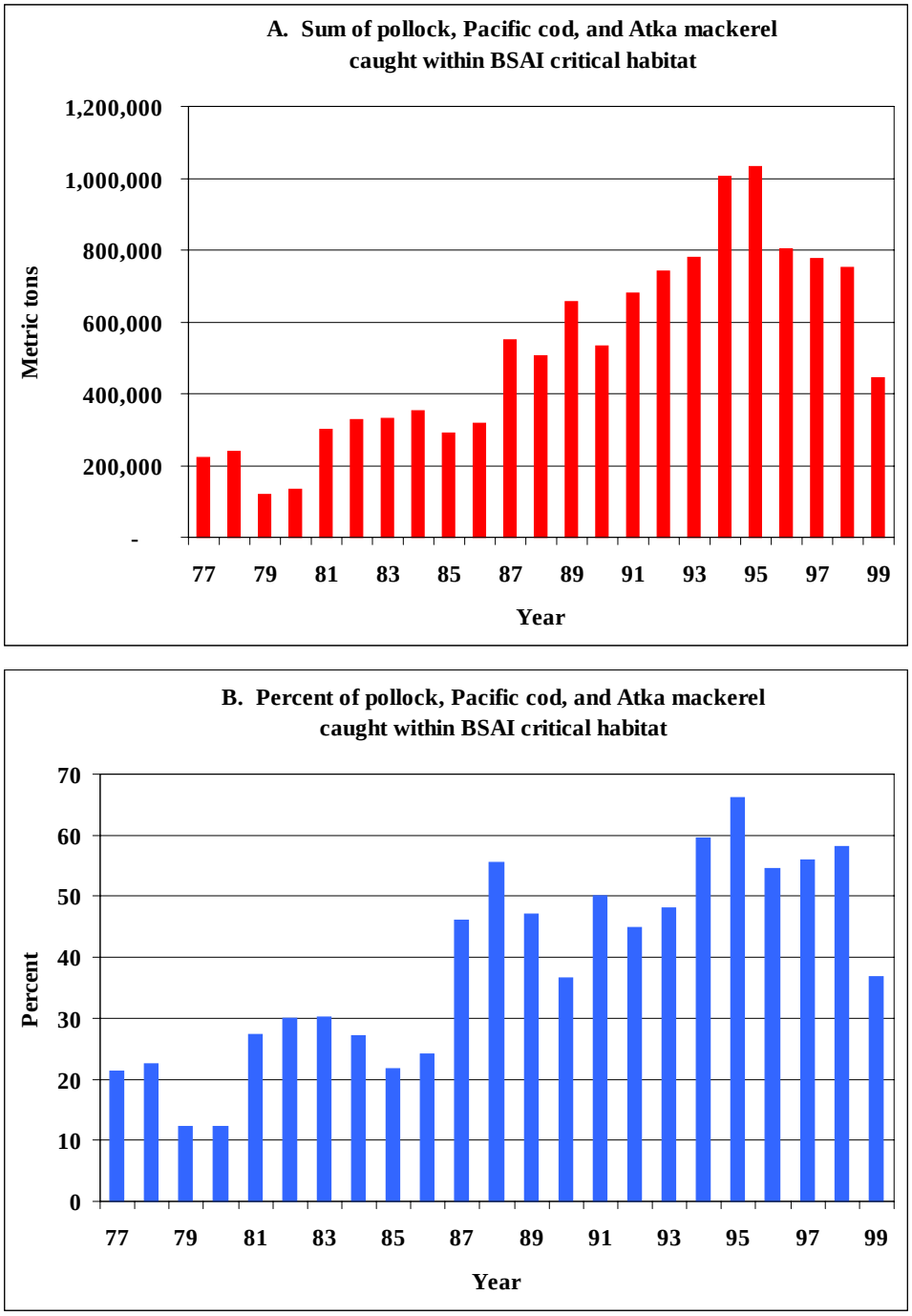


Figure 6.14a. Total catch of pollock, Pacific cod, and Atka mackerel in critical habitat (top panel, in mt) and as a percent of the annual catch (bottom panel) for the BSAI and GOA.

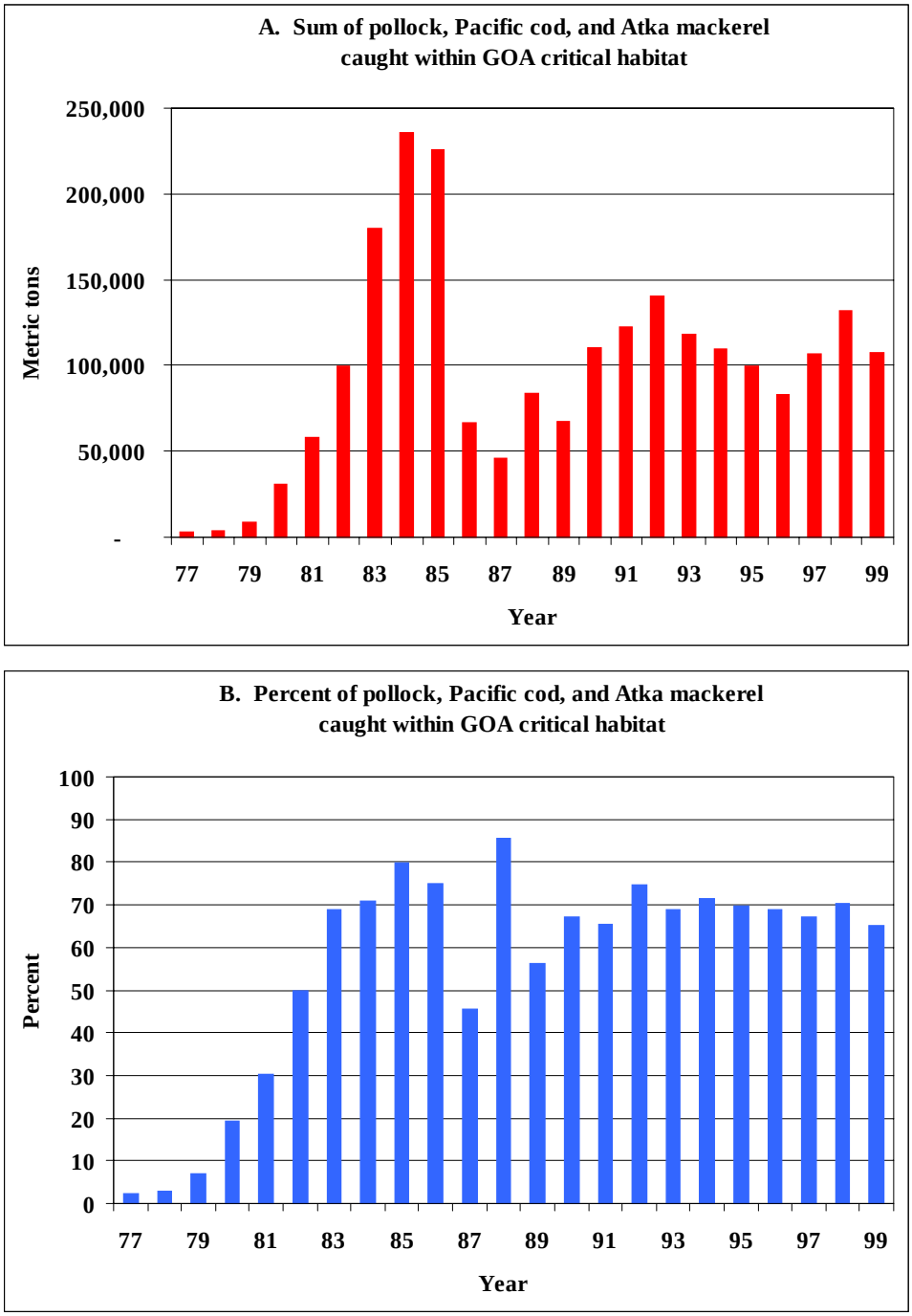


Figure 6.14b. Total catch of pollock, Pacific cod, and Atka mackerel in critical habitat (top panel, in mt) and as a percent of the annual catch (bottom panel) for the BSAI and GOA.

Figure 6.15a. Weekly catch rates of Atka mackerel, Pacific cod, pollock, and all other groundfish species in the BSAI from 1995-1999, both inside and outside of critical habitat.

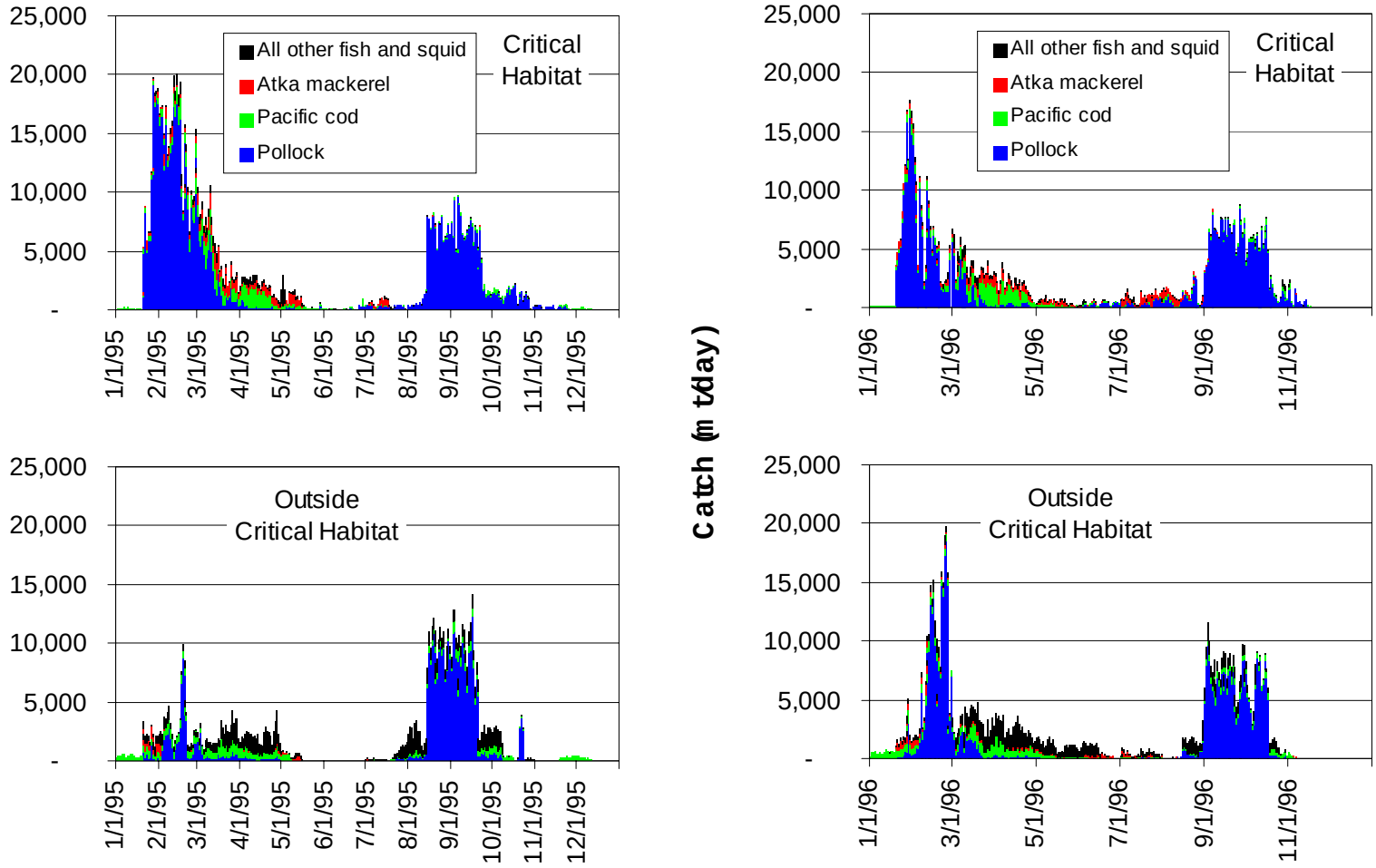


Figure 6.15a. BSAI continued.

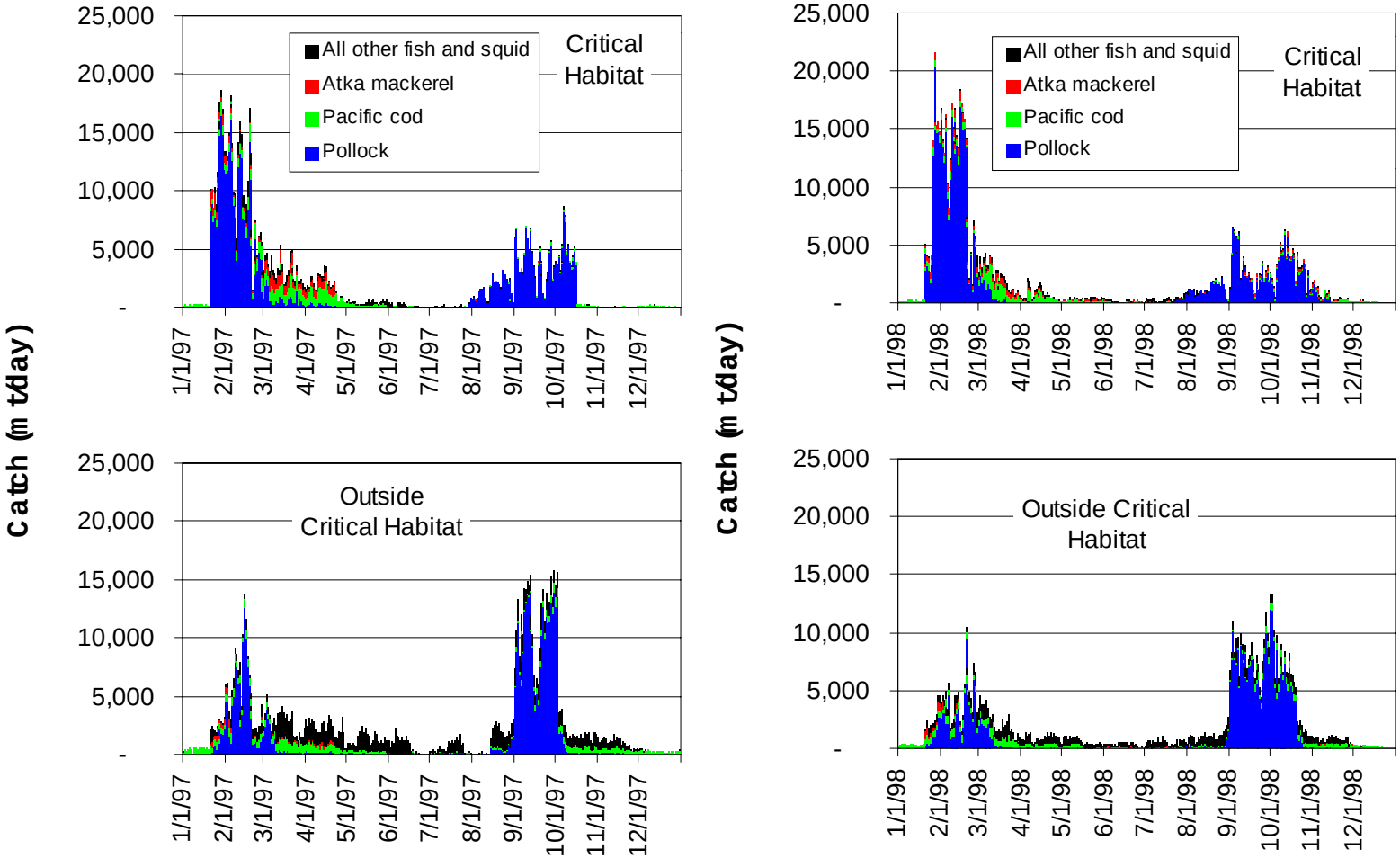


Figure 6.15a. BSAI continued.

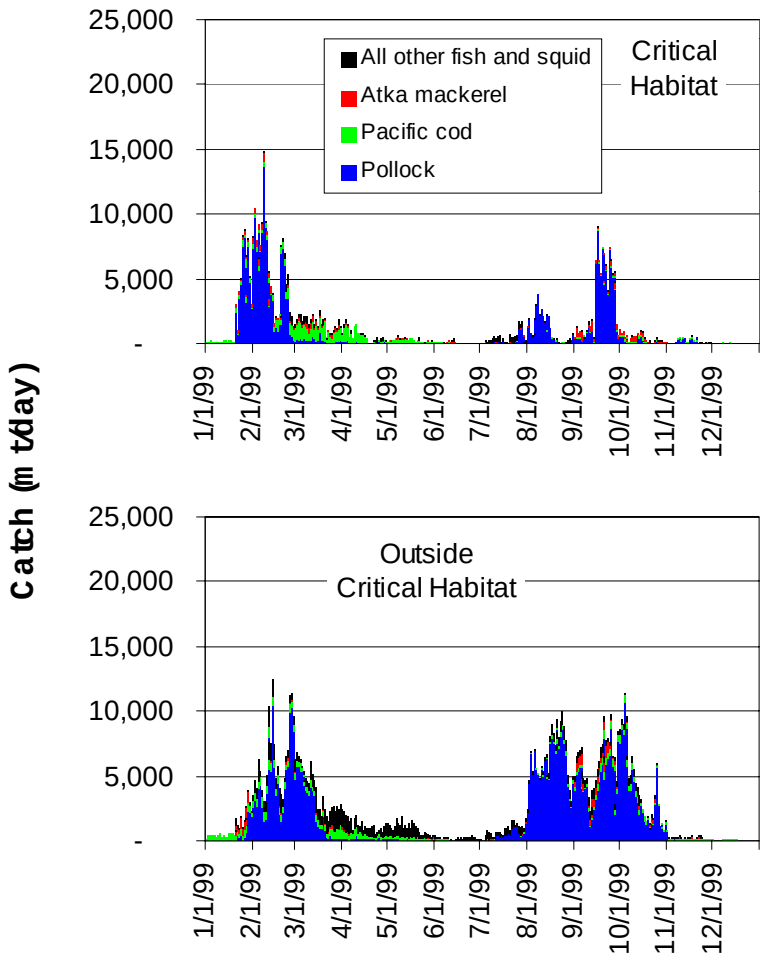


Figure 6.15b. Weekly catch rates of Pacific cod, pollock, and all other groundfish species in the GOA from 1995-1999, both inside and outside of critical habitat.

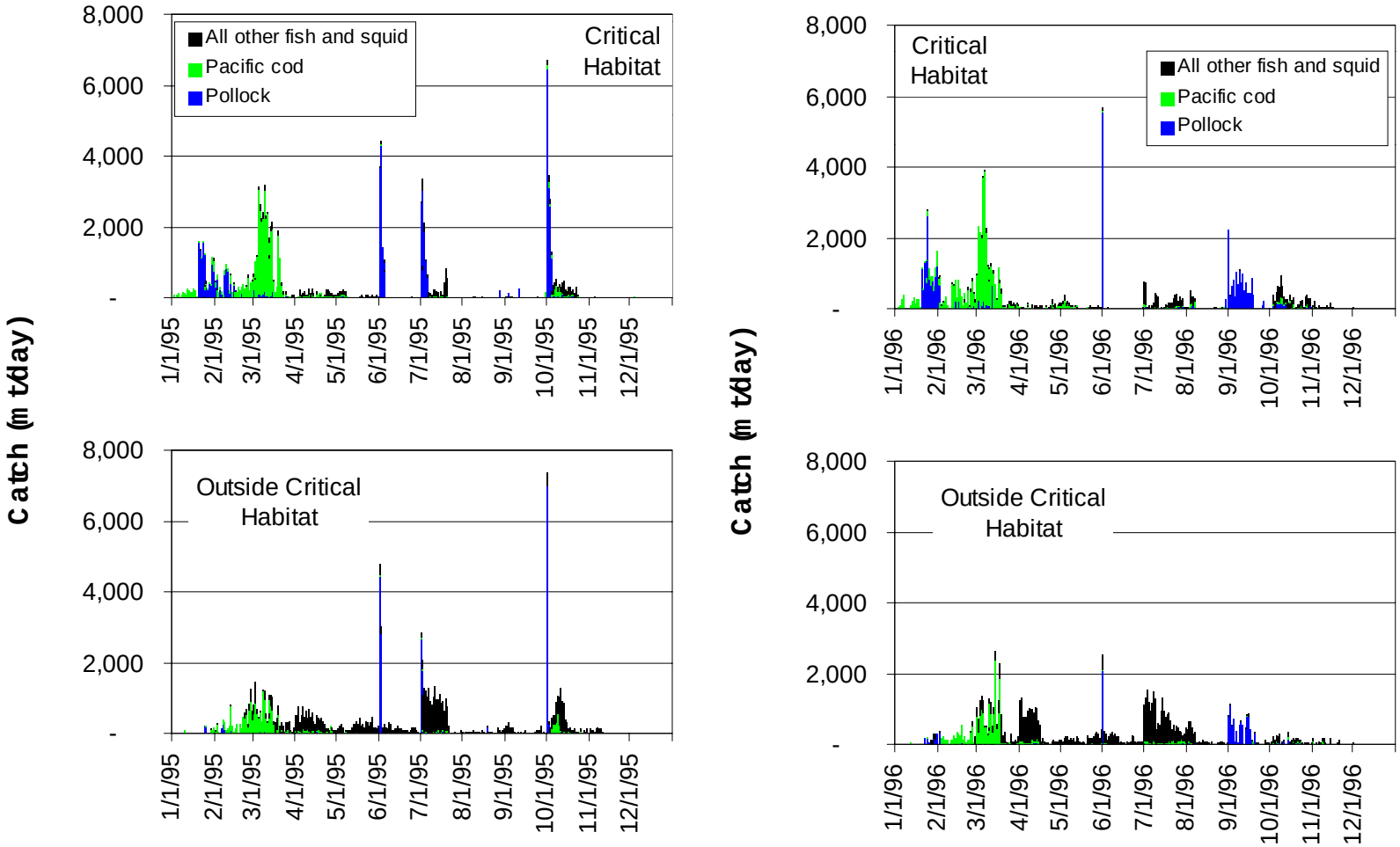


Figure 6.15b. GOA continued.

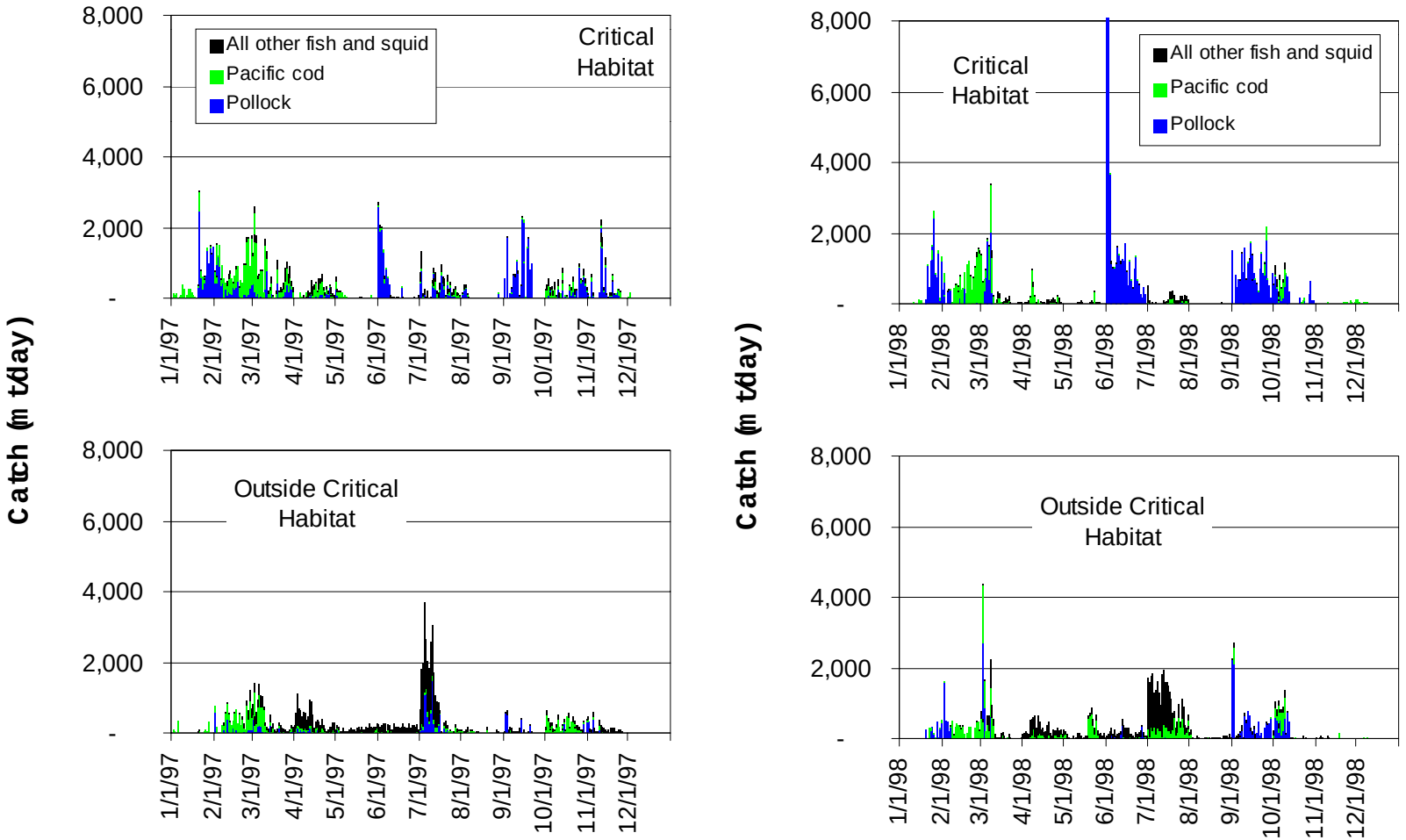
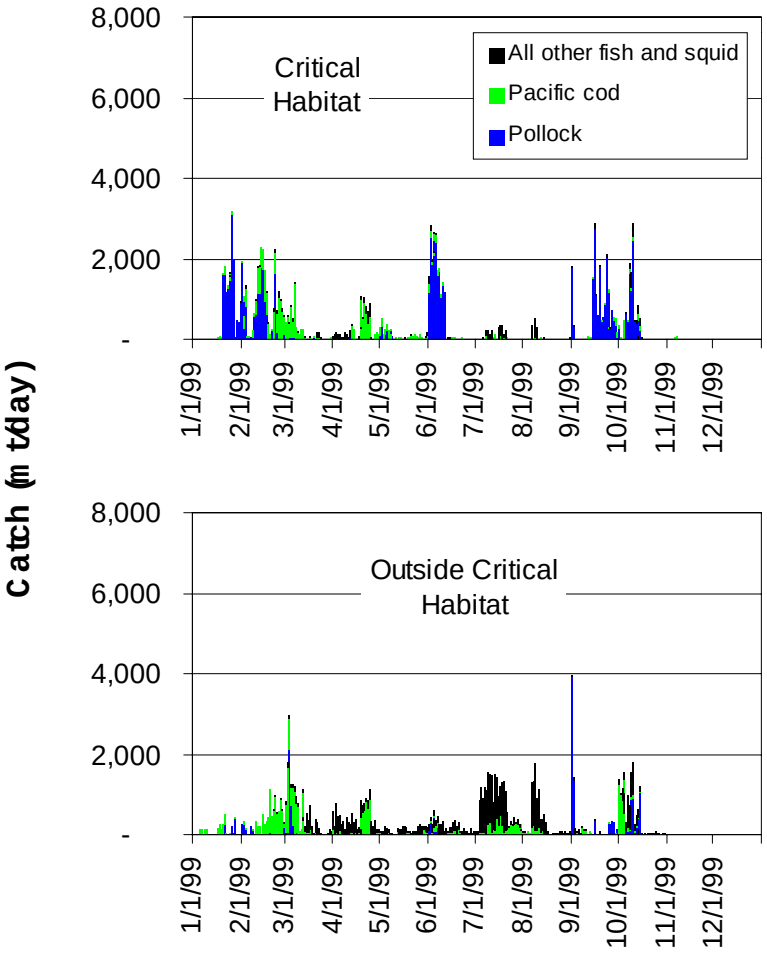


Figure 6.15b. GOA continued.



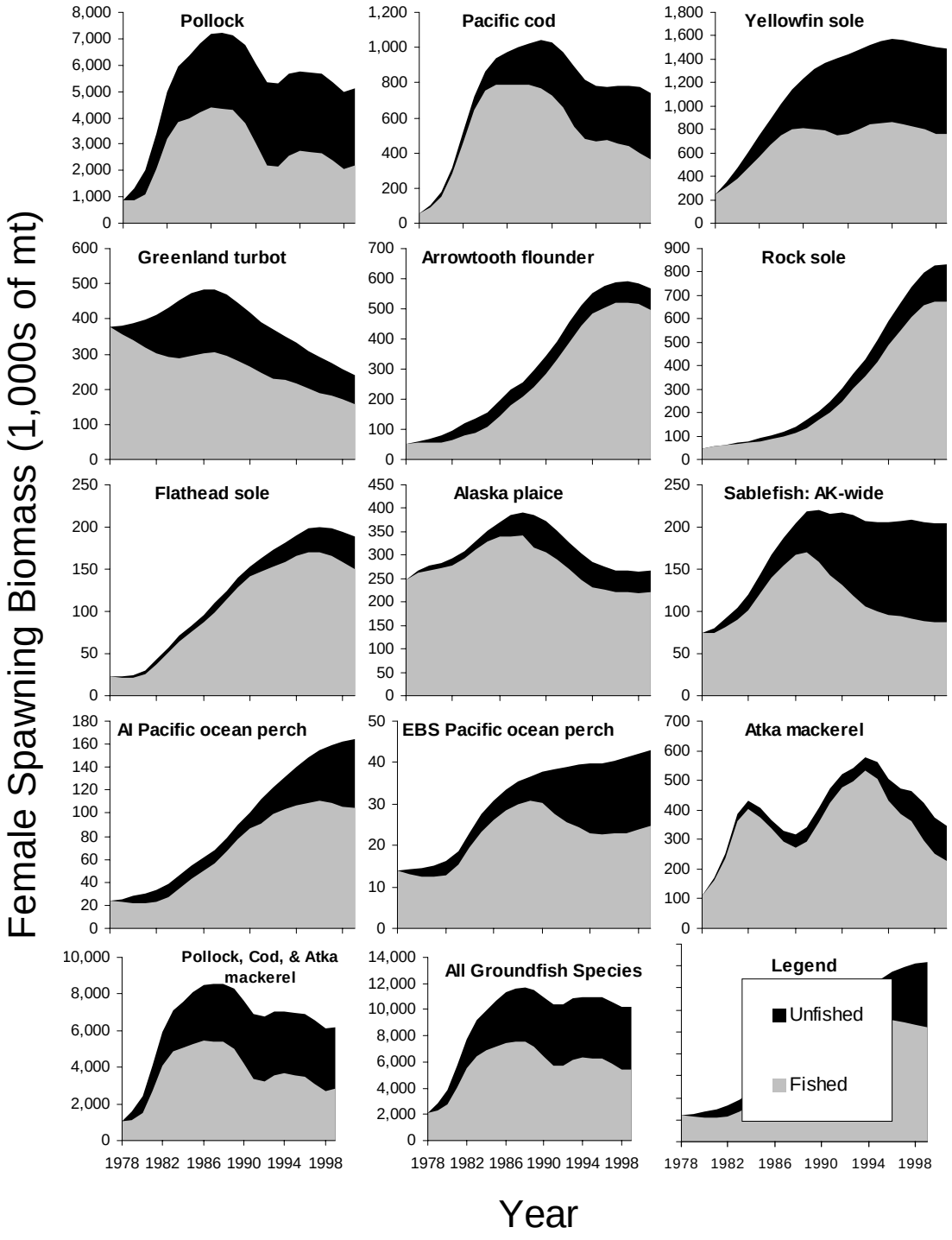


Figure 6.16. Reduction in fish biomass due to cumulative fishing effort on BSAI groundfish.

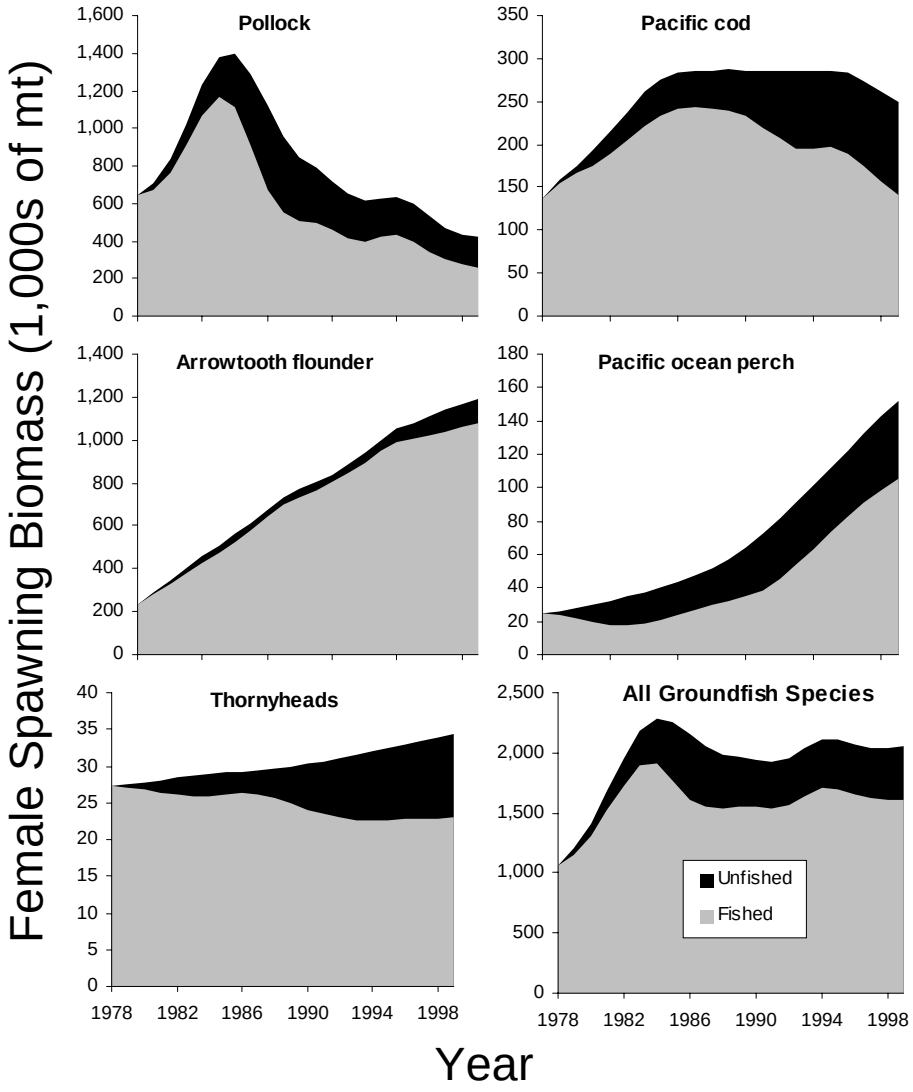


Figure 6.17. Reduction in fish biomass due to cumulative fishing effort on GOA groundfish.

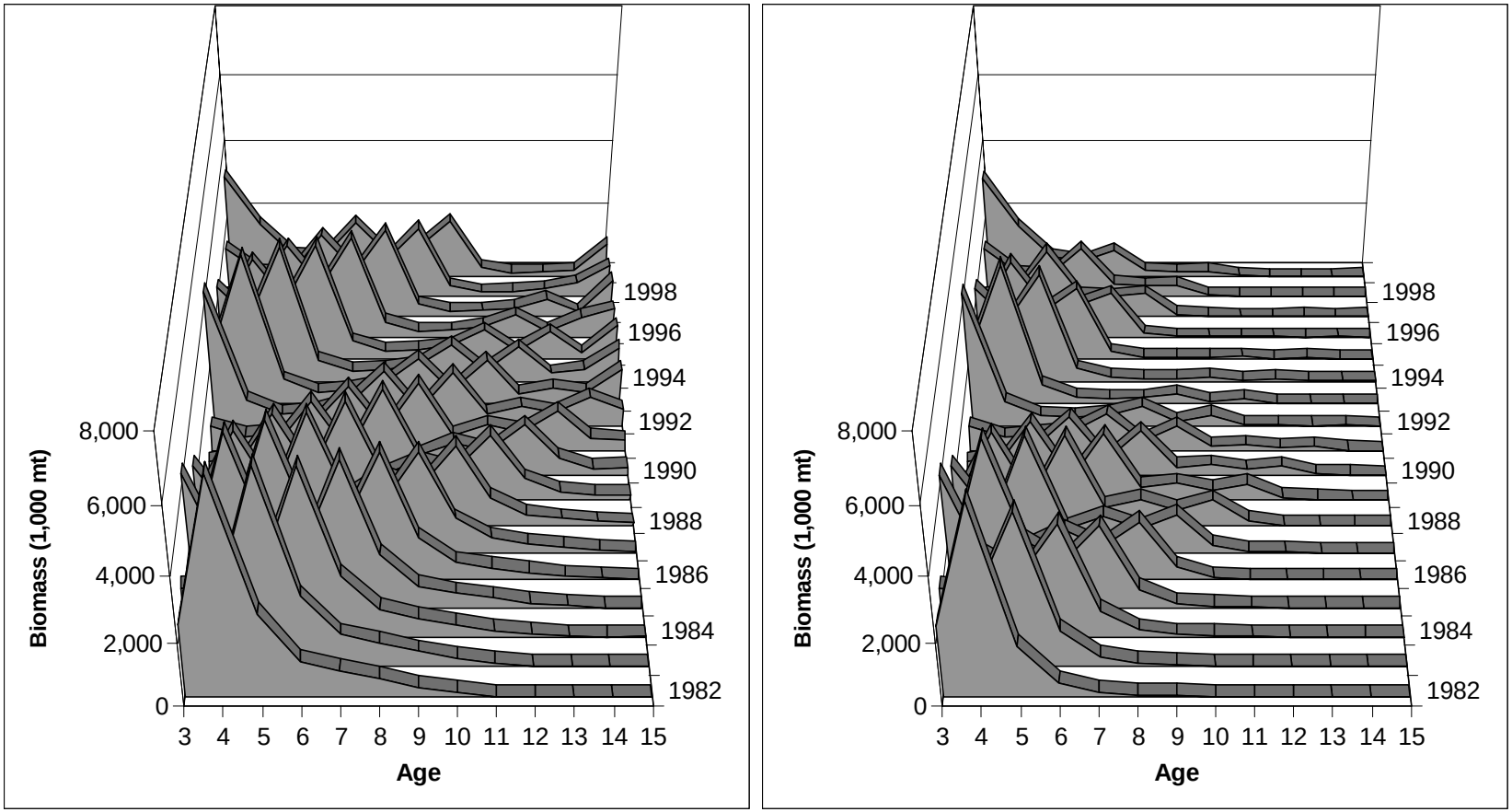


Figure 6.18. Eastern Bering Sea pollock biomass displayed by cohort without fishing (left panel) and with fishing (right panel) applied over the period from 1982 to 1998.

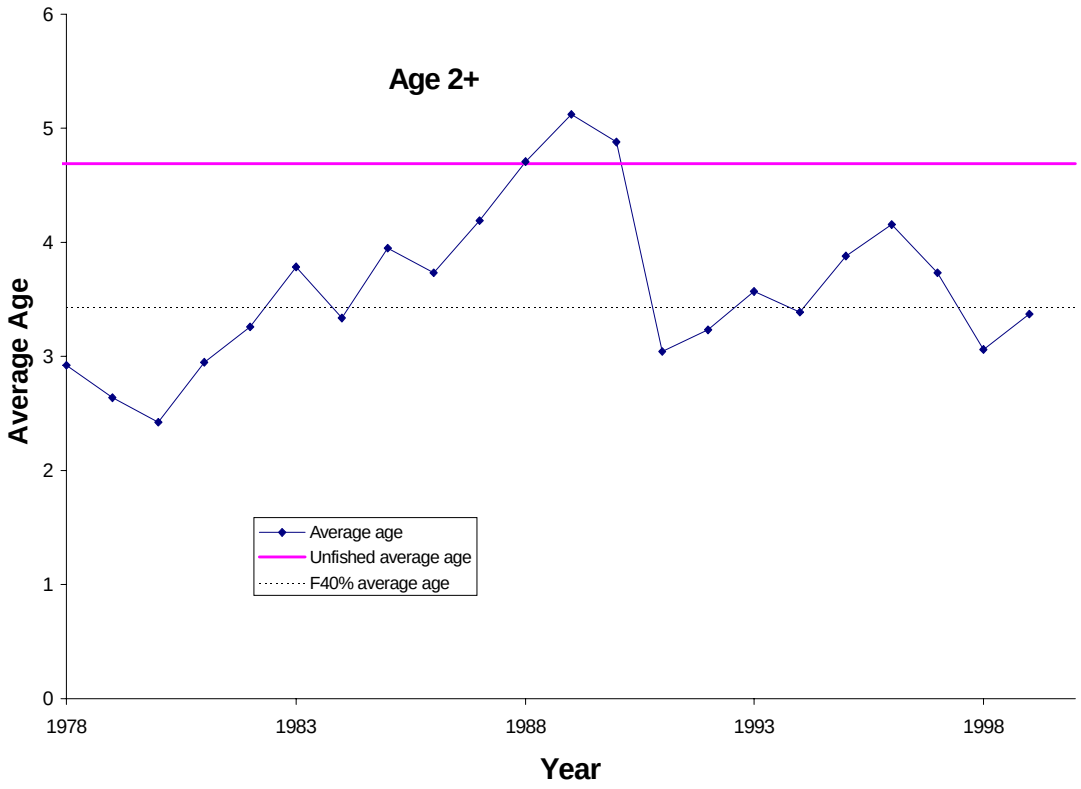


Figure 6.19. Mean age for EBS pollock (1978-1999) from Ianelli et al. (1999) compared to the expected mean age under no fishing and under fishing at a constant F40% harvest rate.

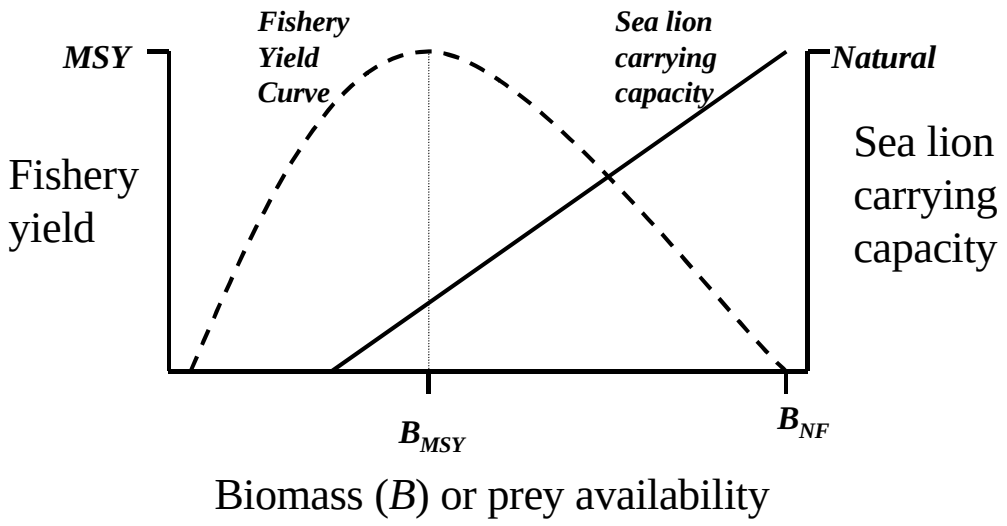


Figure 6.20. Schematic illustration of the relation between 1) the biomass of prey stocks and the yield curve that serves as the basis for the yield-based fishery paradigm, and 2) the simplest approximation of the relation of biomass of the prey stock to the environmental carrying capacity for Steller sea lions.

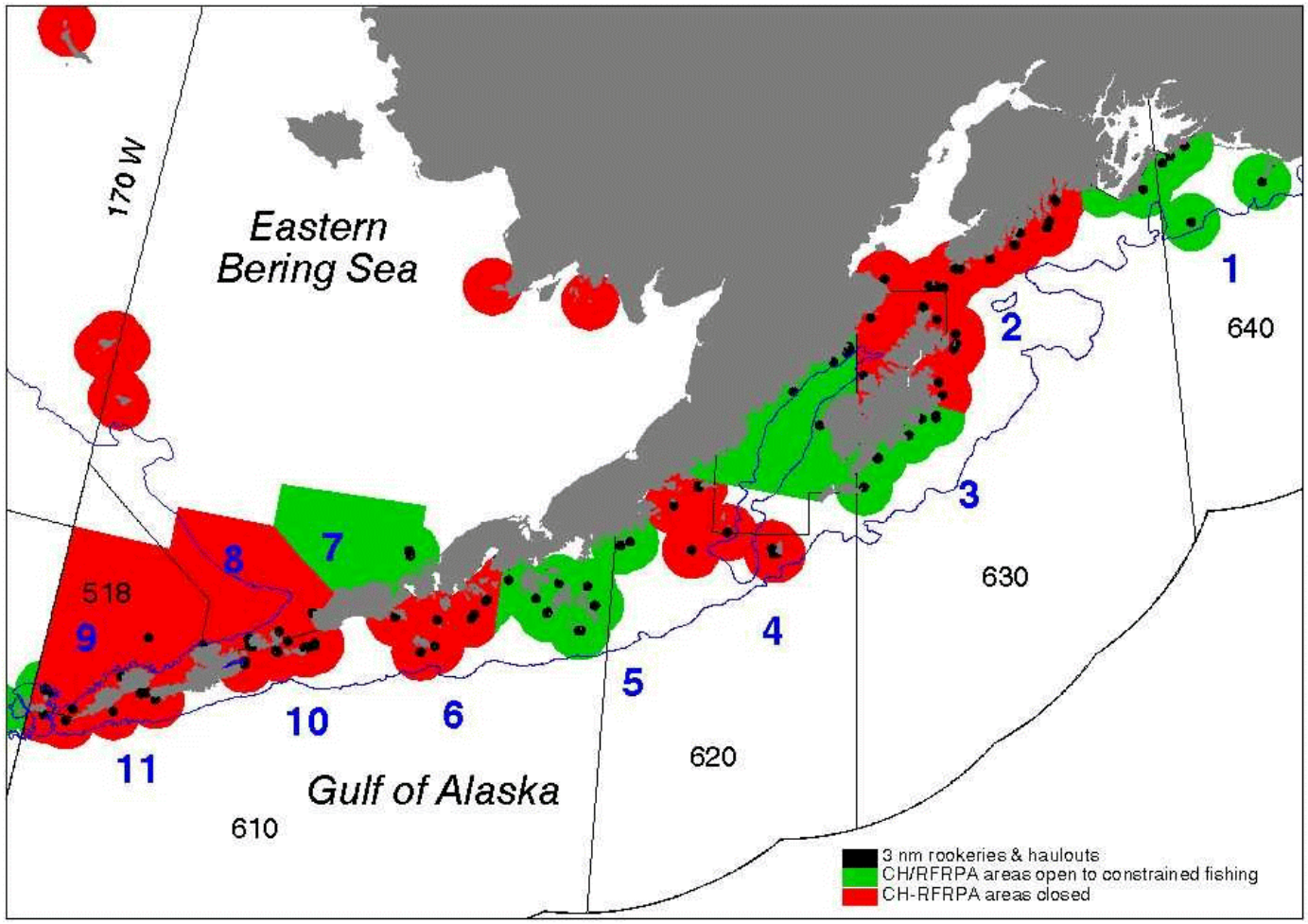


Figure 9.1a. CH-RFRPA areas closed and open to constrained fishing for pollock and Pacific cod fisheries in the Gulf of Alaska. Areas 1-6, 10 and 11 are in the Gulf of Alaska groundfish fishery management region (areas 610-640).

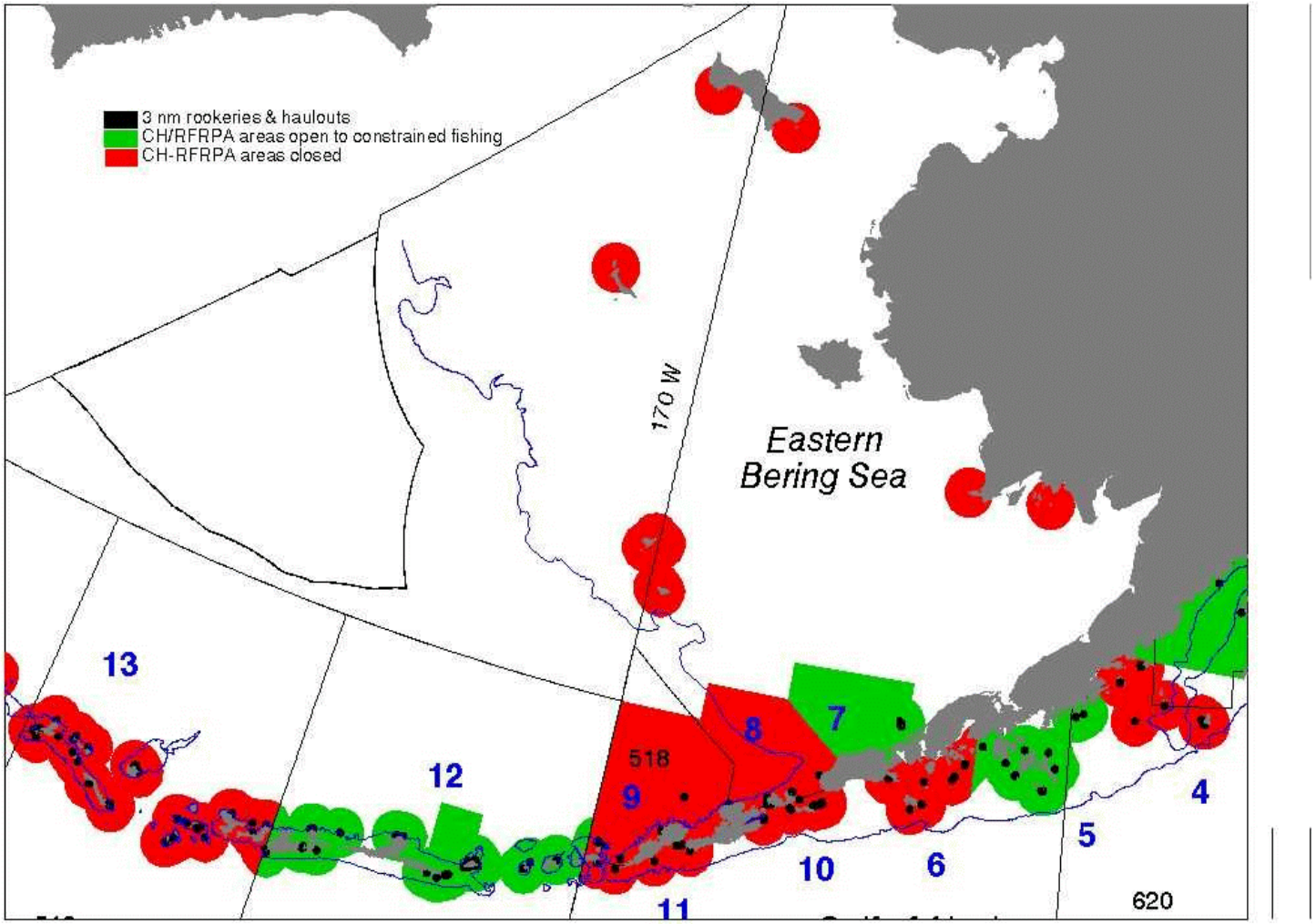


Figure 9.1a. CH-RFRPA areas closed and open to constrained fishing for pollock, Pacific cod, and Atka mackerel fisheries in the eastern Bering Sea. Areas 7-9 are in the eastern Bering Sea groundfish fishery management region.

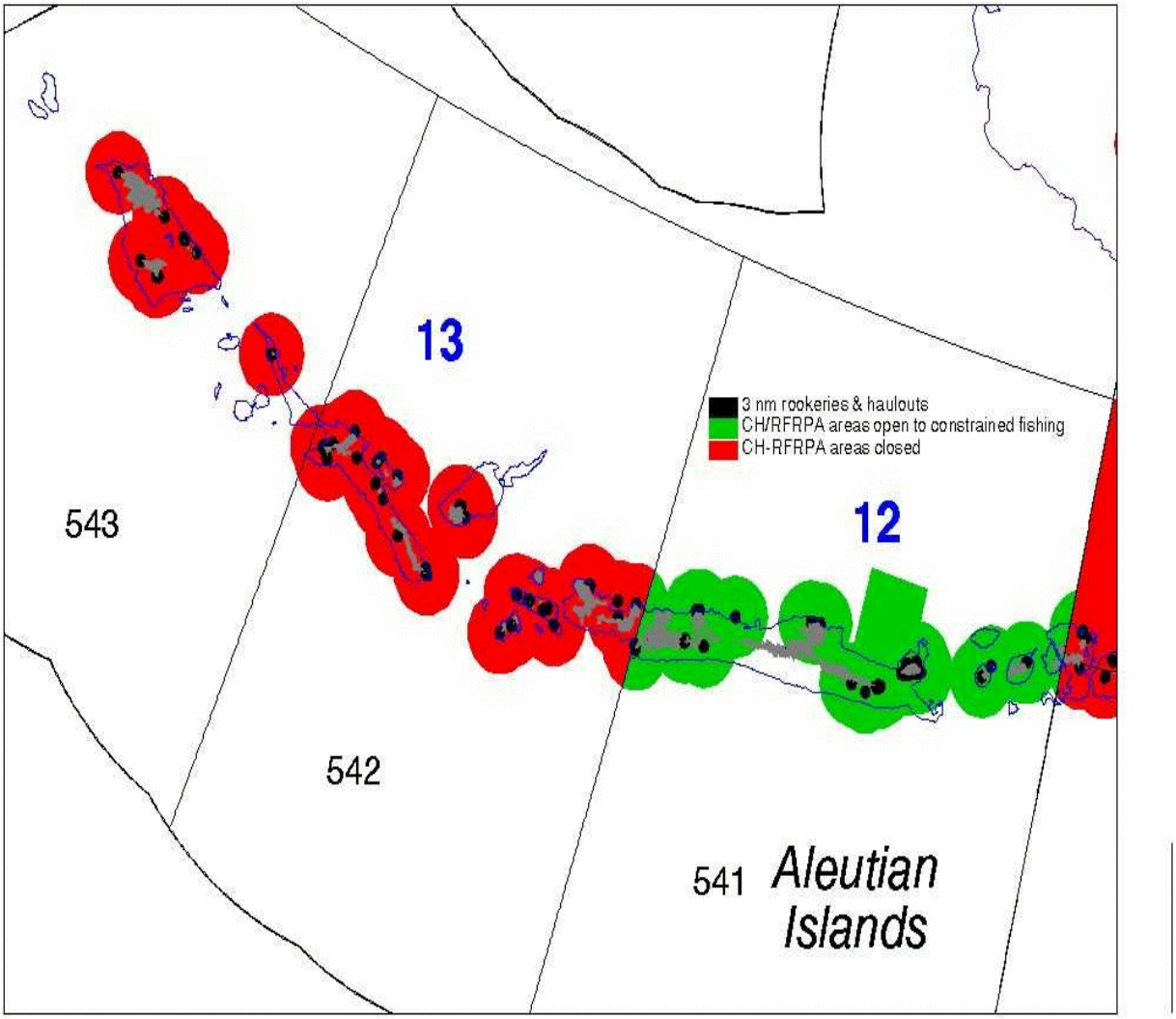


Figure 9.1c. CH-RFRPA areas closed and open to constrained fishing for pollock, Pacific cod, and Atka mackerel fisheries in the Aleutian Islands. Areas 12 and 13 are in the Aleutian Islands groundfish fishery management region (areas 541-543).