

MEMORANDUM

TO: Council, SSC and AP Members

FROM: Clarence G. Pautzke  
Executive Director

DATE: December 1, 1998

SUBJECT: Final GOA Groundfish Specifications for 1999

ESTIMATED TIME  
8 HOURS  
(for all D-3 items)

**ACTION REQUIRED**

- (c) Review Final 1998 GOA Final Stock Assessment and Fishery Evaluation (SAFE) document.
- (d) Approve final GOA groundfish and bycatch specifications for 1999.
- (e) Approve halibut discard mortality rates.

**BACKGROUND**

At this meeting, the Council sets final recommendations for groundfish and bycatch specifications. The final SAFE report, groundfish ABCs and TACs, and bycatch apportionments and halibut discard mortality rates need to be approved. These final specifications will be used for managing the 1999 groundfish fisheries and will supersede the Council's preliminary specifications.

(c) GOA SAFE Document

The groundfish Plan Teams met in Seattle during November 16-19, to prepare the final GOA SAFE report that was mailed to you on November 25. This SAFE forms the basis for final groundfish specifications for the 1999 fishing year. The final GOA SAFE contains the Plan Team's estimates of biomass, ABCs, and overfishing levels for all groundfish species covered under the FMP and information concerning PSC bycatch to provide guidance to the Council in establishing PSC apportionments. The SAFE and Plan Team minutes (Item D-3(c)) also include recommendations and rationale for separating the Eastern Gulf ABC for several species/complexes. The attached tables from the SAFE lists the Plan Team's recommended 1999 ABCs and corresponding OFLs for each of the species or species complexes.

(d) Final ABCs and TACs

A summary worksheet of Plan Team, SSC, and AP recommendations from this meeting will be provided to the Council. Tables 1-4 from the SAFE summary chapter listing groundfish ABCs and biomass levels are attached as Item D-3(d)(1). The Plan Team's sum of recommended ABCs for 1999 is 528,190 mt, a decrease of approximately 20,000 mt from the total 1998 ABCs of 548,650 mt.

Overall, the status of the stocks in the Gulf of Alaska continues to appear relatively favorable. ABC recommendations remain essentially unchanged from 1998 for GOA flatfish and rockfish. Plan Team recommendations for pollock decreased from 130,000 mt in 1998 to 103,020 mt for 1999. The Plan Team

recommended the same ABC for Pacific cod in 1999 as was approved in 1998. Sablefish continues to decline, by about 9% from 14,120 mt in 1998 to 12,700 mt in 1999. The recommendation for Pacific ocean perch continued to increase, by more than 20% from 10,776 mt in 1998 to 13,120 mt in 1999. Catches totaled approximately 75% of the 1998 TAC, as of November 21, 1998.

Beginning in 1997, the Council has reduced the GOA Pacific cod TAC to account for removals from the State P. cod fisheries. In December 1997, the Council allowed for the automatic increase in the Kodiak subarea and reduced the Central area TAC accordingly. At its December meeting, the BOF decided to rescind that automatic increase for 1998 in the Kodiak area. NMFS subsequently made the correction to the final specifications as listed in the box at right.

According to ADF&G, Kodiak, Chignik, and the Alaska Peninsula likely will take their full allocations in 1998, and will automatically ramp up in 1999 to 20% of the Federal ABC for those subareas (Item D-3(d)(2)). Prince William Sound and Cook Inlet/N. Gulf Coast are predicted to not attain their GHLS. Using the projected increases in state water GHLS and the Plan Team's recommended ABC for 1999, the federal TAC for P. cod would be adjusted as listed at right.

The release of unharvested State water quota back to the federal fishery prior to October 1 remains unresolved. ADF&G has noted that a framework mechanism is needed to give the agency flexibility to return unused P. cod to the federal fishery. While it was not needed in 1998 because the quotas for Kodiak, Chignik and Alaska Peninsula likely will be fully utilized, it could be needed next year as the State quotas are increased. ADF&G was requested to develop a mechanism for transferring unharvested State quota to the federal fisheries in time for the fleet to respond to the additional federal quota. The Board was scheduled to discuss this issue at its December meeting.

| 1998 Gulf Pacific cod ABC, TAC and State guideline harvest level (mt). |                |              |              |        |
|--|----------------|--------------|--------------|--------|
| Specifications   | Western        | Central      | Eastern      | Total  |
| ABC  | 27,260         | 49,080       | 1,560        | 77,900 |
| BOF GHl  | 4,090          | 7,360        | 400          | 11,840 |
| (%)  | 15             | 15           | 25           | 15.2   |
| TAC  | 23,170         | 41,720       | 1,170        | 66,060 |
|  | Cook Inlet     | 1,104        | 2.25%        |        |
|  | Kodiak         | 3,680        | 7.5%         |        |
|  | <u>Chignik</u> | <u>2,576</u> | <u>5.25%</u> |        |

| 1999 Gulf Pacific cod ABC, TAC and State guideline harvest level (mt). |                |              |         |        |
|--|----------------|--------------|---------|--------|
| Specifications   | Western        | Central      | Eastern | Total  |
| ABC  | 27,260         | 49,080       | 1,560   | 77,900 |
| BOF GHl  | 5,452          | 9,448        | 400     | 15,290 |
| (%)  |                |              | 25      | 19.6   |
| TAC  | 21,808         | 39,632       | 1,170   | 62,610 |
|  | Cook Inlet     | 1,104        | 2.25%   |        |
|  | Kodiak         | 4,908        |         |        |
|  | <u>Chignik</u> | <u>3,436</u> | _____   |        |

The PSC limits for halibut in the Gulf of Alaska in 1998 are:

|             |              |               |              |
|-------------|--------------|---------------|--------------|
| 1st quarter | 600 mt (30%) | 1st trimester | 250 mt (86%) |
| 2nd quarter | 400 mt (20%) | 2nd trimester | 15 mt ( 5%)  |
| 3rd quarter | 600 mt (30%) | 3rd trimester | 25 mt ( 9%)  |
| 4th quarter | 400 mt (20%) | DSR           | 10 mt        |
| <hr/>       |              | <hr/>         |              |
| 2,000 mt    |              | 300 mt        |              |

| Quarter | Shallow water    | Deep water     | Total  |
|---------|------------------|----------------|--------|
|         | <u>Complex</u>   | <u>Complex</u> |        |
| 1       | 500 mt           | 100 mt         | 600 mt |
| 2       | 100 mt           | 300 mt         | 400 mt |
| 3       | 200 mt           | 400 mt         | 600 mt |
| 4       | No apportionment |                | 400 mt |

(e) Halibut Discard Mortality Rates

The GOA and BSAI SAFE reports contain recommendations by IPHC staff for managing halibut bycatch in 1999. Item D-3(e) lists the IPHC recommendations for setting discard mortality rates for the 1999 fishery in the BSAI and GOA. A number of modifications to the methodology used by IPHC were made to the report as recommended by the Plan Teams and SSC. Gregg Williams, IPHC, will present this report.

**GOA Plan Team Meeting Minutes  
November 16-19, 1998**

*Sandra Lowe (NMFS-AFSC, Chair)*  
*Bill Bechtol (ADF&G)*  
*Jane DiCosimo (NPFMC)*  
*Jeff Fujioka (NMFS-ABL)*  
*Lew Haldorsen (UAF)*  
*Jim Hastie (NMFS AFSC)*  
*Jon Heifetz (NMFS-ABL)*

*Dave Jackson (ADF&G)*  
*Jim Ianelli (NMFS-AFSC)*  
*Tory O'Connell (ADF&G)*  
*Tom Pearson (NMFS-AKRO)*  
*John Sease (NMML)*  
*Farron Wallace (WDF)*  
*Gregg Williams (IPHC)*

**EGOA Split.** The Plan Team discussed the need for separating Eastern Gulf area ABCs for West Yakutat and Southeast Outside/East Yakutat subareas as a result of the trawl prohibition east of 140° W, implemented in 1998. The Team is concerned about disproportionate removals from the West Yakutat area by trawl gear. Eric Brown and Mike Martin, AFSC, briefed the Team on its review of the 1999 GOA trawl survey design to allow for assessing fish abundances on either side of 140° W, inside and outside the 3-mile state management boundary, and inside and outside Steller sea lion critical habitats. A working group of GOA assessment scientists and trawl survey scientists will discuss the 1999 trawl survey design to accommodate future assessment needs.

The Team examined Eastern Gulf ABC splits on a case by case basis for 1999, pending resolution of this issue via the 1999 survey for calculating 2000 ABCs next year. The Team examined NMFS catch records for the EGOA broken out by subarea. Since this is an interim year pending further report from the survey scientists in 1999, the PT will recommend action where management action appears necessary. The Team recommended splitting the EGOA ABC for species that would be disproportionately harvested from the West Yakutat area by trawl gear. The Team did not split EGOA ABCs for species that were prosecuted by multi-gear fisheries or harvested as bycatch.

**NO SPLIT**

Pacific cod, Atka mackerel, SRRE,  
thornyhead, northern rockfish, DSR

**SPLIT, POINT ESTIMATE**

DWF, SWF, rex sole, sablefish  
ATF, flathead sole, OSR

**SPLIT + RANGE**

pollock, POP, PSR

**Pollock.** The Team concurred with the author's recommendation for ABC (94,400 mt) and OFL (134,000 mt) for W/C Gulf pollock. The EGOA ABC and OFL recommendations were 8,620 and 12,300 mt, respectively. AFSC is exploring a spatially explicit stock assessment for GOA pollock. Results of this approach are planned for the 1999 Wakefield Symposium on Spatial Processes and Management of Fish Populations.

Bill Bechtol presented the results of the 1997 area-swept bottom trawl survey. The main points were: 1) the survey was conducted in the summer, 2) it covered an area not surveyed by the federal survey, 3) survey results were not extrapolated beyond pollock habitat; 4) ADF&G trawl is one-third as selective as the federal trawl, so is conservatively estimating the PWS pollock population; and 5) acoustic survey results were three times previous estimates. Also, ADF&G genetic studies indicated differences between GOA and Bogoslof pollock, but not between Shumagin and PWS pollock.

The Plan Team concurs with the State's precautionary approach in setting conservative harvest rates for PWS pollock, which are based on summer trawl surveys. The Plan Team also encourages the State to annually continue its summer trawl survey, as its highest priority, and the hydroacoustic survey to develop a time-series to better understand PWS spawner biomass and interannual variability. The team recommends using a cod end liner to avoid under-sampling small fish.

Since 1995, the Team has recommended that the State of Alaska PWS pollock GHL not be counted against the federal TAC since the PWS population is not assessed by the GOA trawl survey. NMFS has taken varied approaches to managing this stock. In 1996 and 1997, NMFS counted PWS landings against the EGOA TAC. In 1998, NMFS deducted the PWS GHL proportionately from all four GOA subareas, based on the SSC and Council recommendations. The Team agrees that PWS and GOA pollock are of the same genetic stock, but asserts that the PWS portion of the population are not assessed by the NMFS trawl and hydroacoustic surveys. Based on this, the Team continues to recommend that NMFS not reduce the ABC by the state GHL in any area. The Team has recommended in the past that if NMFS continued to adjust the ABC, the reduction would most logically be taken in the Central Gulf area.

The Team recommended that EGOA pollock be split with an upper limit between the two subareas, similar to the approach recommended for POP and other considerations: 1) pollock may be a distinct spawning population with danger of localized depletion; 2) it is a faster-growing, shorter-lived species; and 3) may be more mobile. The Team noted that since no fishery will occur east of 140° due to the trawl ban, therefore, the majority of the ABC in the eastern GOA would not be taken.

**Pacific cod.** The Team discussed the model's sensitivity to recruitment parameters, and the uncertainty in estimating the size of 1995 year class and its contribution to the author's ABC recommendation of 90,900 mt, which was based on the geometric mean of the F40% catches. The Team was concerned with increasing the ABC recommendation, in the face of decreasing exploitable biomass. The Team was uncomfortable with the influence of the 1995 year class on the ABC estimate of that magnitude, and recommended a 1999 ABC = 77,900 mt, equal to the 1998 specifications. The overfishing level from the current assessment based on the F30% harvest rate is 134,000 mt. The Team recommended that the author provide alternative recruitment estimates from recent year classes for next year's assessment.

**Arrowtooth flounder.** No changes were made in the assessment since the preliminary SAFE. In 1999, AD Model Builder will be used in the stock assessment. Results from a herding experiment by AFSC may provide information to reestimate  $q$  in next year's model. The Team concurred with the author's recommendations of OFL = 308,875 mt and ABC = 217,110 mt.

**Flatfish.** The last deep water survey occurred in 1987 and the flatfish assessment reflects the lack of deep-water samples in the survey from 1990-96. Deepwater flatfish, except for Dover sole, is in tier 6 using average catch to estimate ABC. The Team recalculated the Dover sole ABC utilizing only the biomass that occurred from 1-500 m (78,310 mt). The OFL and ABC for Dover sole was calculated at 7,830 mt and 5,870 mt, respectively. The deepwater flatfish complex OFL = 8,070 and ABC = 6,050 mt. A seasonality study conducted around Kodiak in 1998 will provide maturity information on flathead sole for future assessments.

**Slope rockfish** The assessment includes age composition data from the 1996 survey in a new run of the synthesis model for POP. The authors estimated  $q = 2.78$ , based on uncertainty, herding of fish into the trawl, and conservative management. POP OFL = 18,490 mt; ABC = 13,120 mt. The remaining OFL and ABC recommendations are unchanged from 1998.

The team reviewed a separate report by Chris Lunsford which examined the size and distribution of POP in catches from around Kodiak. The results indicated that there does not seem to be an impact of intensive fishing pressure near Kodiak causing localized depletions of POP in the GOA Central Area. This report was appended to the slope rockfish chapter.

The Team is concerned about a disproportionate removal from the WY area, if the ABC is not split due to the trawl ban. The Team recommended a subarea split for EGOA POP. The point estimate for WY = 18%, with an upper limit of 32%, based on the coefficient of variance all three surveys. The Team was equally comfortable with recommending the point estimate for the WY subarea since no fishery will occur east of 140° and, therefore, the majority of the ABC in the eastern GOA will not be taken.

The remaining rockfish species are bycatch fisheries only and will continue to be harvested. For SRRE, bycatch is equally distributed and there are multiple gear fisheries on both sides of the line. Since the entire ABC is harvested as bycatch in other directed fisheries equally by trawl and longline gear, the Team feels a proportionate harvest is preferable and no split was recommended for SRRE.

The Team did not see evidence of a management problem for harvesting these ABCs relative to the trawl ban, and splits were not recommended for SRRE, thornyheads, northern rockfish, and DSR. Since northern rockfish occur only in the WY subarea at the eastern edge of its range, the Team suggested combining this species EGOA allocation (10 mt) with other slope rockfish. The Team recommended that the EGOA allocation for other slope rockfish be split using the point estimate of 10%. The OSR trawl fishery and most biomass appears to occur in WY. This follows the Team strategy applied for POP.

**Sablefish** The Team concurred with the authors' recommendation of 15,900 mt for the combined stock, with area apportionments of 12,700 mt for the GOA, 1,340 mt for the Bering Sea, and 1,860 mt for the Aleutian Islands. The Team noted that current spawning biomass is only 31% of the unfished level, and is projected to fall to 27% by 2002. The Team is concerned that a slightly higher rate of decline over this period could lead to classification of sablefish as "overfished," and necessitate the development of a rebuilding plan.

The Team accepted the authors' recommendations for PSR, DSR, Atka mackerel for which there were no changes in ABC relative to 1998 specifications.

Others in attendance: Chris Blackburn, Fran Bennis, Beth Stewart, Ken Stump, Sarah Gaichas, Chuck Hamel, Glenn Merrill, Dave Benson, Phil Rigby, Neal Williamson.

**SUMMARY OF STATE WATER PACIFIC COD FISHERIES**

UPDATED: November 29

|                               | PWS    |              | COOK INLET/<br>N. GULF |                | KODIAK |                | CHIGNIK |                | AK. PENINSULA |                |
|-------------------------------|--------|--------------|------------------------|----------------|--------|----------------|---------|----------------|---------------|----------------|
|                               | 1997   | 1998         | 1997                   | 1998           | 1997   | 1998           | 1997    | 1998           | 1997          | 1998           |
| <b><u>Jig Fishery</u></b>     |        |              |                        |                |        |                |         |                |               |                |
| No. vessels making landings   | 3      | 4            | 53                     | 33             | 71     | 93             | 6       | 13             | 40            | 25             |
| No. of landings               | 4      | 16           | 233                    | 129            | 481    | 671            | 18      | 61             | 173           | 112            |
| Accum. Harvest (million lbs.) | 0.0035 | 0.032        | 0.55                   | 0.18           | 1.99   | 2.13           | 0.04    | 0.17           | 0.35          | 0.44           |
| GHL (million lbs.)            | 0.32   | 0.43         | 1.05                   | 1.46           | 4.25   | 4.05           |         | 5.7            |               | 1.35           |
| Status                        | Open   | Open<br>3/17 | Open                   | Open<br>3/17   | Open   | Open<br>3/17   | Open    | Reopen<br>5/20 | Open          | Open<br>3/10   |
| <b><u>Pot Fishery</u></b>     |        |              |                        |                |        |                |         |                |               |                |
| No. vessels making landings   | 5      | 3            | 8                      | 10             | 33     | 44             | 6       | 33             | 45            | 49             |
| No. of landings               | 23     | 9            | 61                     | 130            | 173    | 255            | 56      | 236            | 417           | 309            |
| Accum. Harvest (million lbs.) | 0.13   | 0.22         | 0.13                   | 0.29           | 5.06   | 4.88           | 1.11    | 5.44           | 8.73          | 8.20           |
| GHL (million lbs.)            | 0.48   | 0.43         | 1.05                   | 0.97           | 4.25   | 4.05           |         |                |               |                |
| Status                        | Open   | Open<br>3/17 | Open                   | Reopen<br>6/15 | Open   | Closed<br>4/27 | Open    | Closed<br>4/26 | Open          | Closed<br>4/16 |
| <b><u>TOTALS</u></b>          |        |              |                        |                |        |                |         |                |               |                |
| No. vessels making landings   | 8      | 7            | 61                     | 43             | 102    | 130            | 12      | 44             | 82            | 69             |
| No. of landings               | 27     | 25           | 294                    | 259            | 654    | 926            | 74      | 297            | 590           | 421            |
| Accum. Harvest (million lbs.) | 0.13   | 0.25         | 0.68                   | 0.47           | 7.05   | 7.01           | 1.15    | 5.61           | 9.08          | 8.64           |
| GHL (million lbs.)            | 0.80   | 0.86         | 2.10                   | 2.44           | 8.50   | 8.10           | 5.90    | 5.70           | 9.40          | 9.00           |

**Table 12. Summary of halibut discard mortality rates (DMRs) in the Bering Sea/Aleutian Islands (BSAI) groundfish fisheries during 1990-1997 and recommendations for Preseason Assumed DMRs to use in monitoring halibut bycatch mortality in 1998.**

| <b>Gear and Target</b> | <b>1990</b> | <b>1991</b> | <b>1992</b> | <b>1993</b> | <b>1994</b> | <b>1995</b> | <b>1996</b> | <b>1997</b> | <b>2-Year Mean</b> | <b>Used in 1998</b> | <b>Recommendations for 1999</b> |
|------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------------|---------------------|---------------------------------|
| <b><i>Trawl</i></b>    |             |             |             |             |             |             |             |             |                    |                     |                                 |
| Atka mackerel          | 66          | 77          | 71          | 69          | 73          | 73          | 83          | 85          | 84                 | 83                  | 85                              |
| Bottom pollock         | 68          | 74          | 78          | 78          | 80          | 73          | 79          | 72          | 76                 | 76                  | 76                              |
| Pacific cod            | 68          | 64          | 69          | 67          | 64          | 71          | 70          | 67          | 69                 | 71                  | 69                              |
| Other Flatfish         | 80          | 75          | 76          | 69          | 61          | 68          | 67          | 71          | 69                 | 68                  | 69                              |
| Rockfish               | 65          | 67          | 69          | 69          | 75          | 68          | 72          | 71          | 72                 | 70                  | 72                              |
| Flathead sole          | -           | -           | -           | -           | 67          | 62          | 66          | 57          | 62                 | 64                  | 62                              |
| Other species          | -           | -           | -           | -           | -           | -           | -           | -           | -                  | 71                  | 69                              |
| Pelagic pollock        | 85          | 82          | 85          | 85          | 80          | 79          | 83          | 87          | 85                 | 81                  | 85                              |
| Rock sole              | 64          | 79          | 78          | 76          | 76          | 73          | 74          | 77          | 76                 | 74                  | 76                              |
| Sablefish              | 46          | 66          | -           | 26          | 20          | -           | -           | -           | 23                 | 23                  | 23                              |
| Turbot                 | 69          | 55          | -           | -           | 58          | 75          | 70          | 75          | 73                 | 73                  | 73                              |
| Yellowfin sole         | 83          | 88          | 83          | 80          | 81          | 77          | 76          | 80          | 78                 | 77                  | 78                              |
| <b><i>Pot</i></b>      |             |             |             |             |             |             |             |             |                    |                     |                                 |
| Pacific cod            | 12          | 4           | 12          | 4           | 10          | 10          | 7           | 4           | 6                  | 9                   | 4                               |
| Other species          | -           | -           | -           | -           | -           | -           | -           | -           | -                  | 9                   | 4                               |
| <b><i>Longline</i></b> |             |             |             |             |             |             |             |             |                    |                     |                                 |
| Pacific cod            | 19          | 23          | 21          | 17          | 15          | 14          | 12          | 11          | 12                 | 11                  | 11                              |
| Rockfish               | 17          | 55          | -           | 6           | 23          | -           | 20          | 4           | 12                 | 22                  | 12                              |
| Other species          | -           | -           | -           | -           | -           | -           | -           | -           | -                  | 12                  | 11                              |
| Sablefish              | 14          | 32          | 14          | 13          | 38          | -           | -           | -           | -                  | -                   | 11                              |
| Turbot                 | 15          | 30          | 11          | 10          | 14          | 9           | 15          | 22          | 19                 | 12                  | 19                              |
| IFQ                    | -           | -           | -           | -           | -           | 14          | 20          | 31          | -                  | -                   | -                               |

**Table 13. Summary of halibut discard mortality rates (DMRs) in the Gulf of Alaska (GOA) groundfish fisheries during 1990-1997 and recommendations for Preseason Assumed DMRs to use in monitoring halibut bycatch mortality in 1999.**

| <b>Gear and Target</b> | <b>1990</b> | <b>1991</b> | <b>1992</b> | <b>1993</b> | <b>1994</b> | <b>1995</b> | <b>1996</b> | <b>1997</b> | <b>2-Year Mean</b> | <b>Used in 1998</b> | <b>1999 Recommendation</b> |
|------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------------|---------------------|----------------------------|
| <b>Trawl</b>           |             |             |             |             |             |             |             |             |                    |                     |                            |
| Atka mackerel          | 67          | 89          | 81          | 67          | 53          | -           | 60          | -           | 57                 | 57                  | 57                         |
| Bottom pollock         | 51          | 62          | 66          | 57          | 48          | 66          | 79          | 66          | 73                 | 73                  | 73                         |
| Pacific cod            | 60          | 62          | 66          | 59          | 53          | 64          | 70          | 62          | 66                 | 67                  | 66                         |
| Deep wtr flats         | 61          | 58          | 70          | 59          | 60          | 56          | 71          | 61          | 66                 | 64                  | 66                         |
| Shallow wtr flats      | 66          | 71          | 69          | 65          | 62          | 70          | 71          | 71          | 71                 | 71                  | 71                         |
| Rockfish               | 65          | 75          | 79          | 75          | 58          | 71          | 65          | 63          | 64                 | 68                  | 64                         |
| Flathead sole          | -           | -           | -           | -           | 54          | 64          | 67          | 74          | 71                 | 67                  | **                         |
| Other species          | -           | -           | -           | -           | -           | -           | -           | -           | -                  | 67                  | 66                         |
| Pelagic pollock        | 71          | 82          | 72          | 63          | 61          | 51          | 81          | 70          | 76                 | 66                  | 76                         |
| Sablefish              | 70          | 60          | 68          | 59          | 67          | 58          | 80          | 61          | 71                 | 67                  | 71                         |
| Arrowtooth fldr        | -           | -           | -           | -           | -           | -           | 66          | 48          | 57                 | 66                  | 57                         |
| Rex sole               | -           | -           | -           | -           | 56          | 76          | 63          | 47          | 55                 | 69                  | 55                         |
| <b>Pot</b>             |             |             |             |             |             |             |             |             |                    |                     |                            |
| Pacific cod            | 12          | 7           | 16          | 24          | 17          | 21          | 7           | 4           | 6                  | 14                  | 6                          |
| Other species          | -           | -           | -           | -           | -           | -           | -           | -           | -                  | 14                  | 6                          |
| <b>Longline</b>        |             |             |             |             |             |             |             |             |                    |                     |                            |
| Pacific cod            | 15          | 18          | 13          | 7           | 11          | 13          | 11          | 22          | 16                 | 12                  | 16                         |
| Rockfish               | 6           | -           | -           | 7           | -           | 4           | 13          | -           | 9                  | 9                   | 9                          |
| Other species          | -           | -           | -           | -           | -           | -           | -           | -           | -                  | 12                  | 16                         |
| Sablefish              | 17          | 27          | 28          | 30          | 22          | -           | -           | -           | -                  | -                   | -                          |
| IFQ                    | -           | -           | -           | -           | -           | 40          | 16          | 15          | 16                 | -                   | -                          |

\*\* Recommend 58% for the Catcher vessel fleet, 74% for the Catcher/Processor fleet.



**Prince William Sound Walleye Pollock:  
Current Assessment and 1999  
Management Recommendations**



By  
William R. Bechtol

Regional Information Report<sup>1</sup> No. 2A98-41

Alaska Department of Fish and Game  
Division of Commercial Fisheries  
333 Raspberry Road  
Anchorage, Alaska 99518-1599

December 1998

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<sup>1</sup> The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate timely reporting of recently collected information, reports in this series may contain preliminary data; this information may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without prior approval of the author or the Division of Commercial Fisheries.

## AUTHOR

William R. Bechtol is Research Project Leader for salmon and herring in Lower Cook Inlet and groundfish and shellfish in Cook Inlet and Prince William Sound for the Alaska Department of Fish and Game, Division of Commercial Fisheries, 3298 Douglas Place, Homer, AK, 99603.

## ACKNOWLEDGMENTS

Discussions with National Marine Fisheries Service biologists Anne Hollowed, Chris Wilson, Eric Brown, and Jim Traynor helped clarify my understanding of management strategies for walleye pollock in federal waters. Anne Hollowed provided data on pollock size distributions in the Gulf of Alaska commercial fisheries. Chris Blackburn of the Alaska Groundfish Data Bank was instrumental in coordinating industry involvement in Prince William Sound pollock assessment. Jay Stinson and the crew of the fishing vessel *Alaskan* conducted the 1995, 1997, and 1998 acoustic surveys; Mr. Stinson offered substantial insights on the pollock fishery and resource distribution. The hydroacoustic and longline surveys were partially funded through an ADF&G legislative program receipt authorization. Stephen Fried, Robert Berceci, and Brian Bue reviewed this manuscript.

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## ABSTRACT

Prior to 1995, less than 4 metric tons (mt) of walleye pollock *Theragra chalcogramma* were annually harvested, mainly by jig and bottom trawl gears, from Prince William Sound (PWS), Alaska. An annual fishery using mid-water trawls first developed in 1995. This fishery occurs within internal waters of PWS and is managed by the Alaska Department of Fish and Game (ADF&G). Walleye pollock occurring in PWS during the summer have not been included in Gulf of Alaska assessments conducted by the National Marine Fisheries Service (NMFS). The harvest guideline for the PWS pollock fishery has been based on estimates of the pollock resource that reside in PWS in the summer and is not assessed by NMFS surveys in adjacent federal waters. Comprehensive summer surveys were not conducted during 1995-1997. Therefore, the PWS harvest guideline for 1996 and 1997 was calculated as (1) PWS pollock population estimates from the last non-winter survey in 1994, (2) scaled by the same relative change that NMFS assessment scientists recommended for the allowable biological catch for pollock in adjacent federal waters. This approach assumed that ecosystem processes affecting PWS pollock were similar in magnitude and direction to ecosystem processes affecting adjacent pollock stocks in adjacent federal waters. In 1997, ADF&G conducted summer trawl and longline surveys in PWS and in 1997 and 1998 coordinated winter acoustic surveys of pre-spawning pollock. Based on the 1997 summer trawl survey, a guideline harvest level of 2,100 mt (4.6 million lb) was recommended for PWS pollock in 1998. In addition to sampling pollock for length, weight, sex, maturity, and age from survey and commercial fishery catches in PWS, ADF&G collected genetic samples and the Prince William Science Center collected tissue isotope samples from pollock caught in PWS and adjacent federal waters. Preliminary genetic analysis indicated differentiation between the pollock in PWS and Shelikof Strait and those pollock near Bogoslof Island. The relationship between pollock in PWS and adjacent federal waters remains poorly understood and additional analysis is underway. Because the summer biomass was not effectively assessed in 1998, it is recommended that the 1999 fishery again be managed for a 2,100 mt harvest guideline. In addition to sampling during the fishery, ADF&G anticipates conducting another PWS summer trawl survey in 1999.

**KEY WORDS:** commercial fishery, groundfish management, Prince William Sound, *Theragra chalcogramma*, walleye pollock.

## INTRODUCTION

Prior to 1995, less than 4 mt of walleye pollock *Theragra chalcogramma* were commercially harvested annually, mainly by jig and bottom trawl gear, within Prince William Sound, Alaska (Bechtol 1995, 1998a). In 1995 the annual harvest from this area increased dramatically with the landing of 2,900 mt of walleye pollock, mainly by mid-water trawl gear. The objectives of this report are: (1) to present updated information on the walleye pollock resource of Prince William Sound; (2) to provide a description and summary of commercial harvests of this species for this area; and (3) to make recommendations for the future management and research needs for this species in Prince William Sound.

## GENERAL BIOLOGY

Walleye pollock have been reported along the west coast of North American from Carmel, central California, through the Bering Sea to St. Lawrence Island, and on the Asia coast to Kamchatka, the Okhotsk Sea, and the southern Sea of Japan (Hart 1973; Bakkala et al. 1986). Walleye pollock are generally considered to be semidemersal, inhabiting continental shelf and slope waters to depths of 650 m, but they may also be pelagic in some areas. Genetic differences between walleye pollock of the eastern and western Pacific, as well as regional differences in age, growth, morphometric, and meristic characteristics, suggests that multiple stocks exist (Okada 1986).

Walleye pollock typically spawn in the first half of the calendar year, but may spawn later in the year at higher latitudes. The pelagic eggs are 1.35 to 1.45 mm in diameter. Age-0 walleye pollock in the Bering Sea typically occupy the upper 40 m of the water column until fall months when they begin a semidemersal existence (Traynor and Nelson 1983). Age-1 and -2 walleye pollock occupy discrete schools between 30 m and the bottom in the eastern Bering Sea. Age-1, -2, and -3 fish generally occur higher in the water column and are typically captured in pelagic trawls, while most fish age-4 and older are located closer to the bottom and are commonly captured in demersal trawls. In the Gulf of Alaska, age-1 and -2 walleye pollock are approximately 13 cm and 25 cm in length, respectively (Janusz 1986). Size at first maturity appears to be about 35 cm, which is usually attained at age-3.

The size, number, and variety of prey increase with walleye pollock size. Walleye pollock yolk-sac larvae, 3-6 mm in length, feed primarily on copepod nauplii (Nishiyama et al. 1986). Euphausiids and shrimp are important prey items for both juveniles and adults, particularly in the spring (Dwyer et al. 1986; Yang 1993). In summer, calanoid copepods and amphipods become an important component of the diet of small walleye pollock, while fishes are a major prey of large walleye pollock. In the Bering Sea during summer,

age-0 walleye pollock were major prey items of larger walleye pollock (Livingston et al. 1993). By autumn cannibalism represented a major diet component of both large and small fish. In the Gulf of Alaska, a variety of fishes are consumed by walleye pollock during the summer, with the most important prey item often being capelin *Mallotus villosus*. In winter, fish again composed the greatest portion of the diet of walleye pollock, but only the larger individuals commonly preyed upon other walleye pollock.

Walleye pollock are harvested in several fisheries and are also preyed upon by a variety of organisms. Population models for pollock resources occurring in federal waters incorporate a variety of data sources including recent efforts to model predation upon pollock (Hollowed et al. 1997).

## MANAGEMENT AREA

Prince William Sound, Alaska, (PWS) is a complex fjord-type system located along the northern Gulf of Alaska (Muensch and Schmidt 1974). The commercial pollock fishery described in this report occurs within the Inside District of the PWS Management Area. The Inside District includes all waters enclosed by lines drawn from Point Whitted to Point Bentinck, Cape Hinchinbrook to Zaikof Point, and Cape Cleare to Cape Puget (Figure 1). PWS is recognized as being internal waters of the State of Alaska, so the Alaska Department of Fish and Game (ADF&G) manages groundfish harvests within PWS.

## CATCH HISTORY

Prior to 1995, annual commercial harvests of walleye pollock from PWS were less than 4 mt (Table 1; Bechtol 1995a, 1998a). These harvests were primarily taken incidentally by trawl or longline gear, although some directed effort with jig gear occurred in 1994. Little information on at-sea discards is available for PWS, but walleye pollock discards probably occur at low levels on longline gear (Bechtol and Vansant 1998).

In January 1995, mid-water trawl vessels transiting the southwest portion of PWS observed sonar echoes from what appeared to be walleye pollock aggregations. A harvest guideline had not previously been established for pollock in (Bechtol 1995b) although historical assessment surveys indicated that walleye pollock reside year-round within PWS (Parks and Zenger 1979; Haynes and Urban 1991; C. Wilson, NMFS, unpublished data). The most recent survey, a series of bottom trawl tows made during the summer of 1989 following the *T/V Exxon Valdez* oil spill, indicated that 9,500 mt of walleye pollock were in PWS at the time of the survey (Haynes and Urban 1991). Therefore, ADF&G set a guideline harvest range of 950-2,000 mt for the 1995 directed fishery of walleye pollock



based on an exploitation rate of 10-20% of the 1989 biomass estimate. The 1995 trawl fishery lasted from 31 January until 16 February 1995 with a total of nine midwater trawl vessels delivering 2,857 mt (6.2 million lb). Following the trawl closure, walleye pollock fishing was not closed to other gear types because non-trawl catches were expected to be small. The total PWS walleye pollock harvest in 1995 was 2,960 mt (6.5 million lb), which included about 4 mt landed by longline and jig gears and 98 mt landed by a combination test fishery and acoustic survey conducted by ADF&G in late February and early March (Trowbridge 1996).

The 1996 midwater trawl fishery from 20-25 January yielded a harvest of 1,480 mt (3.3 million lb) by 11 vessels (Trowbridge 1996). The total harvest of pollock in 1996 was 1,672 mt (3.7 million lb), including 191 mt landed by an ADF&G test fishery and <1 mt landed as bycatch in other pot, longline, and trawl fisheries.

The 1997 midwater trawl fishery from 20-28 January yielded a harvest of 1,779 mt (3.9 million lb) by 10 vessels (Charles Trowbridge, ADF&G, Homer, AK, personal communication). The total 1997 pollock harvest from PWS was 2,027 mt (4.5 million lb), including 244 mt landed by an ADF&G test fishery and 3.3 mt landed as bycatch in other pot, longline, and trawl fisheries.

The 1998 midwater trawl fishery from 20-26 January yielded a harvest of 2,022 mt (4.5 million lb) by 10 vessels. The total 1998 pollock harvest through 26 October was 2,310 mt (4.6 million lb), including 287 mt landed by an ADF&G test fishery and 1 mt landed as bycatch in other pot and longline fisheries.

The directed pollock fishery typically involved midwater trawl vessels targeting dense aggregations of pre-spawning pollock in the southwest portion of the Inside District (Figure 1). Vessels delivered to shore-based processing plants once every 2-3 days or to tender vessels on the grounds up to twice daily. Individual deliveries usually consisted of 70-140 mt of walleye pollock, captured in one or two tows, depending upon vessel size and capacity and fish aggregations. Most of the directed fishery catch has been processed into fillets with some marketing of the roe.

## **FISHERY MANAGEMENT CONSIDERATIONS**

The mid-water trawl fishery for walleye pollock in PWS is a relatively new fishery within state managed waters; management strategies are still being developed. Although previous surveys indicated that walleye pollock resided year-round within PWS (Parks and Zenger 1979; Haynes and Urban 1991), the relationship between walleye pollock inside PWS and pollock in adjacent Gulf of Alaska waters remains unclear. Even if walleye pollock occurring in PWS intermingle with the Gulf of Alaska stock, the PWS component is not assessed by the National Marine Fisheries Service (NMFS) triennial trawl survey conducted during summer months in the Gulf of Alaska (Chris Wilson, NMFS, Seattle,

WA, personal communication). Groundfish resources off the coast of Alaska are co-managed by ADF&G and NMFS (Trowbridge 1996). In the absence of area and gear specific regulations established by the Alaska Board of Fisheries or management measures developed by ADF&G through internal and public review, fisheries in state waters typically coincide with seasons in the adjacent federal waters. However, prosecuting the PWS pollock fishery as part of the total allowable catch (TAC) established for the adjacent federal waters of the Gulf of Alaska fails to accommodate resource levels in PWS and could lead to over- or under-utilization of the resource in PWS. In contrast, sustainability for the walleye pollock fishery in PWS may be established if: (1) estimates of walleye pollock biomass inside PWS are available, (2) a conservative harvest level is set, (3) fishery management measures ensure harvests can be controlled, and (4) further research is conducted to explore the relationship between pollock in PWS and those in the adjacent waters of the Gulf of Alaska.

### *Available Assessment Data*

#### **1989 Trawl Surveys**

Following the *M/V Exxon Valdez* oil spill, ADF&G and NMFS conducted two multi-species bottom trawl surveys of PWS in the summer of 1989 using a 400 mesh Eastern otter trawl (Haynes and Urban 1991). The first survey, designed to emulate a previous survey conducted in April 1978 (Parks and Zenger 1979), included 61 hauls during 17 May through 23 June 1989. The second survey, based on a random stratified sampling design, included 63 hauls during 7 August through 13 September 1989. The survey estimated a walleye pollock biomass of 9,500 mt. Actual pollock biomass was probably greater because the semi-pelagic habits of this species likely made some of the population unavailable to the bottom trawl survey gear. Furthermore, the 400-mesh Eastern gear has a lower rise opening than bottom trawls currently used in the NMFS triennial surveys (Anne Hollowed, NMFS, Seattle, WA, personal communication), so abundance data collected in PWS were not directly comparable to data collected in the Gulf of Alaska.

#### **Acoustic Surveys**

##### *1994 Spring Acoustic*

During early and late May 1994, an acoustic survey was conducted in PWS as part of the *Exxon Valdez* Trustee Council Sound Ecosystem Assessment (SEA) project. Expansion of survey data resulted in a walleye pollock biomass estimate of 24,328 mt within the 40-125 m depth range of PWS (Table 2; Jay Kirsch, Prince William Sound Science Center, Cordova, AK, personal communication). However, several factors make it difficult to assess the accuracy of this estimate. First, although sampling conducted during the acoustic survey indicated that walleye pollock were widely distributed at depths greater

than 20 m, pollock density (kg/surface area) above 40 m could not be estimated due to echo scattering by a plankton layer. Second, while the acoustic survey did not assess pollock biomass below 125 m, ADF&G bottom trawl surveys have shown walleye pollock to occur deeper than 125 m in PWS (personal observation). These two factors likely resulted in an underestimate of walleye pollock biomass in 1994. Furthermore, the acoustic survey only covered western PWS and errors introduced into the biomass estimate by extrapolating acoustic density estimates from western to eastern PWS are unknown.

#### *Winter Acoustic Surveys*

In cooperative projects, ADF&G worked with the Prince William Sound Science Center and the fishing industry to obtain more information on the prespawning biomass and distribution of walleye pollock in PWS. Commercial vessels, using biologists and acoustic equipment provided by the Prince William Sound Science Center and ADF&G, conducted acoustic surveys of pollock in PWS after the winter fisheries in 1995, 1997, and 1998 (Thomas and Stables 1995; Kirsch 1997; Kirsch and Thomas 1998). These surveys focused on prespawning walleye pollock aggregation in southwestern PWS, particularly Port Bainbridge, Knight Island Passage, and Montague Strait.

The 1995 survey involved two survey legs: the first leg, conducted from 24 to 25 February, yielded a walleye pollock biomass estimate of 19,756 mt; the second leg, from 28 February to 1 March, provided an estimate of 37,953 mt (Thomas and Stables 1996). During the second leg, approximately 27,000 mt were observed in Port Bainbridge and 11,000 mt in Lower Knight Island Pass. The mean estimate of both legs was 28,855 mt. Despite a cursory examination of other areas of PWS, no other significant walleye pollock aggregations were found. This wide range in survey estimates over a relative short temporal scale may have indicated short-term spawning movements.

The 1997 PWS acoustic survey, conducted during 23-27 February, yielded a pollock biomass estimate of 37,894 mt (Kirsch 1997). The relative distribution of pollock biomass was a virtual reversal of the distribution in the 1995 survey. In 1997, pollock biomass was distributed approximately 27,000 mt in Lower Knight Island Pass and 11,000 mt in Port Bainbridge. Smaller aggregations were assessed in Orca Bay and east of Green Island but totaled less than 1,000 mt and were excluded from the above 1997 total biomass estimate.

#### *1998 Winter Acoustic Survey*

The 1998 acoustic survey, conducted during 8-13 March, yielded a maximum PWS pollock biomass estimate of 114,344 mt (Kirsch and Thomas 1998). This biomass was approximately distributed as follows: 9,800 mt in Port Bainbridge, 63,100 mt in the Lower Knight Island Pass, 39,400 mt extending from Hinchinbrook Entrance across the mouth of Orca Bay, and 2,100 mt in Montague Strait. The Lower Knight Island Pass estimate was a replicate assessment conducted 11 March; the pollock biomass estimate from the first assessment on 9 March was 42,500 mt. With the exception of Port Bainbridge which yielded a biomass estimate lower than previous years, other areas contained substantially

more pollock biomass than was observed in either the 1995 or 1997 acoustic surveys. In particular, the 39,400 mt aggregation extending from Hinchinbrook Entrance across Orca Bay had not been previously observed.

### 1997 Trawl and Longline Surveys

A 1997 trawl survey with the research vessel *Pandalus* used a 400 mesh Eastern bottom trawl to conduct 53 tows in PWS (Bechtol *in preparation*). After dividing PWS into quadrants delineated at 147°00' W. longitude and 60°30' N. latitude, survey effort included 26 stations in the southwest quadrant, 25 stations in the northeast, and 2 in the southeast. Each survey station measured 6.25 square nautical miles and was sampled by a 1.0 nautical mile long tow. Average catches of pollock per nautical mile towed were 98.6 kg (217.4 lb) in the southwest, 74.3 kg (163.8 lb) in the northeast, and 1.8 kg (4.0 lb) in the southeast. No tows were made in the northeast area.

Another approach with the trawl data involved post-stratification of PWS surface area according to 91.6 m (50 fathom) bottom depth contours. In this case, mean catch from trawl stations within a stratum was expanded by the stratum surface area. Four of the nine depth strata represented on a NOAA nautical chart were sampled by the 1997 trawl survey. After excluding unsampled strata, this approach yielded a 27% and 16% coverage of the available survey stations in the two largest depth strata; 11% of all potential survey stations were sampled in 1997. The pollock biomass estimate for the four sampled strata was 21,000 mt  $\pm$  9,491 mt (95% confidence interval; Table 2). This estimate incorporated some habitat from all PWS quadrants but was seen as conservative because the surveyed strata represented only 74% of the available PWS surface area.

A 1997 longline survey for sablefish *Anoplopoma fimbria* with the research vessel *Montague* sampled 24 stations in the northwest area and 14 stations in the southwest area (Bechtol (1998b)). Gear configuration was similar to sablefish surveys conducted in federal waters by the National Marine Fisheries Service (Mike Sigler, NMFS, Juneau, personal communication). One objective of these surveys was to evaluate the relative abundance and distribution of all species caught on longline gear. Although only an index, the northwest area of PWS yielded an average catch of 4.7 pollock per set, compared to 3.1 pollock per set in the southwest area, or an average catch rate of 49.5% more pollock in the northwest area. The application of relative pollock catch rates from the longline survey to extrapolate trawl catch rates from the southwest to the northwest area was considered but rejected at this time due to uncertainties about this approach. This technique may be further explored as future longline and trawl surveys are completed.

### *Trawl Catchability*

In October 1997, NMFS and ADF&G conducted a project off the southern end of Kodiak to compare bottom trawl catchabilities among the NMFS and ADF&G bottom trawl survey gears (Eric Brown, National Marine Fisheries Service, Seattle, WA, personal

communication). NMFS used a four-seam, high-opening polyethylene Nor' eastern trawl equipped with roller gear and towed by a NMFS-chartered vessel, the *Peggy Jo*. ADF&G used standard 400 mesh Eastern nets towed by the ADF&G research vessels the *Resolution* and the *Pandalus*. Instrumentation attached to the nets indicated mean net widths were virtually identical at 13.8 m among all nets, while the vertical openings were substantially different at 6.9 m for the Nor' eastern trawl and 1.9 m for the Eastern trawls. Preliminary results indicated that standardized catch rates for walleye pollock were 3.1 times greater with the NMFS Nor' eastern trawl than with ADF&G's Eastern trawl.

### **Age, Weight, and Length Data**

Length and sex composition data were collected from commercial landings of walleye pollock in PWS during 1995-1998. In addition, sagittal otoliths were removed for aging of pollock in 1997 and 1998. To date, only otoliths from 1997 have been aged.

In the 1995 PWS commercial fishery, males comprised 46% of all samples. The length distribution ranged from 44-65 cm (Figure 2). The most abundant male pollock measured 51 cm whereas the most abundant female pollock measured 56 cm.

Males comprised 56% of all samples in the 1996 PWS commercial fishery. The length distribution ranged from 38-64 cm, with the most abundant male pollock being 52-cm fish and the most abundant female pollock being 56-cm fish (Figure 3). Length frequency data from the commercial pollock fisheries indicated PWS pollock were substantially larger than pollock caught in other GOA areas in 1996.

In 1997, males comprised 51% of pollock in commercial fishery samples but only 45% of pollock in acoustic survey samples. For both male and female pollock, the 56-cm fish were the dominant size mode in the PWS commercial fishery (Figure 4). Acoustic survey samples were dominated by 54-cm fish for both male and female pollock. A mode of smaller fish, centered at 32-34 cm for male and female pollock, was also observed in the acoustic surveys. Age data for commercial catch samples indicated age-7 pollock were the most abundant age class (Figure 5). Age-7 males and age-7 females contributed 17% and 16%, respectively, of all commercial samples.

In 1998 samples, males pollock comprised 53% of all commercial samples, increasing to 68% of the acoustic survey samples. Dominant size modes in commercial fishery samples were 55 cm for male fish and 57 cm for female pollock (Figure 6). In the March 1998 acoustic survey, 57-cm fish were the most abundant male pollock and 60-cm fish were the most abundant females. A smaller-sized cohort, centered at 38 cm for males and 42 cm for females, was also observed in the 1998 acoustic survey. This smaller cohort is likely the 1994 age class that is becoming more prevalent in Gulf of Alaska fisheries (Hollowed et al. 1997).

Length distributions of pollock sampled from the PWS commercial fisheries were similar during the directed fisheries of 1995 to 1998, although a shift toward slightly larger fish was evident during most of the time series (Figure 7). The exception was commercial catch composition in 1997 when slightly smaller fish were observed. Although only available for one year, length frequency data from the commercial pollock fisheries also indicated PWS pollock were substantially larger than pollock caught in other GOA areas in 1996 (Figure 8).

### **Biological Markers**

Biological markers may yield data on the mixing or the lack of mixing between pollock in PWS and adjacent federal waters. Previous genetic studies of pollock indicated that heterogeneity exists across large areas, such as between the Eastern Bering Sea and the Sea of Japan. ADF&G biologists assessed three different types of genetic markers to evaluate differentiation among pollock stocks collected from PWS, the Western Gulf of Alaska, and the Eastern Bering Sea (Eric Kretschmer, ADF&G, Anchorage, AK, personal communication). Walleye pollock collected from PWS, Shelikof Strait, and near Bogoslof Island in the Bering Sea were assayed for genetic variation at microsatellite, mtDNA and allozyme loci. Of seven microsatellite loci developed in Atlantic cod *Gadus morhua*, four amplified in walleye pollock. Mendelian inheritance of the microsatellite loci was confirmed using three single-pair matings. The four microsatellite loci had a frequency for the most common allele  $\leq 0.95$ . Five regions of walleye pollock mtDNA were amplified and digested with 33 restriction enzymes; ten enzymes produced polymorphisms. Finally, 31 allozyme loci were screened, and seven allozyme loci had a frequency for the most common allele  $\leq 0.95$ . The mtDNA analysis showed significant differences between Gulf of Alaska samples, treated as collections pooled from PWS and Shelikof, and Bering Sea samples collected near Bogoslof Island. The results indicate that these three types of genetic markers may be useful for future studies of walleye pollock populations.

In addition, Prince William Sound Science Center staff observed differences in the carbon isotope ratios of *Neocalanus* spp. from inside and outside PWS, and used these ratios to identify feeding habits of young-of-the-year (YOY) pollock (T. Kline, Prince William Sound Science Center, Cordova, AK, personal communication). YOY pollock were subsequently classified by carbon isotope ratios into the following geographic groups: (1) Gulf of Alaska and South Montague; (2) Eastern PWS; and (3) Western PWS. Although adult pollock showed similar  $C_{13}$  signatures, greater work is needed to understand uptake/response times.

## *Relative Change in the Eastern Gulf of Alaska Regulatory Area*

Previous estimates of surplus production in the PWS pollock population relied on an assumption that large-scale processes that simultaneously affect many areas across the northern Gulf of Alaska direct changes in ecosystem productivity. Thus, ecosystem functions that cause a change in the pollock population of the Eastern Gulf of Alaska Regulatory Area will cause a similar relative change in the PWS pollock population. As a result, the relative scale of changes in the allowable biological catch (ABC) for pollock in the in adjacent federal waters of the Eastern Gulf of Alaska Regulatory Area (Hollowed et al. 1995, 1996; Bechtol 1998) was used to scale changes in the PWS pollock guideline. The recommended ABC for the eastern Gulf of Alaska increased by 62% from 1997 to 1998 (Hollowed et al. 1997). Under this relative change, the PWS pollock biomass would have potentially increased by 62% from the 1997 level of 1,800 mt to 2912 mt in 1998. Although the ABC recommendation is not yet available for the 1999 Gulf of Alaska population, preliminary analysis indicates spawner biomass will peak in 1999 following estimated increases in recent years (Anne Hollowed, National Marine Fisheries Service, Seattle, WA, personal communication).

## **GUIDELINE HARVEST RECOMMENDATIONS**

The 1995, 1997, and 1998 winter acoustic surveys of prespawning pollock aggregations in PWS yielded biomass estimates that were substantially greater than recent or historical summer population estimates. In particular, the 1998 survey observed a previously undetected aggregation in eastern PWS in the mouth of Orca Bay. Among all PWS survey sites, the 1998 biomass estimate was three times greater than the 1977 biomass estimate (Kirsch and Thomas 1998). However, the relationship between these prespawning aggregations and the summer population unassessed by the NMFS surveys is unknown. Further research is needed to explore the utility of winter acoustic data in determining exploitable biomass for the Gulf of Alaska and the PWS pollock resources.

The harvest guideline for the PWS pollock fishery has been based on estimates of the pollock resource not assessed by NMFS surveys in adjacent federal waters. Although a substantial summer pollock population was observed in PWS by numerous assessment studies that followed the *EXXON Valdez* Oil Spill (EVOS Trustee Council 1993), most of these studies focused on juvenile pollock interactions with rearing Pacific herring (*Clupea pallasii*) and salmonids (*Ocorhynchus* spp.). The wide variety of habitats, an extensive plankton bloom that inhibits acoustic assessments, and depths that exceed 700 m have hampered acoustic assessments of the adult summer population in PWS. An alternative of extrapolating a previous PWS guideline by the relative change of the allowable biological

catch in the adjacent federal waters fails to incorporate data on PWS pollock generated by 1997 summer surveys.

Based on a delineation of PWS into a sample station grid of squares, 2.5 nautical miles on a side, the 1997 trawl survey sampled 17% of the available stations in the northeast and southeast portions of PWS and 17% of the stations available in the southwest area. No trawl survey estimates were available for the northwest area. Use of the longline survey data to expand trawl catch rates from the southwest area to the northwest area was seen as problematic without additional analysis. Instead, the delineation of PWS surface area into 91.6 m depth strata allowed extrapolation of trawl data into all four quadrants of PWS. Area-swept estimates yielded a pollock biomass estimate of 21,220 mt  $\pm$  9,491 mt (95% CI). This is a conservative estimate for several reasons. First, only four of the nine available depth strata, or 74% of the PWS total surface area, was represented because non-sampled strata were excluded from the analysis. Full expansion to the entire surface area would yield an estimated pollock biomass of 28,676 mt but would incorporate unsurveyed depth strata. Second, the NMFS survey uses a high-rise trawl that is three times more effective in capturing pollock than the 400 mesh Eastern used by ADF&G (Eric Brown, National Marine Fisheries Service, Seattle). As a result, the ADF&G survey likely underestimated summer pollock biomass in PWS when compared to what the NMFS trawl might have estimated. Because little new biomass data are available, it is recommended that the walleye pollock harvest guideline for Prince William Sound in 1999 be set at 2,100 mt, the same guideline that was recommended for 1997 (Bechtol 1998).

#### *Ongoing PWS Pollock Research*

Genetic assessment to differentiate pollock from PWS, the Gulf of Alaska, and the Bering Sea is still in progress (J. Seeb, ADF&G, Anchorage, AK). In addition, staff from the Prince William Science Center continue to examine pollock from inside and outside of PWS for isotope signatures. In September 1998, ADF&G conducted a third longline survey, this time focusing on the northwest and eastern quadrants of PWS. Finally, ADF&G is scheduled to conduct another bottom trawl survey of PWS during 1999. The 1999 trawl survey would occur at approximately the same time of year as the triennial trawl survey conducted by NMFS in the adjacent federal waters.

#### *Fishery Management Measures*

The fishing power of the mid-water trawl vessels makes it possible to harvest and even exceed the relatively small guideline harvest level within a short time frame. To meet stock conservation needs and allow for an orderly harvest, the Alaska Board of Fisheries adopted a registration deadline of 13 January for any vessel participating in the PWS pollock fishery. The board also adopted a regulation to allow trawl fishing for pollock only under the terms of a permit issued by the commissioner of ADF&G. This permit may



specify requirements for logbooks, observers, harvest reporting procedures, and other requirements. The following measures will likely be implemented for the 1999 fishery:

Fishing Season - The fishery will open at 12:00 noon on 20 January 1999, and will remain open until the harvest guideline is taken. This opening will coincide with openings in the adjacent federal waters. Time and area closures may be used to reduce the bycatch of non-target species.

Check-In/Check-Out procedures - Vessel operators are required to check-in and check-out with the Cordova ADF&G office prior to fishing.

Observer Coverage - All vessels must carry an ADF&G observer if requested.

Logbook Reporting - All vessels will be required to maintain logbooks while participating in this fishery.

## LITERATURE CITED

- Bakkala, R., T. Maeda, and G. McFarlane. 1986. Distribution and biology of pollock (*Theragra chalcogramma*) in the North Pacific Ocean. In: Symposium on Biology, Stock Assessment, and Management of Pollock, Pacific Cod, and Hake in the North Pacific Region. International North Pacific Fisheries Commission, Bulletin 45: 3-20
- Bechtol, W.R. 1995a. Commercial groundfish fisheries in the Central Region, 1994. Alaska Department of Fish and Game, Division of Commercial Fisheries, Management and Development, Regional Information Report 2A95-32, Anchorage.
- Bechtol, W.R. 1995b. Assessment and management of Prince William Sound walleye pollock for 1996. Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, Regional Information Report 2A95-45, Anchorage.
- Bechtol, W.R. 1998. Current assessment and 1998 management recommendations for walleye pollock in Prince William Sound. Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, Regional Information Report 2A97-36, Anchorage.
- Bechtol, W.R., and J. Vansant, III. 1998. Relative abundance of sablefish and other groundfish caught on longline gear in Prince William Sound, Alaska, 1997. Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, Regional Information Report 2A98-27, Anchorage, 44 p.
- Dwyer, D.A., K. Bailey, P. Livingston, and M. Yang. 1986. Some preliminary observations on the feeding of walleye pollock (*Theragra chalcogramma*) in the Eastern Bering Sea, based on field and laboratory studies. In: Symposium on Biology, Stock Assessment, and Management of Pollock, Pacific Cod, and Hake in the North Pacific Region. International North Pacific Fisheries Commission, Bulletin. 45: 228-246.
- Exxon Valdez* Oil Spill Trustee Council. 1993. *Exxon Valdez* Oil Spill symposium: Abstract book. *Exxon Valdez* Oil Spill Trustee Council. Oil spill public information center, Anchorage. 356 p.
- Hart, J.L. 1973. Pacific fishes of Canada. Fisheries Research Board of Canada, Bulletin 180.

- Haynes, E. and D. Urban. 1991. Prince William Sound trawl assessment. State/Federal Natural Resource Damage Assessment, Fish/Shellfish Study Number 18. Final Report, 66 p.
- Hollowed, A.B., E. Brown, P. Livingston, B.A. Megrey, and C. Wilson. 1995. Walleye pollock. In: Stock Assessment and Fishery Evaluation Report for the Gulf of Alaska as projected for 1996. Prepared by the Gulf of Alaska Groundfish Plan Team, North Pacific Fishery Management Council, Anchorage, Alaska.
- Hollowed, A.B., E. Brown, B.A. Megrey, and C. Wilson. 1996. Walleye pollock. In: Stock Assessment and Fishery Evaluation Report for groundfish resources of the Gulf of Alaska. Prepared by the Gulf of Alaska Groundfish Plan Team, North Pacific Fishery Management Council, Anchorage, Alaska.
- Hollowed, A.B., E. Brown, J. Ianelli, P. Livingston, B. Megrey, and C. Wilson. 1997. Walleye pollock. In: Stock Assessment and Fishery Evaluation Report for groundfish resources of the Gulf of Alaska. Prepared by the Gulf of Alaska Groundfish Plan Team, North Pacific Fishery Management Council, Anchorage, Alaska.
- Janusz, J. 1986. Biology of walleye pollock (*Theragra chalcogramma*) from the Gulf of Alaska. In: Symposium on Biology, Stock Assessment, and Management of Pollock, Pacific Cod, and Hake in the North Pacific Region. International North Pacific Fisheries Commission, Bulletin. 45: 247-261.
- Kirsch, J. 1997. Acoustic biomass estimate of adult walleye pollock in Prince William Sound, Alaska, in winter 1997. Prince William Sound Science Center, Cordova, Alaska.
- Kirsch, J., and G. Thomas. 1998. Acoustic biomass estimate of adult walleye pollock in Prince William Sound, Alaska, in winter 1998: final report. Prince William Sound Science Center, Cordova, Alaska.
- Livingston, P.A., A. Ward, G.M. Lang, and M.-S. Yang. 1993. Groundfish food habits and predation on commercially important prey species in the Eastern Bering Sea from 1987 to 1989. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-AFSC-11, 192 p.
- Methot, R.D. 1990. Synthesis model: an adaptable framework for analysis of diverse stock assessment data. INPFC Bulletin. 50: 259-277.
- Muensch, R.D., and C.M. Schmidt. 1974. Variations in the hydrographic structure of Prince William Sound. IMS Report R75-1, Institute of Marine Science, University of Alaska, Fairbanks, 35 p.

- Nishiyama, T., K. Hirano, and T. Haryu. 1986. The early life history and feeding habits of larval walleye pollock, *Theragra chalcogramma* (Pallas), in the southeast Bering Sea. *In*: Symposium on Biology, Stock Assessment, and Management of Pollock, Pacific Cod, and Hake in the North Pacific Region. International North Pacific Fisheries Commission, Bulletin. 45: 177-227.
- Okada, K. 1986. Biological characteristics and abundance of pelagic pollock in the Aleutian Basin. *In*: Symposium on Biology, Stock Assessment, and Management of Pollock, Pacific Cod, and Hake in the North Pacific Region. International North Pacific Fisheries Commission, Bulletin. 45: 150-176.
- Parks, N.B., and H. Zenger. 1979. Trawl survey of demersal fish and shellfish resources in Prince William Sound, Alaska: spring 1978. NWAFC Processed Report 79-2, 49 p.
- Thomas, G.L., and T.B. Stables. 1995. Winter 1995 estimate of the prespawning biomass of walleye pollock in Prince William Sound, Alaska. Prince William Sound Science Center, Cordova, Alaska.
- Traynor, J.J., and M.O. Nelson. 1983. Results of the U.S. hydroacoustic survey of pollock on the continental shelf and slope. pp: 305-320 *In*: R.G. Bakkala and K. Wakabayashi [eds.], Results of cooperative U.S.-Japan groundfish investigations in the Bering Sea during May-August 1979. Unpublished manuscript., NWAFC, NMFS, Seattle.
- Trowbridge, Charles. 1996. Central Region groundfish report to the Alaska Board of Fisheries, 1996. Alaska Department of Fish and Game, Division of Commercial Fisheries, Management and Development, Regional Information Report 2A96-37, Anchorage.
- Yang, M.-S. 1993. Food habits of the commercially important groundfishes in the Gulf of Alaska in 1990. U.S. Dept. of Commerce, NOAA Technical Memo. NMFS-AFSC-22, 150 p.

Table 1. Annual commercial walleye pollock harvest from Prince William Sound, Alaska during 1987-1998.

| Year <sup>a/</sup> | Round Weight (metric tons) |         |       | Total   |
|--------------------|----------------------------|---------|-------|---------|
|                    | Longline                   | Trawl   | Other |         |
| 1987               | 0.4                        |         |       | 0.4     |
| 1988               | 0.7                        |         |       | 0.7     |
| 1989               | 0.2                        | 0.4     | <0.1  | 0.7     |
| 1990               | 0.3                        | 3.0     |       | 3.3     |
| 1991               |                            |         |       | 0.0     |
| 1992               | <0.1                       | 2.7     |       | 2.7     |
| 1993               | 0.1                        | 2.5     |       | 2.6     |
| 1994               | <0.1                       |         | 2.5   | 2.5     |
| 1995               | 1.6                        | 2,954.5 | 2.7   | 2,958.8 |
| 1996               | 0.3                        | 1,671.4 | 0.6   | 1,672.3 |
| 1997               | 3.2                        | 2,023.6 | 0.1   | 2,026.9 |
| 1998               | 1.2                        | 2,107.1 | 0.0   | 2,108.3 |

<sup>a/</sup> Preliminary data through 26 October 1998.

Table 2. Walleye pollock biomass survey estimates available for Prince William Sound, 1989-1998.

A. Prince William Sound pollock biomass estimated during 1989-1998 surveys.

| Estimation Source         | Survey Estimated Biomass (mt) |        | Comments   |
|---------------------------|-------------------------------|--------|--|
| 1989 Bottom Trawl Survey  | 9,500                         | Summer | Summer survey.                                   |
| 1994 Hydroacoustic Survey | 24,328                        | Summer | Target discrimination problems >140 m and <20 m. |
| 1995 Hydroacoustic Survey | 28,855                        | Winter | Prespawning Aggregation.                         |
| 1997 Hydroacoustic Survey | 37,894                        | Winter | Prespawning Aggregation.                         |
| 1998 Hydroacoustic Survey | 114,344                       | Winter | Prespawning Aggregation.                         |
| 1997 Trawl Survey         | 21,220                        | Summer | Few stations in SE and no stations in NW         |
| 1997 Longline Survey      | NA                            | Summer | Relative abundance between SW and NW             |
| 1998 Longline Survey      | NA                            | Summer | Relative abundance between east and NW           |

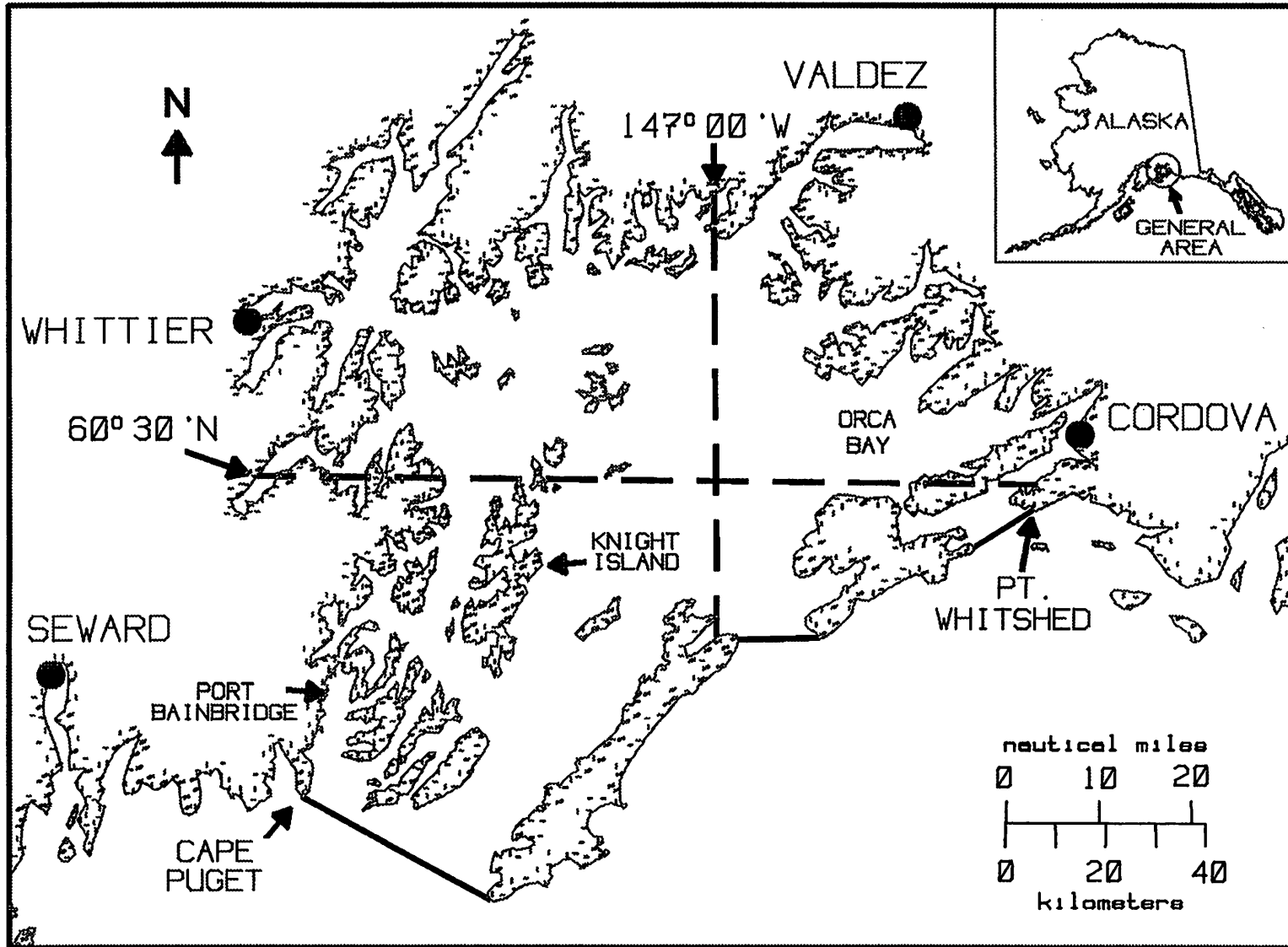


Figure 1. Prince William Sound management area.

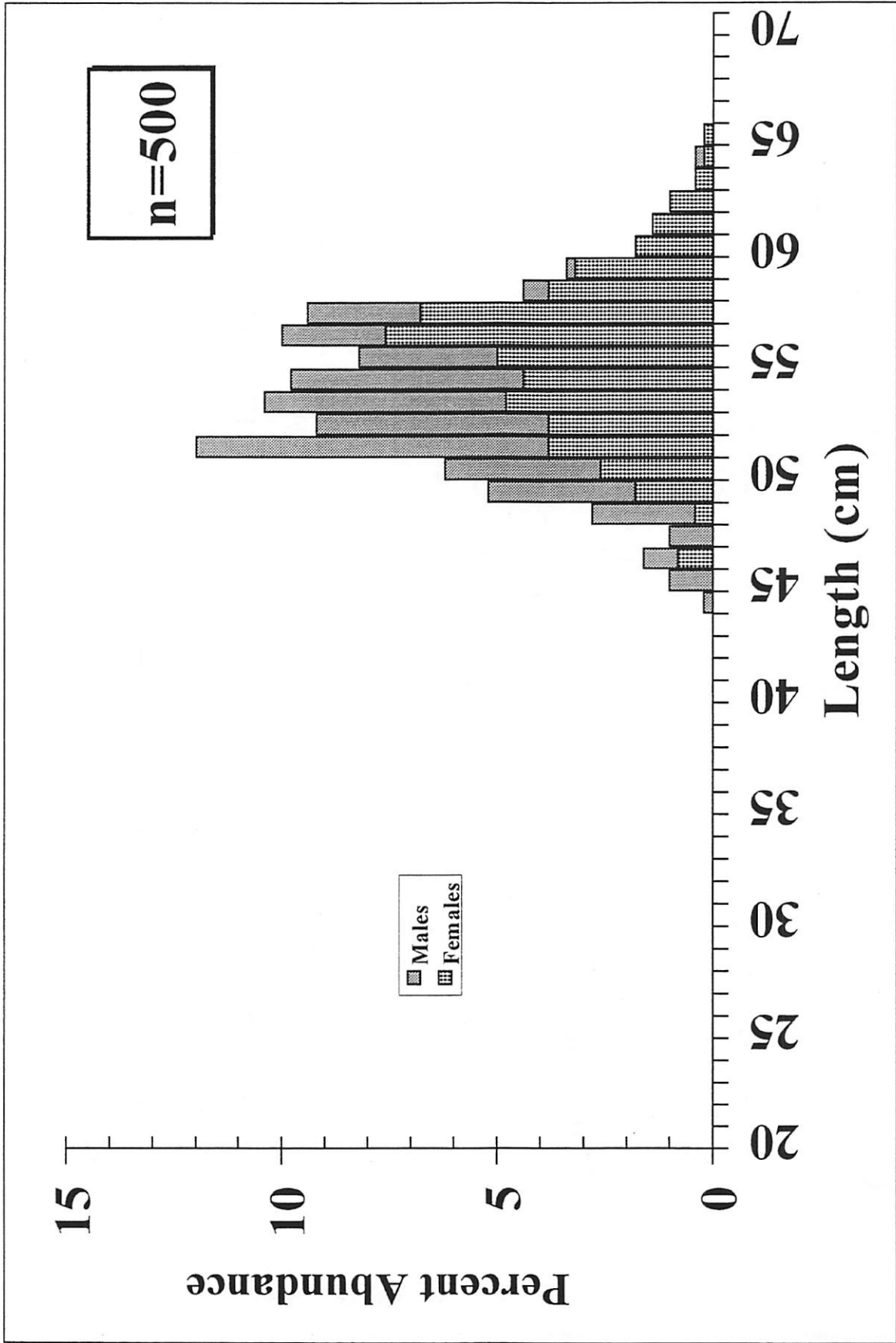


Figure 2. Length composition of pollock sampled from the commercial trawl fishery of Prince William Sound, 1995.



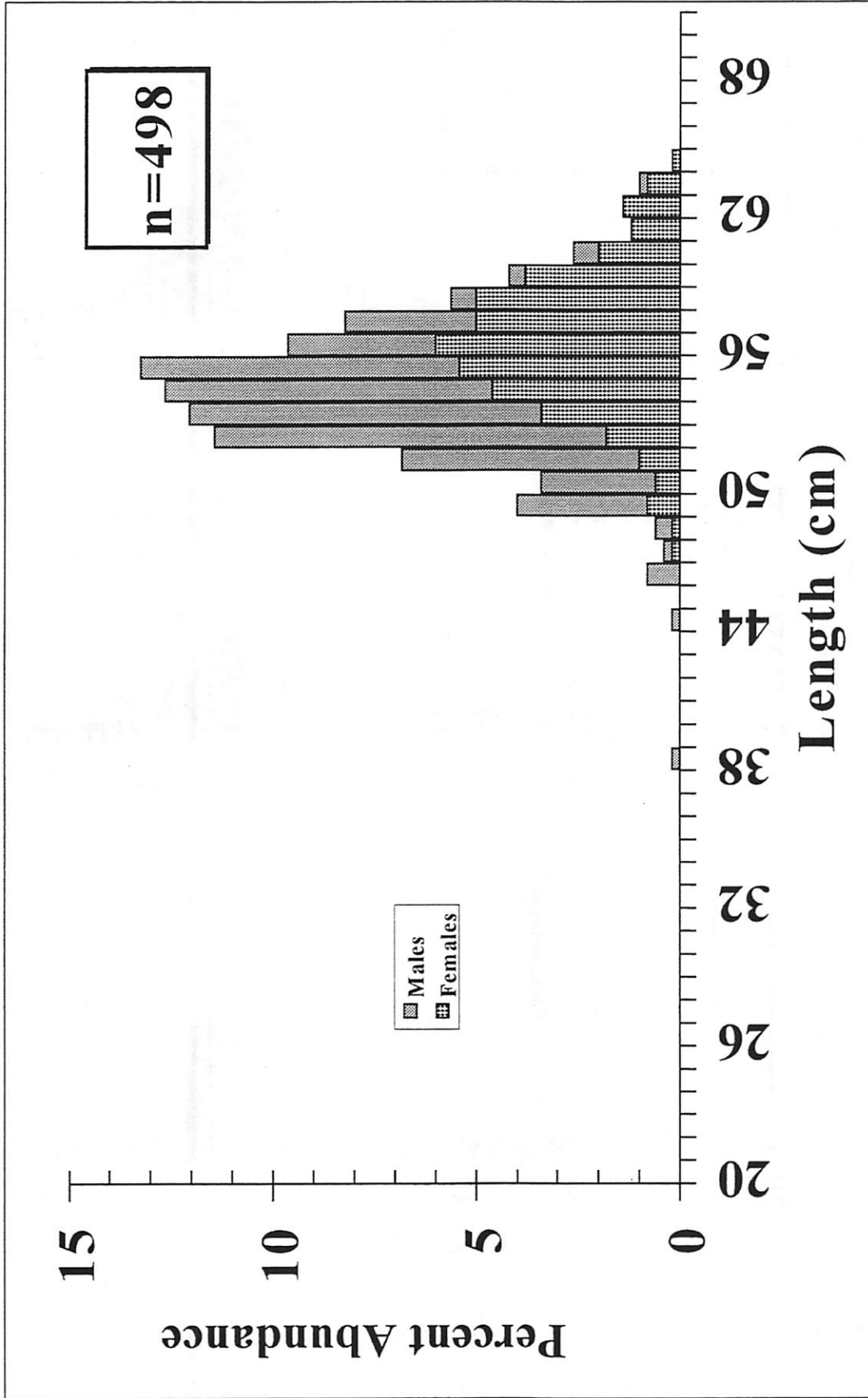


Figure 3. Length composition of pollock sampled from the commercial trawl fishery of Prince William Sound, 1996.

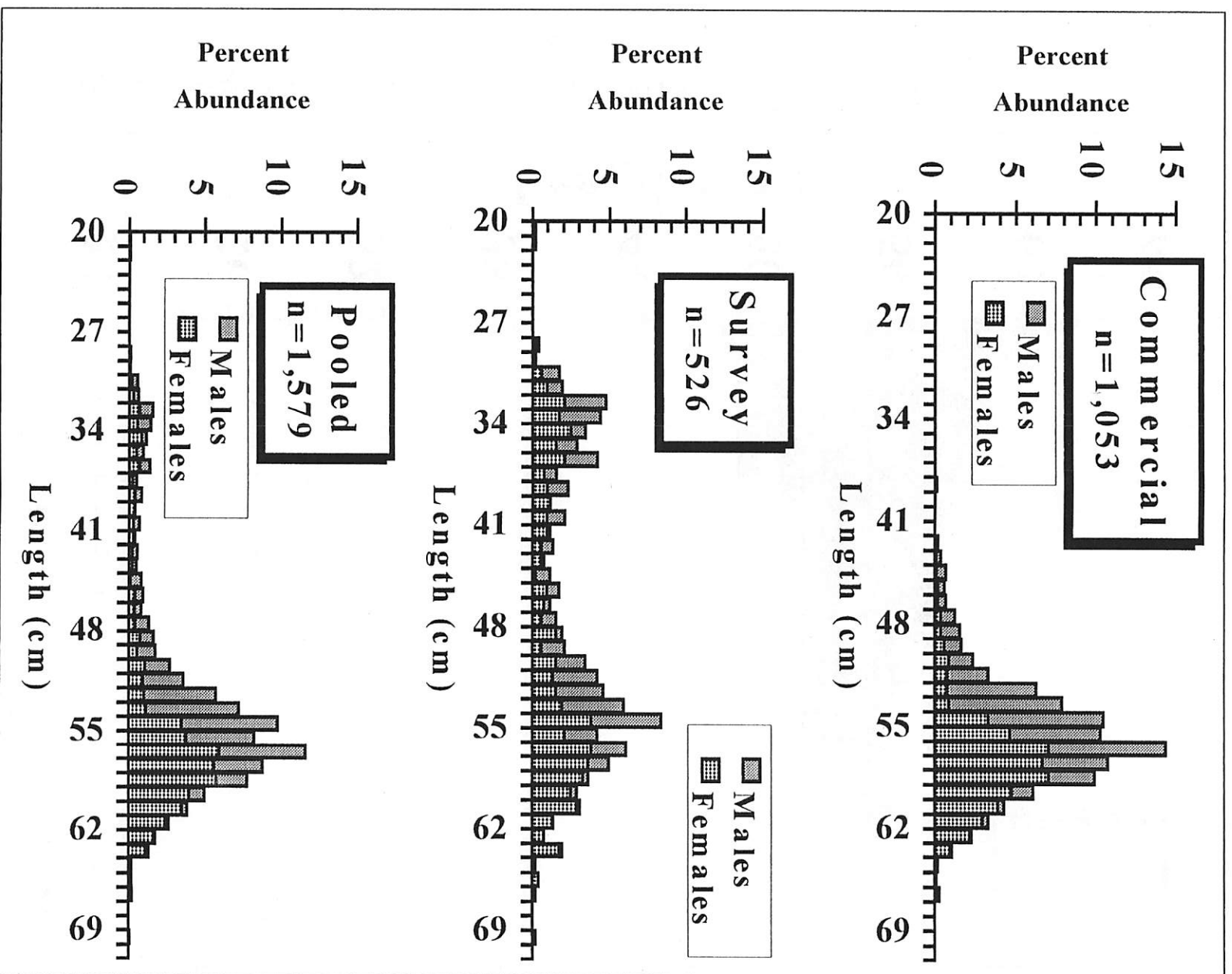


Figure 4. Length composition of pollock in commercial fishery and acoustic survey catches from Prince William Sound, 1997.

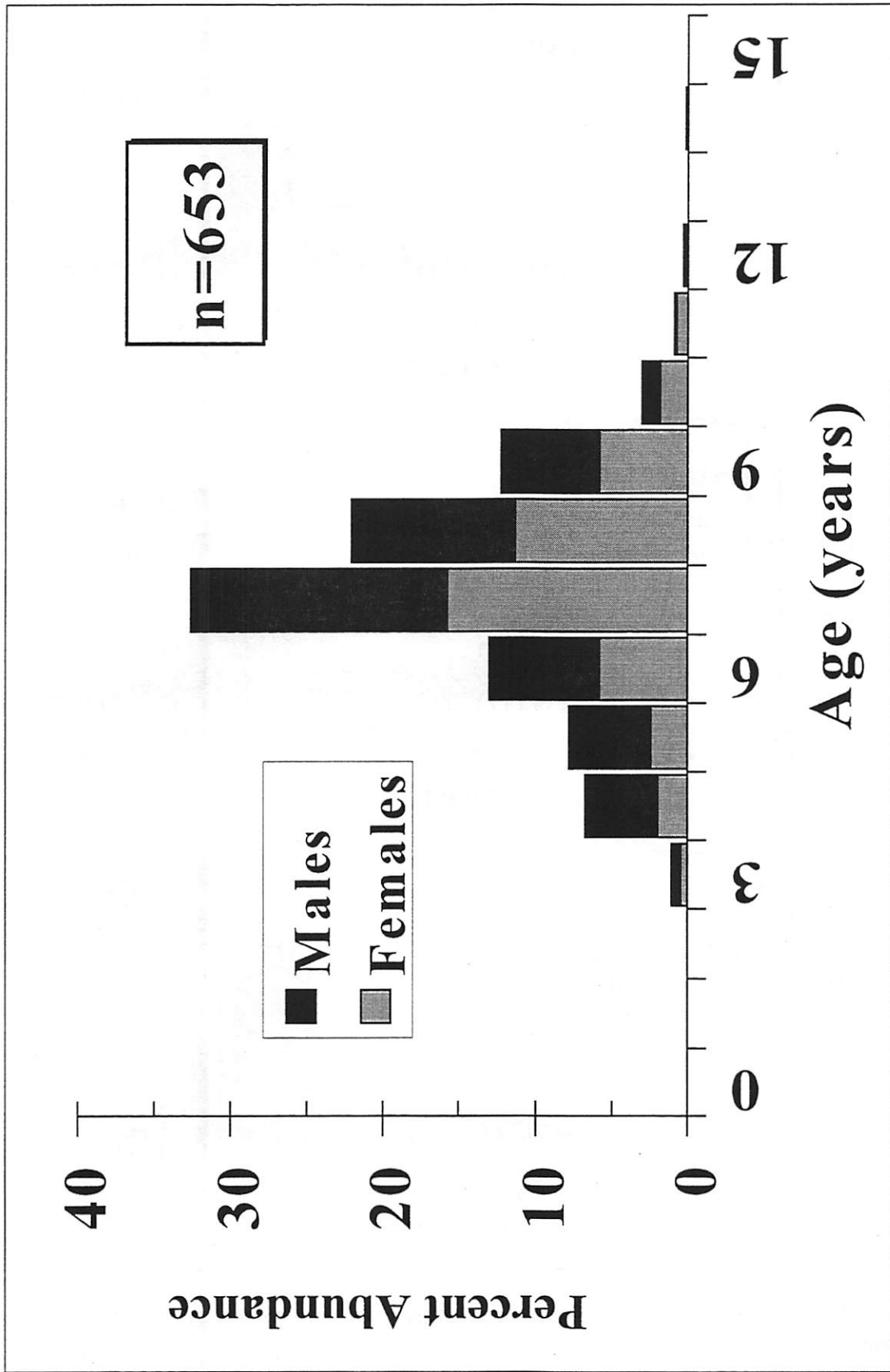


Figure 5. Age composition of male and female pollock in commercial fishery catches from Prince William Sound, 1997.

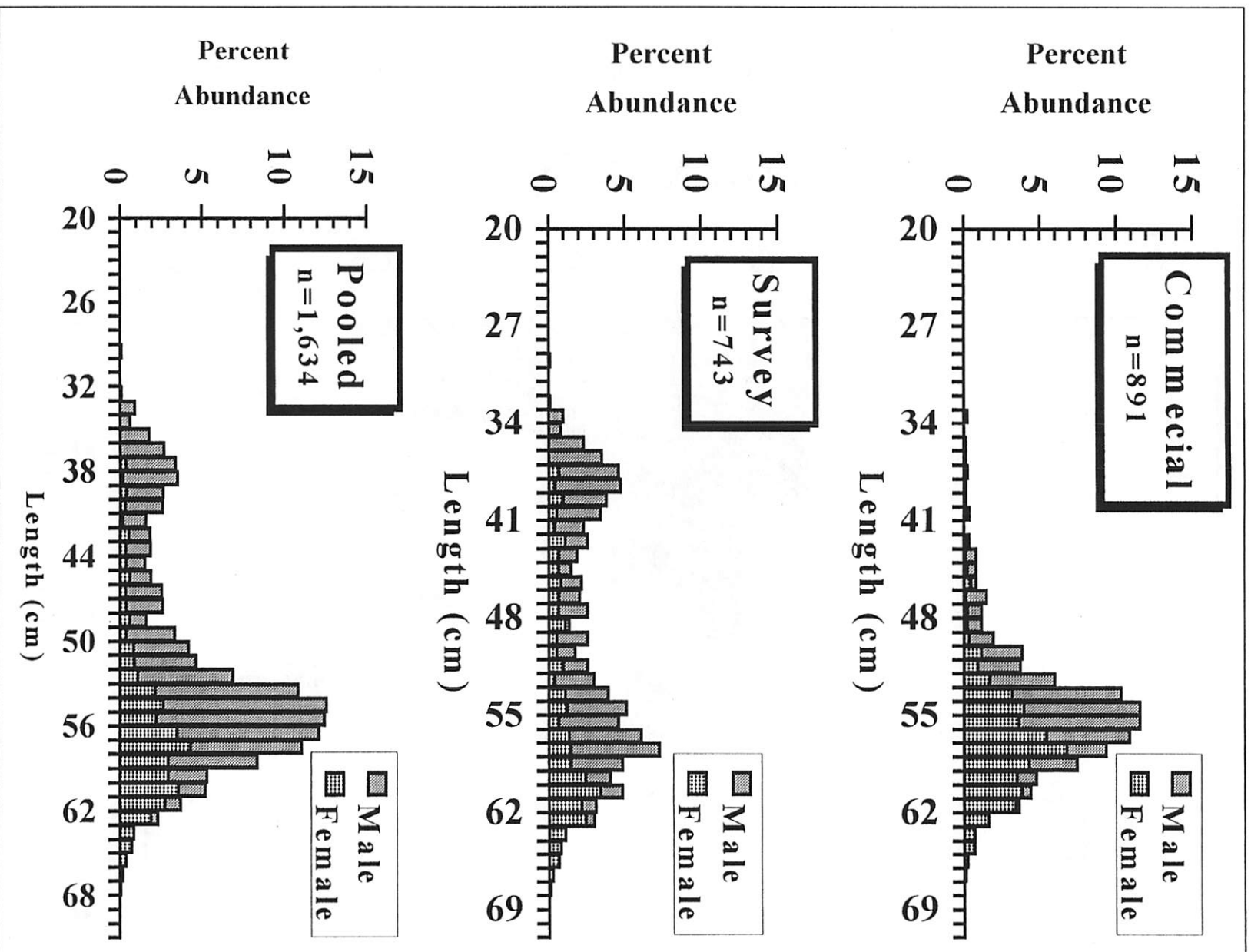


Figure 6. Length composition of pollock in commercial fishery and acoustic survey catches from Prince William Sound, 1998.

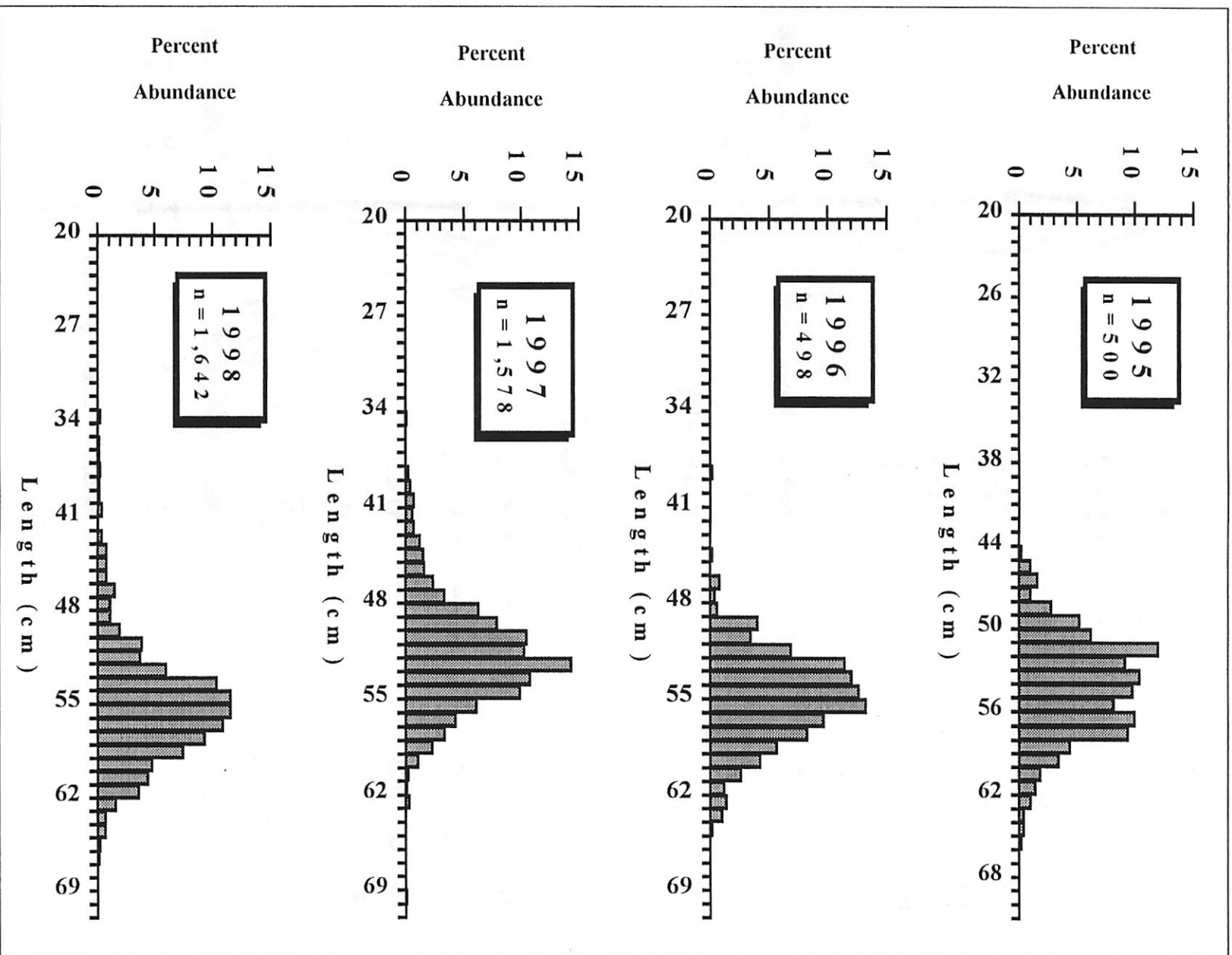


Figure 7. Length composition of pollock caught commercially from Prince William Sound, 1995-1998.

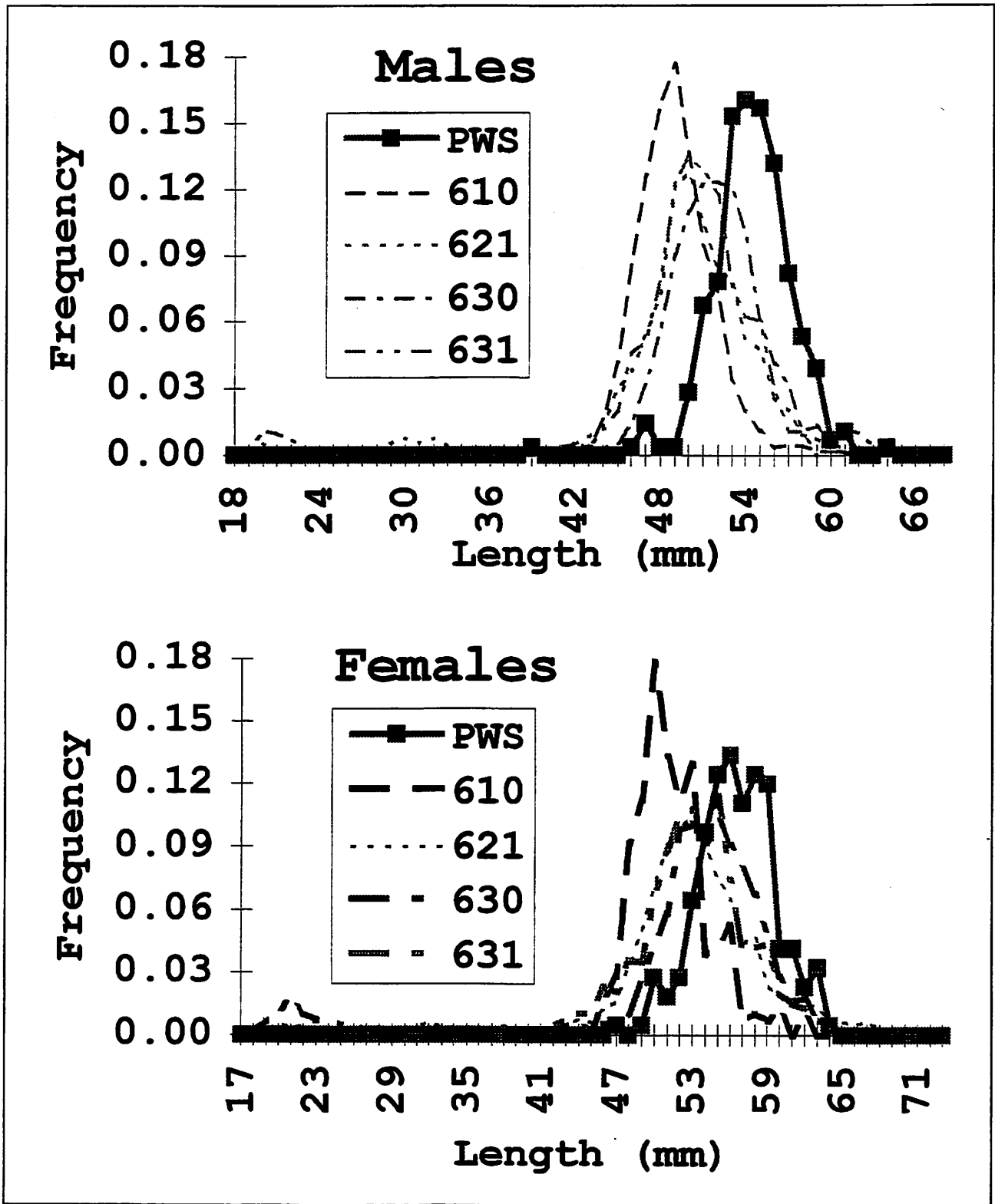


Figure 8. Length-frequency distributions of pollock caught in commercial trawl fisheries in Prince William Sound and federal regulatory areas 610, 620, 630, and 631 of the Gulf of Alaska, 1996.

Appendix A. Length composition of walleye pollock by size, sex, and sample type from Prince William Sound, Alaska, 1995-1998.

| Size<br>(cm) | Pollock Abundance |        |            |        |            |        |        |        |            |        |        |        |
|--------------|-------------------|--------|------------|--------|------------|--------|--------|--------|------------|--------|--------|--------|
|              | 1995              |        | 1996       |        | 1997       |        |        |        | 1998       |        |        |        |
|              | Commercial        |        | Commercial |        | Commercial |        | Survey |        | Commercial |        | Survey |        |
|              | Male              | Female | Male       | Female | Male       | Female | Male   | Female | Male       | Female | Male   | Female |
| 20           |                   |        |            |        |            |        |        |        |            |        |        | 1      |
| 21           |                   |        |            |        |            |        |        |        |            |        |        | 1      |
| 22           |                   |        |            |        |            |        |        |        |            |        |        |        |
| 23           |                   |        |            |        |            |        |        |        |            |        |        |        |
| 24           |                   |        |            |        |            |        |        |        |            |        |        |        |
| 25           |                   |        |            |        |            |        |        |        |            |        |        |        |
| 26           |                   |        |            |        |            |        |        |        |            |        |        |        |
| 27           |                   |        |            |        |            |        |        |        |            |        |        |        |
| 28           |                   |        |            |        |            |        |        | 1      |            |        |        | 1      |
| 29           |                   |        |            |        |            |        |        | 1      |            |        |        | 1      |
| 30           |                   |        |            |        |            |        |        | 6      |            |        |        | 3      |
| 31           |                   |        |            |        |            |        |        | 5      |            |        |        | 5      |
| 32           |                   |        |            |        |            |        |        | 14     |            |        |        | 11     |
| 33           |                   |        |            |        |            |        |        | 14     |            | 2      |        | 9      |
| 34           |                   |        |            |        |            |        |        | 5      |            |        |        | 13     |
| 35           |                   |        |            |        |            |        |        | 7      |            | 1      |        | 8      |
| 36           |                   |        |            |        |            |        |        | 11     |            | 1      |        | 11     |
| 37           |                   |        |            |        |            |        |        | 4      |            | 1      | 1      | 4      |
| 38           |                   |        | 1          |        |            | 1      |        | 7      |            | 1      |        | 5      |
| 39           |                   |        |            |        |            |        |        |        |            | 1      |        | 6      |
| 40           |                   |        |            |        |            |        |        | 6      |            | 2      | 1      | 5      |
| 41           |                   |        |            |        |            |        |        | 1      |            |        |        | 5      |
| 42           |                   |        |            |        | 1          | 1      |        | 4      |            | 2      | 1      | 3      |
| 43           |                   |        |            |        | 3          | 1      |        | 1      |            | 6      | 1      | 3      |
| 44           | 1                 |        | 1          |        | 6          | 1      |        | 5      |            | 5      | 2      | 1      |
| 45           | 5                 |        |            |        | 4          | 2      |        | 4      |            | 3      | 4      | 5      |
| 46           | 4                 | 4      | 4          |        | 5          | 2      |        | 2      |            | 12     | 1      | 4      |
| 47           | 5                 |        | 1          | 1      | 9          | 4      |        | 5      |            | 8      | 2      | 3      |
| 48           | 12                | 2      | 2          | 1      | 12         | 4      |        | 2      |            | 8      | 2      | 8      |
| 49           | 17                | 9      | 16         | 4      | 11         | 6      |        | 8      |            | 14     | 3      | 3      |
| 50           | 18                | 13     | 14         | 3      | 16         | 9      |        | 10     |            | 24     | 10     | 8      |
| 51           | 41                | 19     | 29         | 5      | 27         | 8      |        | 15     |            | 7      | 25     | 8      |
| 52           | 27                | 19     | 48         | 9      | 58         | 8      |        | 16     |            | 8      | 38     | 15     |
| 53           | 28                | 24     | 43         | 17     | 74         | 9      |        | 21     |            | 10     | 64     | 28     |
| 54           | 27                | 22     | 40         | 23     | 75         | 35     |        | 24     |            | 20     | 68     | 35     |
| 55           | 16                | 25     | 39         | 27     | 59         | 49     |        | 11     |            | 11     | 71     | 32     |
| 56           | 12                | 38     | 18         | 30     | 77         | 74     |        | 12     |            | 20     | 49     | 48     |
| 57           | 13                | 34     | 16         | 25     | 43         | 70     |        | 7      |            | 19     | 23     | 60     |
| 58           | 3                 | 19     | 3          | 25     | 30         | 74     |        | 2      |            | 17     | 28     | 38     |
| 59           | 1                 | 16     | 2          | 19     | 14         | 50     |        | 2      |            | 13     | 11     | 31     |
| 60           |                   | 9      | 3          | 10     | 4          | 41     |        | 1      |            | 15     | 5      | 34     |
| 61           |                   | 7      |            | 6      | 4          | 31     |        |        |            |        | 2      | 30     |
| 62           |                   | 5      |            | 7      | 1          | 23     |        |        |            |        |        | 14     |
| 63           |                   | 2      | 1          | 4      | 1          | 10     |        | 1      |            |        |        | 6      |
| 64           | 1                 | 1      |            | 1      |            | 2      |        |        |            |        |        | 1      |
| 65           |                   | 1      |            |        |            | 1      |        |        |            |        |        | 2      |
| 66           |                   |        |            |        | 1          | 2      |        |        |            |        | 1      |        |
| 67           |                   |        |            |        |            |        |        |        |            |        |        | 1      |
| 68           |                   |        |            |        |            |        |        |        |            |        |        |        |
| 69           |                   |        |            |        |            |        |        |        |            |        |        | 1      |
| 70           |                   |        |            |        |            |        |        |        |            |        |        |        |

### **OEO/ADA Statement**

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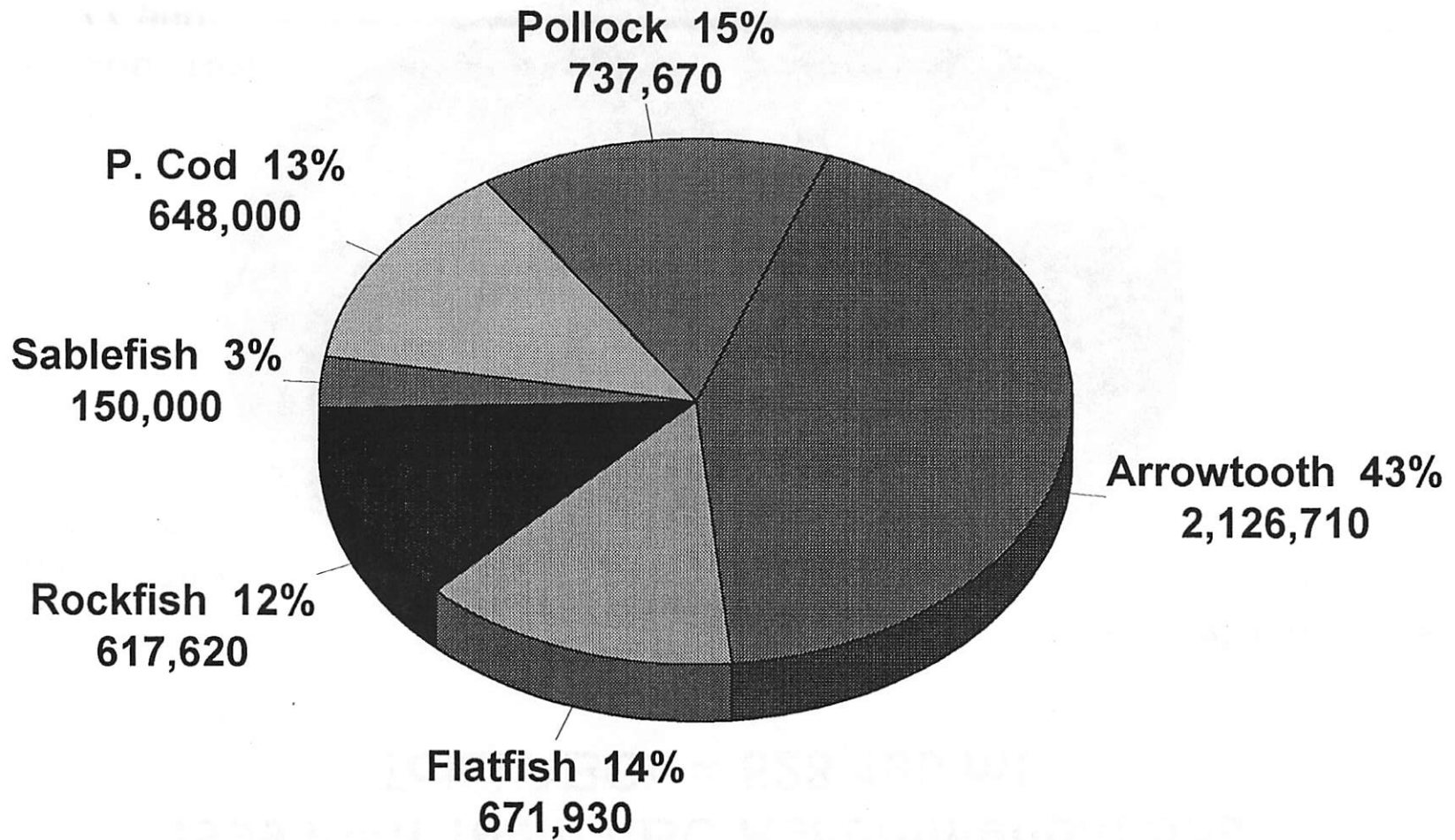
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# Gulf of Alaska Groundfish

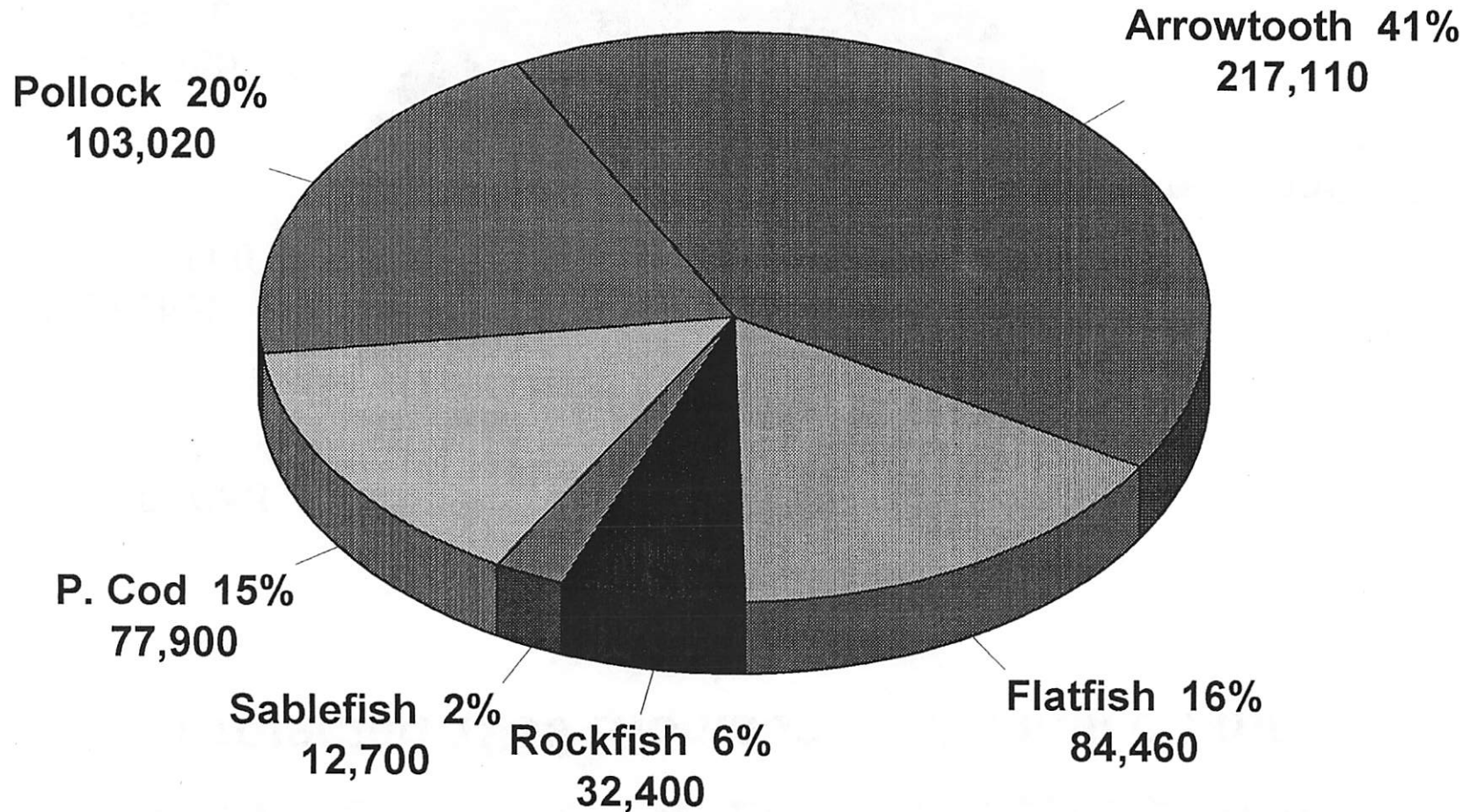
Projected 1999 Biomass - 4.95 million mt



# Gulf of Alaska Groundfish

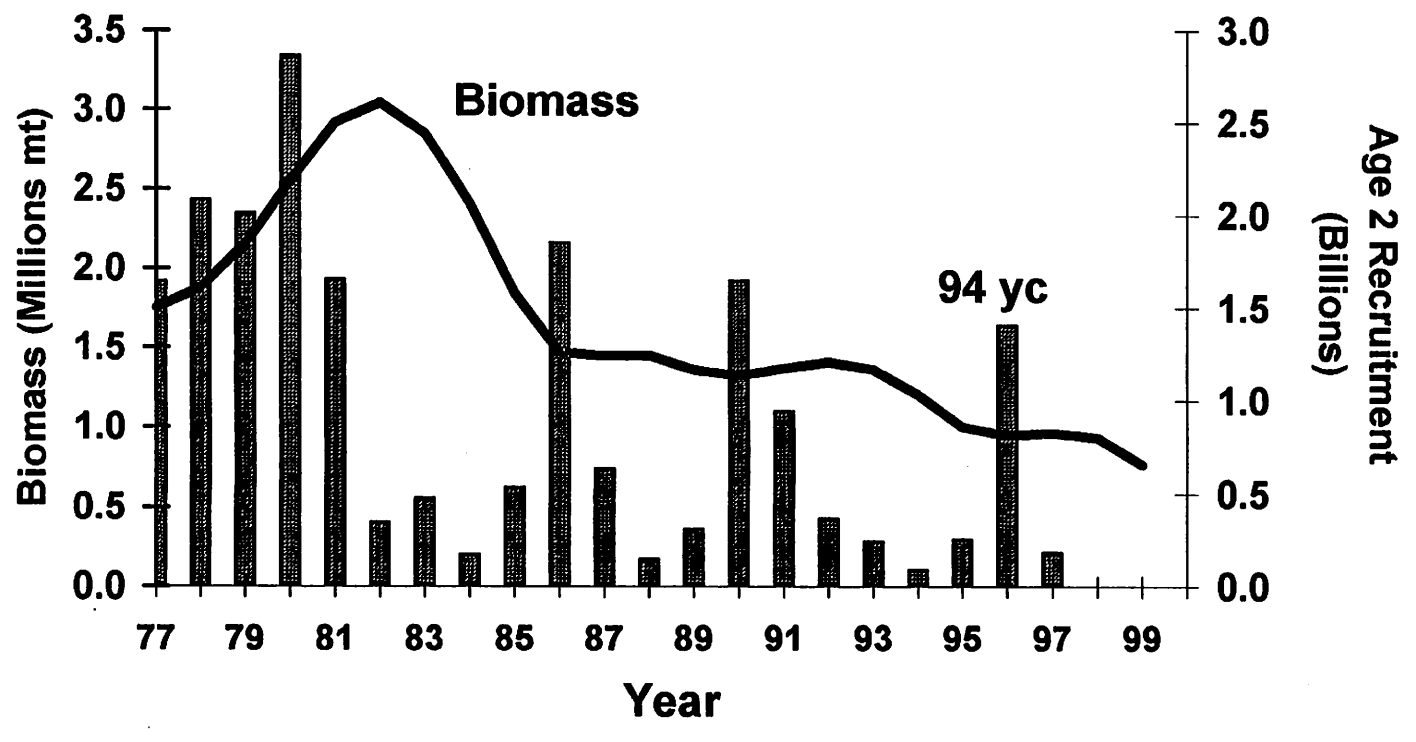
1999 Plan Team ABC Recommendations

Total ABCs = 528,190 mt



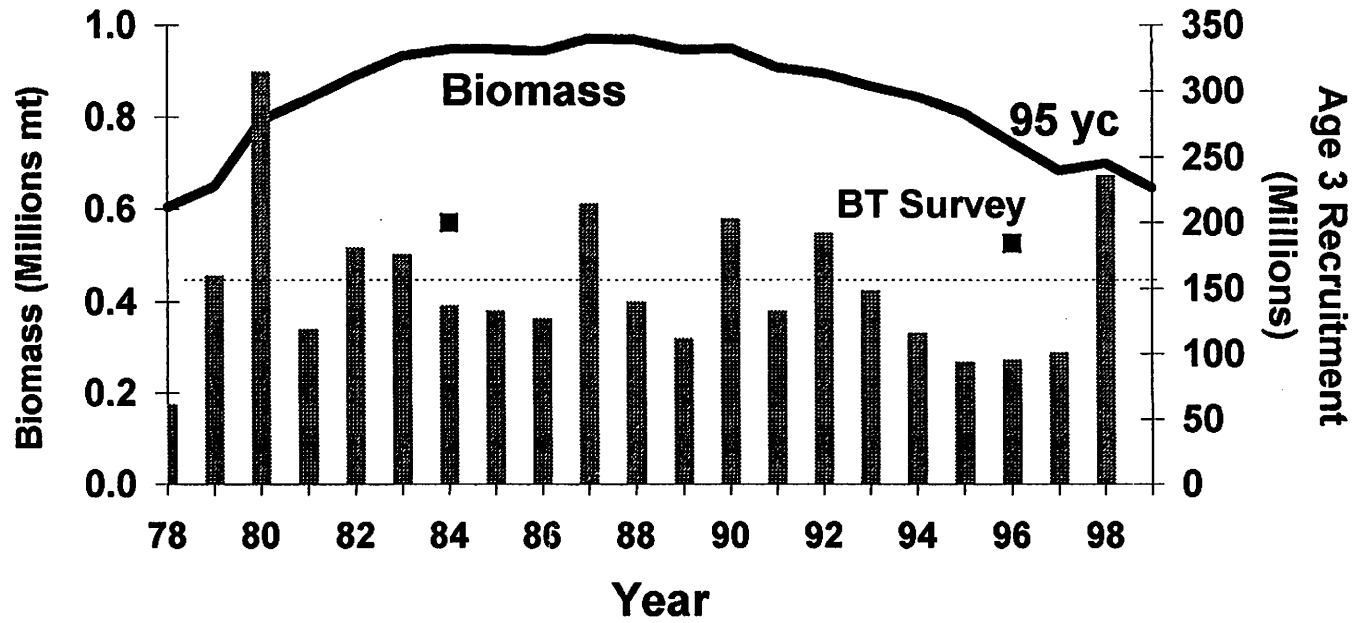
# GULF OF ALASKA POLLOCK

## Abundance and Recruitment Trends



# GULF OF ALASKA PACIFIC COD

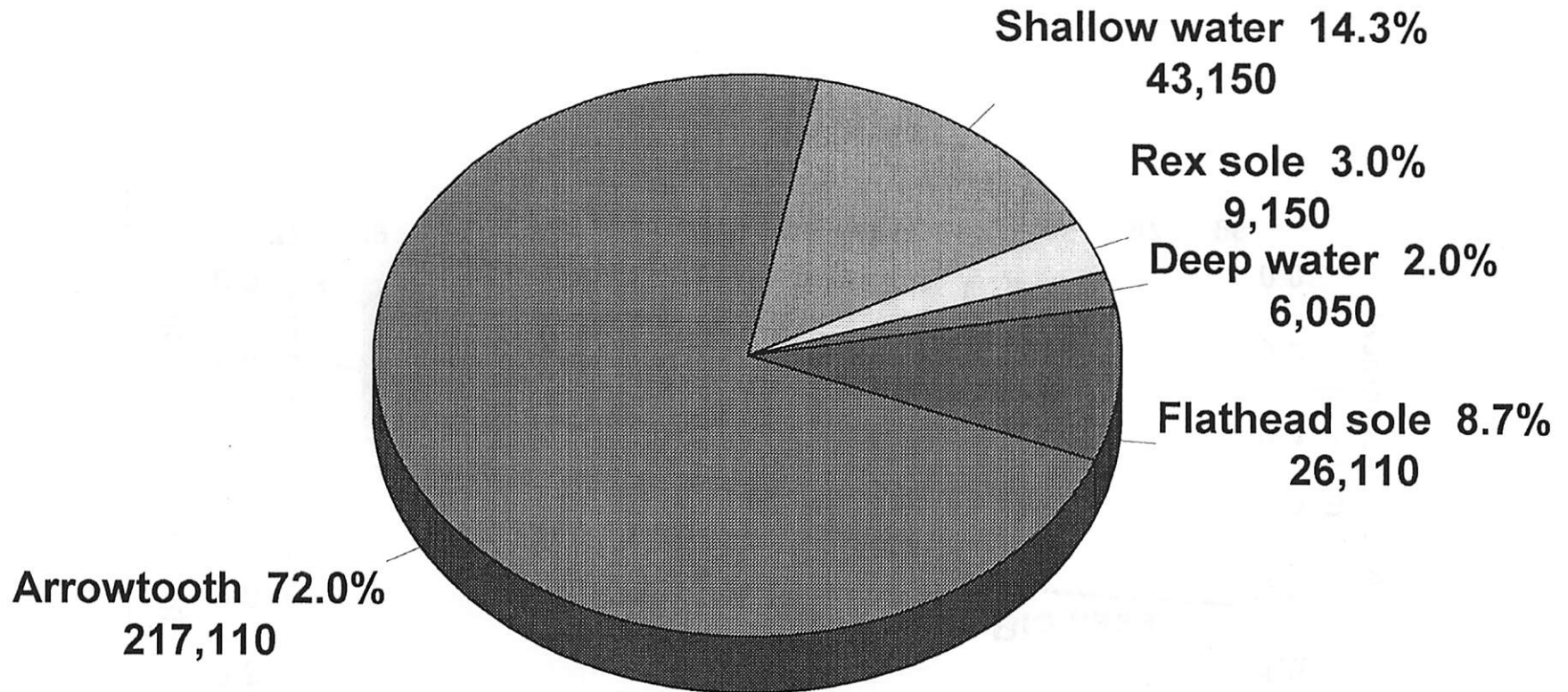
## Abundance and Recruitment Trends



# FLATFISH

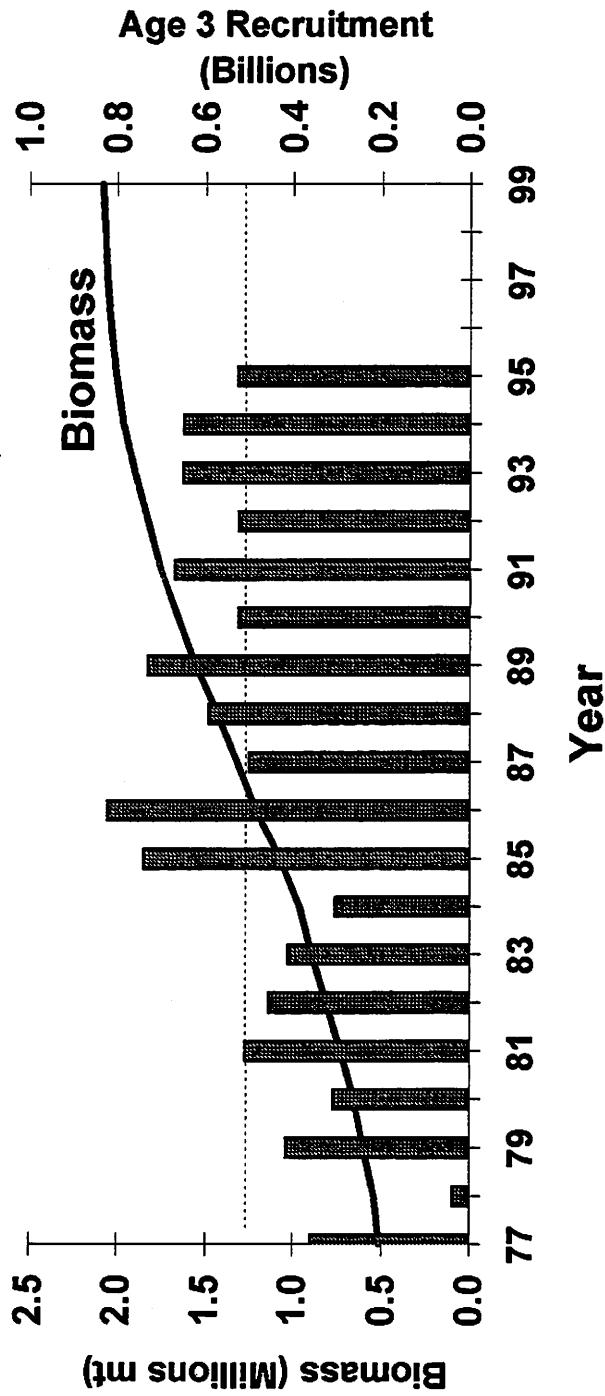
1999 Plan Team ABC Recommendations

Flatfish ABCs = 301,570 mt



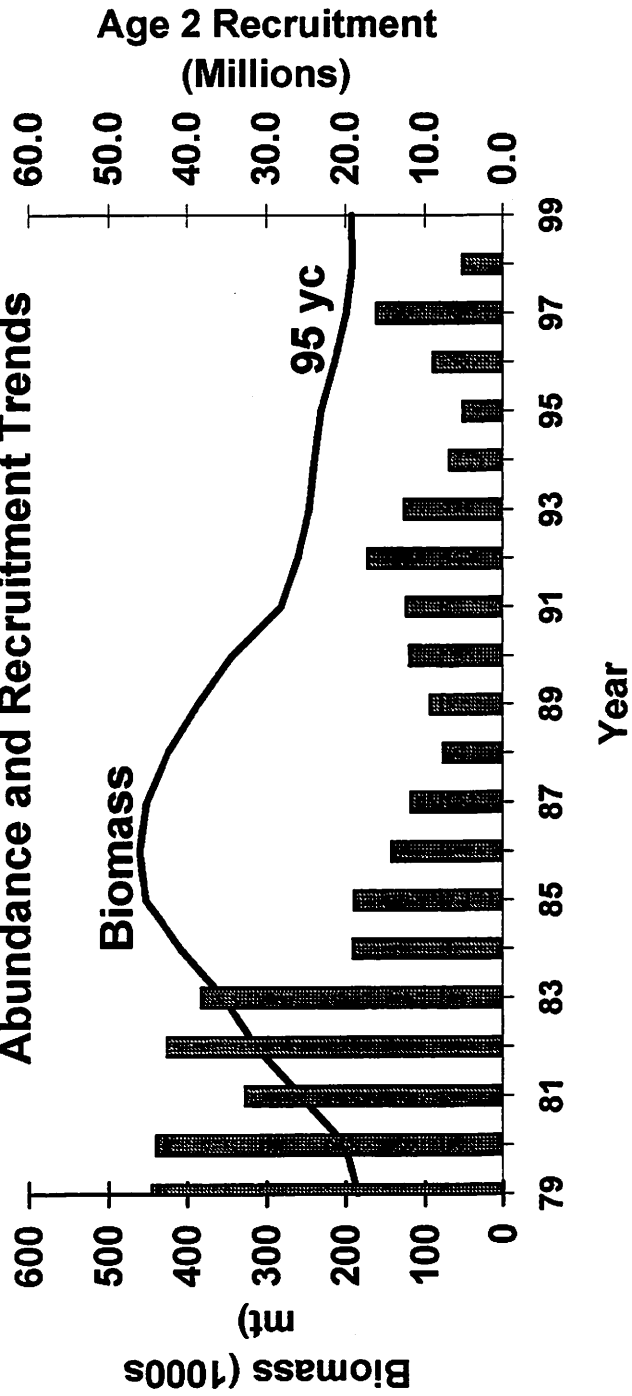
# GULF OF ALASKA ARROWTOOTH

## Abundance and Recruitment Trends



# ALASKA SABLEFISH

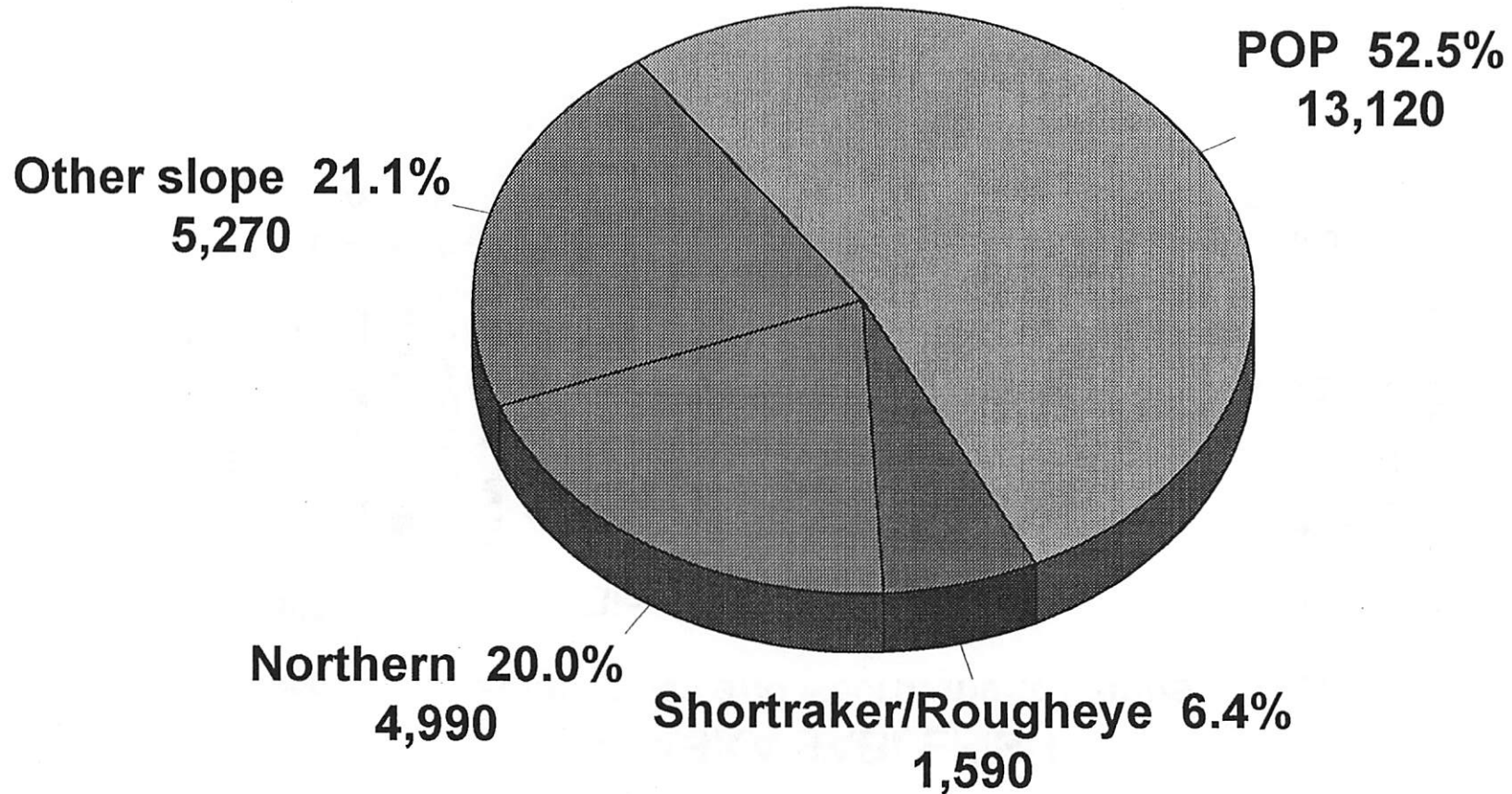
## Abundance and Recruitment Trends



# SLOPE ROCKFISH

1999 Plan Team ABC Recommendations

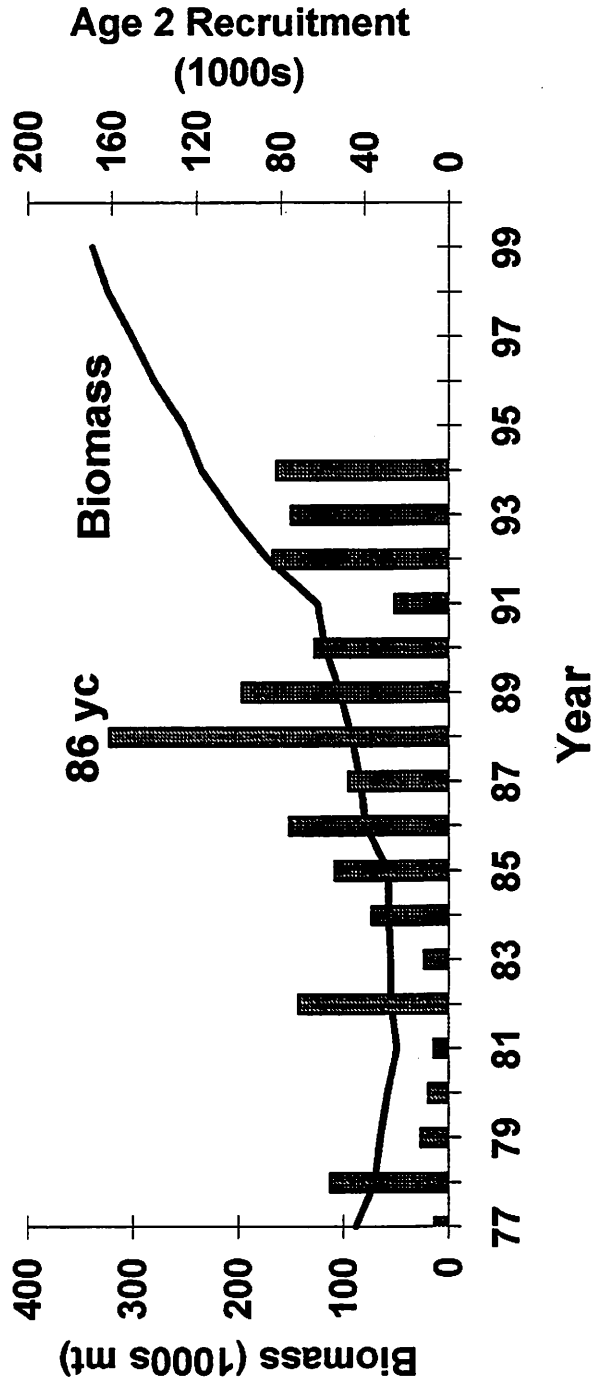
Slope Rockfish ABCs = 24,970 mt





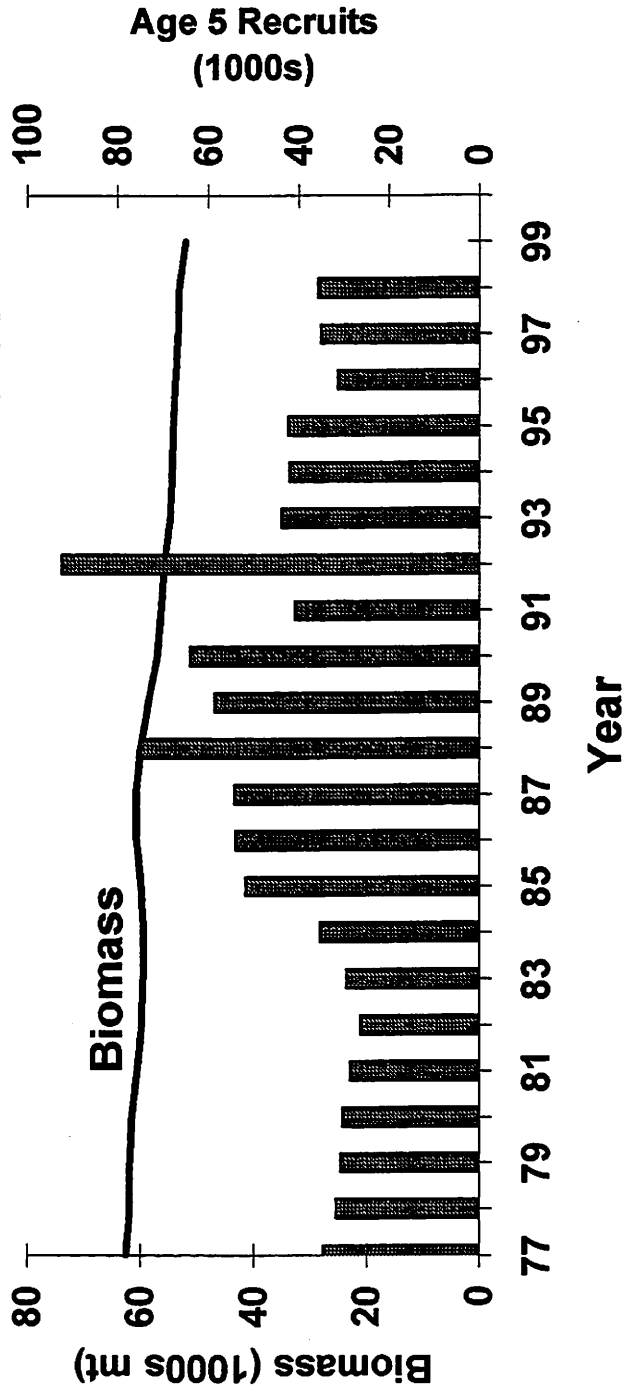
# GULF OF ALASKA POP

## Abundance and Recruitment Trend



# GULF OF ALASKA THORNYHEADS

## Abundance and Recruitment Trends



# 1999 ABCs FOR GOA GROUND FISH

## ABC Change from 1998

| Species             | 1999 ABC       | Change from<br>1998 |
|---------------------|----------------|---------------------|
| Pollock             | 103,020        | Down 26,980         |
| Pacific Cod         | 77,900         | No Change           |
| Flatfish            | 84,460         | Down 1,120          |
| Arrowtooth Flounder | 217,110        | Up 8,770            |
| Sablefish           | 12,700         | Down 1,420          |
| POP                 | 13,120         | Up 300              |
| Other Slope Rk.     | 11,850         | No Change           |
| Pelagic Shelf Rk.   | 4,880          | Down 380            |
| Demersal Shelf Rk.  | 560            | No Change           |
| Thornyheads         | 1,990          | Down 10             |
| Atka Mackerel       | 600            | No Change           |
| <b>Total</b>        | <b>528,190</b> | <b>Down 20,840</b>  |

**DRAFT****FINAL 1999 GULF OF ALASKA GROUND FISH SPECIFICATIONS**

Council recommendations (mt) for 1999

| Species                  | Area        | 1998    |         |         |                    | 1999        |             |         |         |         |
|--------------------------|-------------|---------|---------|---------|--------------------|-------------|-------------|---------|---------|---------|
|                          |             | OFL     | ABC     | TAC     | Catch <sup>1</sup> | Area        | OFL         | ABC     | TAC     |         |
| Pollock                  | W (61)      |         | 29,790  | 29,790  | 29,311             | W (61)      |             | 23,120  | 23,120  |         |
|                          | C (62)      | 170,500 | 50,045  | 50,045  | 49,128             | C (62)      | 134,100     | 38,840  | 38,840  |         |
|                          | C (63)      |         | 39,315  | 39,315  | 39,047             | C (63)      |             | 30,520  | 30,520  |         |
|                          | E           | 15,600  | 10,850  | 5,580   | 6,367              | W. Yakutat  | 12,300      | 8,440   | 2,110   |         |
|                          | Total       |         | 186,100 | 130,000 | 124,730            | 123,853     | E. Yak./SEO |         | 6,330   |         |
|                          | Total       |         | 186,100 | 130,000 | 124,730            | 123,853     | Total       | 146,400 | 100,920 | 100,920 |
| Pacific Cod <sup>2</sup> | W           |         | 27,260  | 23,170  | 19,845             | W           |             | 29,540  | 23,630  |         |
|                          | C           |         | 49,080  | 41,720  | 41,632             | C           |             | 53,170  | 42,935  |         |
|                          | E           |         | 1,560   | 1,170   | 850                | E           |             | 1,690   | 1,270   |         |
|                          | Total       | 141,000 | 77,900  | 66,060  | 62,327             | Total       | 134,000     | 84,400  | 67,835  |         |
| Flatfish, Deep Water     | W           |         | 340     | 340     | 16                 | W           |             | 240     | 240     |         |
|                          | C           |         | 3,690   | 3,690   | 2,348              | C           |             | 2,740   | 2,740   |         |
|                          | E           |         | 3,140   | 3,140   | 108                | W. Yakutat  |             | 1,720   | 1,720   |         |
|                          | Total       | 9,440   | 7,170   | 7,170   | 2,472              | E. Yak./SEO |             | 1,350   | 1,350   |         |
|                          | Total       | 9,440   | 7,170   | 7,170   | 2,472              | Total       | 8,070       | 6,050   | 6,050   |         |
| Rex Sole                 | W           |         | 1,190   | 1,190   | 439                | W           |             | 1,190   | 1,190   |         |
|                          | C           |         | 5,490   | 5,490   | 2,197              | C           |             | 5,490   | 5,490   |         |
|                          | E           |         | 2,470   | 2,470   | 35                 | W. Yakutat  |             | 850     | 850     |         |
|                          | Total       | 11,920  | 9,150   | 9,150   | 2,671              | E. Yak./SEO |             | 1,620   | 1,620   |         |
|                          | Total       | 11,920  | 9,150   | 9,150   | 2,671              | Total       | 11,920      | 9,150   | 9,150   |         |
| Flatfish, Shallow Water  | W           |         | 22,570  | 4,500   | 269                | W           |             | 22,570  | 4,500   |         |
|                          | C           |         | 19,260  | 12,950  | 3,199              | C           |             | 19,260  | 12,950  |         |
|                          | E           |         | 1,320   | 1,180   | 72                 | W. Yakutat  |             | 250     | 250     |         |
|                          | Total       | 59,540  | 43,150  | 18,630  | 3,540              | E. Yak./SEO |             | 1,070   | 1,070   |         |
|                          | Total       | 59,540  | 43,150  | 18,630  | 3,540              | Total       | 59,540      | 43,150  | 18,770  |         |
| Flathead Sole            | W           |         | 8,440   | 2,000   | 568                | W           |             | 8,440   | 2,000   |         |
|                          | C           |         | 15,630  | 5,000   | 1,171              | C           |             | 15,630  | 5,000   |         |
|                          | E           |         | 2,040   | 2,040   | 8                  | W. Yakutat  |             | 1,270   | 1,270   |         |
|                          | Total       | 34,010  | 26,110  | 9,040   | 1,747              | E. Yak./SEO |             | 770     | 770     |         |
|                          | Total       | 34,010  | 26,110  | 9,040   | 1,747              | Total       | 34,010      | 26,110  | 9,040   |         |
| Arrowtooth               | W           |         | 33,010  | 5,000   | 2,997              | W           |             | 34,400  | 5,000   |         |
|                          | C           |         | 149,640 | 25,000  | 9,687              | C           |             | 155,930 | 25,000  |         |
|                          | E           |         | 25,690  | 5,000   | 379                | W. Yakutat  |             | 13,260  | 2,500   |         |
|                          | Total       | 295,970 | 208,340 | 35,000  | 13,063             | E. Yak./SEO |             | 13,520  | 2,500   |         |
|                          | Total       | 295,970 | 208,340 | 35,000  | 13,063             | Total       | 308,880     | 217,110 | 35,000  |         |
| Sablefish <sup>3</sup>   | W           |         | 1,840   | 1,840   | 1,425              | W           |             | 1,820   | 1,820   |         |
|                          | C           |         | 6,320   | 6,320   | 5,778              | C           |             | 5,590   | 5,590   |         |
|                          | W. Yakutat  |         | 5,960   | 2,473   | 1,877              | W. Yakutat  |             | 5,290   | 2,090   |         |
|                          | E. Yak./SEO |         |         | 3,487   | 3,421              | E. Yak./SEO |             | -       | 3,200   |         |
|                          | Total       | 23,450  | 14,120  | 14,120  | 12,501             | Total       | 19,720      | 12,700  | 12,700  |         |
| Rockfish, Other Slope    | W           |         | 20      | 20      | 47                 | W           |             | 20      | 20      |         |
|                          | C           |         | 650     | 650     | 701                | C           |             | 650     | 650     |         |
|                          | E           |         | 4,590   | 1,500   | 112                | W. Yakutat  |             | 470     | 470     |         |
|                          | Total       | 7,560   | 5,260   | 2,170   | 860                | E. Yak./SEO |             | 4,130   | 4,130   |         |
|                          | Total       | 7,560   | 5,260   | 2,170   | 860                | Total       | 7,560       | 5,270   | 5,270   |         |
| Rockfish, Northern       | W           |         | 840     | 840     | 67                 | W           |             | 840     | 840     |         |
|                          | C           |         | 4,150   | 4,150   | 2,974              | C           |             | 4,150   | 4,150   |         |
|                          | E           |         | 10      | 10      | 10                 | E           |             | -       | -       |         |
|                          | Total       | 9,420   | 5,000   | 5,000   | 3,051              | Total       | 9,420       | 4,990   | 4,990   |         |
|                          | Total       | 9,420   | 5,000   | 5,000   | 3,051              | Total       | 9,420       | 4,990   | 4,990   |         |
| Pacific Ocean Perch      | W           |         | 1,810   | 1,810   | 850                | W           | 2,610       | 1,850   | 1,850   |         |
|                          | C           |         | 6,600   | 6,600   | 7,501              | C           | 9,520       | 6,760   | 6,760   |         |
|                          | E           |         | 4,410   | 2,366   | 610                | W. Yakutat  | 6,360       | 1,350   | 820     |         |
|                          | Total       | 18,090  | 12,820  | 10,776  | 8,961              | E. Yak./SEO |             | 3,160   | 3,160   |         |
|                          | Total       | 18,090  | 12,820  | 10,776  | 8,961              | Total       | 18,490      | 13,120  | 12,590  |         |

| Species                              | Area         | 1998           |                |                |                    | 1999         |                |                |                |
|--------------------------------------|--------------|----------------|----------------|----------------|--------------------|--------------|----------------|----------------|----------------|
|                                      |              | OFL            | ABC            | TAC            | Catch <sup>1</sup> | Area         | OFL            | ABC            | TAC            |
| Shortraker/Rougheye                  | W            |                | 160            | 160            | 124                | W            |                | 160            | 160            |
|                                      | C            |                | 970            | 970            | 865                | C            |                | 970            | 970            |
|                                      | E            |                | 460            | 460            | 701                | E            |                | 460            | 460            |
|                                      | Total        | 2,740          | 1,590          | 1,590          | 1,690              | Total        | 2,740          | 1,590          | 1,590          |
| Rockfish, Pelagic Shelf <sup>2</sup> | W            |                | 620            | 620            | 60                 | W            |                | 530            | 530            |
|                                      | C            |                | 3,260          | 3,260          | 2,477              | C            |                | 3,370          | 3,370          |
|                                      | E            |                | 1,000          | 1,000          | 572                | W. Yakutat   |                | 740            | 740            |
|                                      |              |                |                |                |                    | E. Yak./SEO  |                | 240            | 240            |
| Total                                | 8,040        | 4,880          | 4,880          | 3,109          | Total              | 8,190        | 4,880          | 4,880          |                |
| Rockfish, Demersal Shelf             | SEO          | 950            | 560            | 560            | 306                | SEO          | 950            | 560            | 560            |
| Atka Mackerel                        | Gulfwide     | 6,200          | 600            | 600            | 316                | Gulfwide     | 6,200          | 600            | 600            |
| Thornyhead                           | W            |                | 250            | 250            | 206                | W            |                | 260            | 260            |
|                                      | C            |                | 710            | 710            | 572                | C            |                | 700            | 700            |
|                                      | E            |                | 1,040          | 1,040          | 352                | E            |                | 1,030          | 1,030          |
|                                      | Total        | 2,840          | 2,000          | 2,000          | 1,130              | Total        | 2,800          | 1,990          | 1,990          |
| Other Species                        | Gulfwide     |                | NA             | 15,570         | 3,698              | Gulfwide     |                | NA             | 14,600         |
| <b>GULF OF ALASKA</b>                | <b>TOTAL</b> | <b>817,270</b> | <b>548,650</b> | <b>327,046</b> | <b>245,295</b>     | <b>TOTAL</b> | <b>778,890</b> | <b>532,590</b> | <b>306,535</b> |

<sup>1</sup>catch through November 7, 1998.

<sup>2</sup>TAC reduced by 15% GHL for W/C state fishery apportionment (25% for EGOA)

<sup>3</sup>WY and EY/SEO ABC combined; 5% trawl TAC allowance in EY/SEO reallocated to WY, so: 90% of WY=fixed gear, 100% of EY/SEO=fixed gear

<sup>4</sup>nearshore component removed from PSR in 1998

PSC limits for halibut in the Gulf of Alaska by gear

| Quarter | Trawl gear |     | Trimester Hook and Line |     |     |
|---------|------------|-----|-------------------------|-----|-----|
|         | mt         | %   | Quarter                 | mt  | %   |
| 1       | 600        | 30% | 1                       | 250 | 86% |
| 2       | 400        | 20% | 2                       | 15  | 5%  |
| 3       | 600        | 30% | 3                       | 25  | 9%  |
| 4       | 400        | 20% | DSR                     | 10  |     |
|         | 2,000      |     |                         | 300 |     |

PSC limits for trawl gear

| Quarter | Shallowwater     |                   | Total  |
|---------|------------------|-------------------|--------|
|         | Complex          | Deepwater Complex |        |
| 1       | 500 mt           | 100 mt            | 600 mt |
| 2       | 100 mt           | 300 mt            | 400 mt |
| 3       | 200 mt           | 400 mt            | 600 mt |
| 4       | No apportionment |                   | 400 mt |