

2A01-23

**Prince William Sound Walleye Pollock:
Current Assessment and 2002
Management Recommendations**



By
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Regional Information Report¹ No. 2A01-23

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

November 2001

Frank Rue – Commissioner
Robert D. Mecum – Director, Commercial Fisheries

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ACKNOWLEDGMENTS

Discussions with National Marine Fisheries Service biologists Martin Dorn, Anne Hollowed, Chris Wilson, and Eric Brown helped clarify my understanding of assessment and management strategies for walleye pollock in federal waters. Anne Hollowed and Martin Dorn provided data on pollock size distributions in the Gulf of Alaska commercial fisheries. Chris Blackburn, of the Alaska Groundfish Data Bank, and Ken Roemhildt, of North Pacific Processors, Inc., were 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. Charles Trowbridge and Robert Berceli developed management strategies for the PWS pollock fishery. Karl Becker was instrumental in obtaining samples from the commercial and test fisheries, as well as participating as an onboard observer. William Dunne and Kris Munk aged or coordinated ageing of pollock otoliths. Collection, compilation, and analyses of harvest and port sampling data used in this report was partially funded by a grant-cooperative agreement from the National Oceanic and Atmospheric Administration (NOAA) and through the Alaska Fisheries Information Network. Additional incremental funding was generated through a legislative program receipt authorization involving industry cooperation. Commercial fisheries processors are acknowledged for their cooperation in facilitating port sampling of commercial groundfish landings. The views expressed herein are those of the author and do not necessarily reflect the views of NOAA, any NOAA subagencies, or the fishing industry. Appreciation is extended to Charles Trowbridge and Robert Berceli for critical review of this report.

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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). Abundance and biomass data for walleye pollock in PWS are available from summer bottom trawl surveys, summer longline surveys, and summer and winter acoustic surveys. In addition to sampling pollock for length, weight, sex, maturity, and age from survey and commercial fishery catches in PWS, ADF&G has collected genetic samples and the Prince William Science Center collected tissue isotope samples from pollock caught in PWS and adjacent federal waters. The relationship between pollock in PWS and adjacent federal waters remains poorly understood and additional analysis is underway. Meanwhile, walleye pollock occurring in PWS during the summer have not been assessed as a part of the Gulf of Alaska trawl surveys conducted by the National Marine Fisheries Service (NMFS). Therefore, the harvest guideline for the PWS pollock fishery has been based on estimates of the pollock resource that resides in PWS in the summer and is not assessed by NMFS surveys in adjacent federal waters. The 2001 bottom trawl survey resulted in an estimated PWS pollock biomass of $7,664 \pm 1,353$ mt (95% confidence interval). Based on the 2001 summer survey, a guideline harvest level of 1,700 mt (3. million lb) is recommended for PWS pollock in 2002. Relative to previous assessment documents, the following report provides updated commercial harvest information through 2001 and updated age, length, and sex data.

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 (PWS), Alaska (Bechtol 1995a, 1998a; Berceli et al. 1999). The annual harvest from this area increased dramatically in 1995 with the landing of 2,900 mt of walleye pollock, mainly by mid-water trawl gear. The objectives of this report are to: (1) provide a description and summary of commercial pollock harvests in PWS; (2) present updated assessment information on pollock resource of PWS; and (3) make recommendations for the future management and research needs for pollock in PWS.

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 Whithed to Point Bentinck, Cape Hinchinbrook to Zaikof Point, and Cape Cleare to Cape Puget (Figure 1). Because PWS is recognized as being internal waters of the State of Alaska, the Alaska Department of Fish and Game (ADF&G) manages harvests of groundfish, including pollock, within PWS. In December 1999, Alaska Board of Fisheries issued an emergency regulation to amend the area open to commercial fishing for pollock. These changes: (1) opened a portion of the eastern trawl exclusion area in PWS to pelagic trawl gear; and (2) divided the PWS Inside District into three harvest sections with a maximum of 40% of the annual harvest allowed out of any single section (Figure 2). The emergency regulation allowed the department to assess the efficacy of the measures during the 2000 fishery; the board formally adopted the measures were in March 2000.

CATCH HISTORY

Annual commercial harvests of walleye pollock from PWS were less than 4 mt prior to 1995 (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; 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 (6.3 million lb). Following the trawl closure, retention of walleye pollock by other gear types was not prohibited because non-trawl catches were expected to be minor. Total PWS walleye pollock harvest in 1995 was 2,960 mt (6.5 million lb), which included landings by longline and jig gears and also by a combination test fishery and acoustic survey conducted by ADF&G in late February and early March (Table 1; Trowbridge 1996).

The season for the midwater trawl fishery in subsequent years has been quite variable, opening annually on 20 January but closing as early as 25 January and as late as 31 March (Berceli et al. 1999). Total pollock harvest has annually ranged from 1,193 to 2,348 mt (2.6-5.2 million lb) by 4-11 vessels (Table 1). 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). In particular, the pollock fishery has occurred in the Port Bainbridge and southern Knight Island Passage areas (Figure 2). 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 aggregation density. Most of the directed fishery catch has been processed for fillet and roe markets. Winter acoustic surveys indicate pollock also aggregate seasonally in the eastern portion of PWS from Hinchinbrook Entrance across the mouth of Orca Bay (Kirsch and Thomas 1998), although the timing of these aggregations is not well understood. However, the area of these eastern aggregations was historically closed to all groundfish fishing with trawls.

The 2001 midwater trawl fishery opened January 20 under relatively new management strategies intended to temporally and geographically distribute fishing effort (see below). The fishery closed on March 25, yielding a pollock harvest of 1,419 mt (3.1 million lb) by 4 vessels, including 173 mt landed by an ADF&G test fishery. The timing of fish aggregations again appeared delayed in 2001 relative to the earlier years of the commercial fishery. Pollock landed as bycatch in pot, longline, and shrimp trawl fisheries totaled <0.1 mt (Table 1).

FISHERY MANAGEMENT CONSIDERATIONS

The mid-water trawl fishery for walleye pollock in PWS remains a relatively new fishery within state managed waters (Berceli et al. 1999). Management strategies continue to evolve and in December 1999, the Alaska Board of Fisheries considered new regulations designed to distribute the fishery geographically, largely in response to concerns over the decline of Steller sea lions, and to expand fishing opportunities to observed pollock distributions. These changes: (1) opened a portion of the eastern trawl exclusion area in PWS to pelagic trawl gear; and (2) divided the PWS Inside District into three harvest sections with a maximum of 40% of the annual harvest allowed out of any single section (Figure 2). These measures were implemented as emergency

regulations on an interim basis for evaluation during the 2000 fishery, then formally adopted at the board's March 2000 meeting.

Although previous surveys indicated that walleye pollock occur year-round within PWS (Parks and Zenger 1979; Haynes and Urban 1991; Bechtol 1999a), 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, now a biennial 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; Berceli et al. 1999). In the absence of specific regulations established by the Alaska Board of Fisheries, groundfish fisheries in state waters typically occur through a miscellaneous groundfish permit issued by ADF&G. Permit conditions may specify of area and gear restrictions and seasons are often set to coincide with seasons for the target species in 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 for resources in PWS, (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 adjacent federal waters of the Gulf of Alaska. As an interim approach in view of continuing research on the relationship between pollock in PWS and the Gulf of Alaska, the current assessment model for the Gulf of Alaska has incorporated biomass estimates of PWS pollock (Dorn et al. 1999, 2000). This model was originally run using Stock Synthesis software (Methot 1990), but more recently, parameters have been fit using AD Model Builder software.

Available Assessment Data

Longline Surveys

A longline survey for sablefish *Anoplopoma fimbria* has been conducted annually since 1996 with the research vessels *Montague* and *Pandalus* (Bechtol and Vansant 1998; Table 2). Gear configuration was similar to sablefish surveys conducted in federal waters by the National Marine Fisheries Service (Sigler and Zenger 1989). One survey objective was to evaluate the relative abundance and distribution of all species caught on longline gear. Mean catch of pollock per longline set in the PWS survey ranged from 4.9 fish/set in 1998 to 1.3 fish/set in 2000 (Table 2). However, the longline survey is viewed as providing only a weak index of abundance for pollock caught in the target depths of 100 fathoms (183 m) and deeper. As additional data becomes available in the future, greater exploration of the utility of the longline data for more complex stock assessment models is anticipated.

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 3; 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) shallower than 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 in PWS with tows deeper than 125 m in have caught walleye pollock (Bechtol 1999a). 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 (Thomas et al. 2001). 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, 1998, and 2000 (Thomas and Stables 1995; Kirsch 1997; Kirsch and Thomas 1998; Thorne 2000). These surveys focused on prespawning walleye pollock aggregation in southwestern PWS, particularly Port Bainbridge, Knight Island Passage, and Montague Strait. Surveys were conducted with the *F/V Alaskan* operated by Jay Stinson of Kodiak in all years, except the *R/V Pandalus* was used in the 2000 and 2001 surveys. Pollock size data were obtained from survey catches with midwater trawl nets and also from bottom trawl nets in 2000.

The 1995 survey involved two survey legs: the first leg was conducted from 24 to 25 February and the second leg from 28 February to 1 March (Thomas and Stables 1995). The mean biomass estimate between survey 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 1995 survey distribution. Approximately 71% of the 1997 biomass was found in Lower Knight Island Pass and the remainder in Port Bainbridge. Smaller aggregations in Orca Bay and near Green Island totaled less than 1,000 mt and were excluded from the total estimate.

The 1998 acoustic survey, conducted during 8-13 March, yielded a maximum PWS pollock biomass estimate of 114,344 mt (Kirsch and Thomas 1998). Significant pollock aggregations were found in Port Bainbridge, Lower Knight Island Passage, extending from Hinchinbrook Entrance across the mouth of Orca Bay, and in Montague Strait. With the exception of Port Bainbridge, areas contained more pollock biomass than was observed in either the 1995 or 1997 acoustic surveys. In particular, the aggregation extending from Hinchinbrook Entrance across Orca Bay had not been previously observed. However, data from the 1998 acoustic biomass survey is being reevaluated because of the inconsistency between the 1998 estimate and PWS acoustic surveys in other years (Table 3; Richard Thorne, Prince William Sound Science Center, Cordova, AK, personal communication).

The 2000 acoustic survey, conducted during 3-10 March, yielded a maximum PWS pollock biomass estimate of 28,277 mt among all areas (Thorne 2000). This biomass was approximately distributed as follows: 5,057 mt in Port Bainbridge, 1,195 mt in the Lower Knight Island Passage, 9,730 mt extending from Glacier Island to Hinchinbrook Entrance, and 12,245 mt in the Montague Trench along the southeastern shore of Montague Island. These estimates include the means of replicate survey legs conducted in Port Bainbridge and the Montague Trench. The 2000 assessment was the first extensive acoustic survey of fish in the Montague Trench area. Because the midwater trawl net intended for use in the 2000 acoustic survey was found to have substantial rips, a high-rise, small-mesh bottom trawl net was used to obtain pollock samples during the latter portion of the survey.

In 2001, two acoustic survey legs were conducted, the first 2-4 March and the second 28-31 March (Thorne and Thomas *under review*). The acoustics did indicate a slight decrease between the two cruises, although second survey leg did not exactly replicate the area covered by the first leg. The first survey covered 187 square nautical miles and produced a pollock biomass estimate of 20,660 mt, whereas the second survey covered 172 square nautical miles and produced a pollock biomass estimate of 11,653 mt. Incorporating the non-overlapping areas between the two surveys yields a mean biomass estimate of 26,676 mt.

Bottom Trawl Surveys

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 (Brown and Zenger 1999), so abundance data collected in PWS were not directly comparable to data collected in the Gulf of Alaska.

ADF&G Summer Bottom Trawl Surveys

A summer bottom trawl survey with the ADF&G research vessel *Pandalus* towing a 400-mesh Eastern bottom trawl has been conducted biennially since 1995 (Table 3). Historical crab survey stations in the Orca Bay, Port Fidalgo, and North Montague areas were systematically selected using historical towpaths. For the 1997 and subsequent surveys, PWS was divided into potential sample stations, each measuring 6.25 square nautical miles. PWS was then sectioned into quadrants delineated at 147°00' W longitude and 60°30' N latitude and additional stations were randomly selected from target quadrants. Selected stations were sampled by a 1.0 nautical mile long tow. Due to vessel gear limitations, depth of tows was generally less than 366 m (200 fm).

The 1995 survey had a limited geographic distribution that focused on crab habitat in the eastern portion of PWS and the utility of the trawl data for biomass estimation cannot be determined without additional analyses (unpublished data). However, pollock length data from the 1995 bottom trawl survey is provided in this report.

Effort in the 1997 survey involved 53 tows, apportioned as 26 stations in the southwest quadrant, 25 stations in the northeast, and two stations in the southeast (Bechtol 1999a). 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. The exclusion of the northwest quadrant from pollock biomass calculations likely resulted in a substantial underestimate of actual biomass. Another approach with the 1997 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. The pollock biomass estimate for the four sampled strata was 21,000 mt, with 11% of all potential survey stations sampled. 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. Full expansion to the entire surface area, using a weighted mean catch rate to estimate biomass in unsampled strata, yielded an estimated pollock biomass of 28,676 mt (Table 3).

The 1999 survey involved 67 successful tows, representing 13.5% of the available survey station grids (Bechtol 1999b; unpublished data). Estimated biomass of walleye pollock was 6,304 +/- 2,812 (95% CI) metric tons. Average catches of pollock per nautical mile towed were 14.6 kg (32.2 lb) in the southwest, 18.2 kg (40.2 lb) in the northeast, 2.2 kg (4.8 lb) in the southeast, and 7.2 kg (15.8 lb) in the northeast area. Mean survey catch was 29.5 lb/nm towed. Although distribution patterns of pollock appeared to be similar to the 1997 trawl survey, catch rates generally declined in all areas and substantially fewer large aggregations were observed than in previous surveys, as evidenced by a lack of large catches (e.g., >500 lb) of pollock in individual tows.

During 17-28 July 2001, the ADF&G vessel *Pandalus* made 51 successful tows within PWS (Tables 3 and 4; unpublished data). This represented 10.2% of the available survey station grids. This survey again occurred at approximately the same time of year as the biennial trawl survey conducted by NMFS in the adjacent federal waters. Pollock catch rates at individual stations in PWS ranged from 0 to 479.2 lb/nm. Average catches of pollock per nautical mile towed were 27.3 kg (60.3 lb) in the southwest area and 5.8 kg (12.7 lb) in the eastern area; mean survey catch was 16.3kg (35.9 lb) per nautical mile towed among areas. Estimated walleye pollock biomass was $7,664 \pm 1,353$ (95% confidence interval) metric tons. Although pollock distribution appeared to be similar to previous summer bottom trawl surveys, standardized catch rates generally declined in all PWS areas relative to previous years and in only three stations did the catch rate exceed 45 kg (100 lb) per nautical mile towed (Table 4).

Trawl Catchability Considerations

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 (Brown and Zenger 1999). 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. As a result, the ADF&G survey likely underestimated summer pollock biomass in PWS when compared to what the NMFS trawl might have estimated.

Age, Weight, and Length Data

Length and sex composition data were collected from walleye pollock sampled from PWS during 1995-2001. Sample sources included the commercial fishery that opened January 20; the test fishery occurring immediately after, or near, the close of the commercial fishery; a semi-periodic acoustic survey in late February or early March; a biennial summer bottom trawl survey; and a fall annual longline survey. The fisheries and the acoustic survey targeted winter spawning aggregations whereas the bottom trawl and longline surveys captured fish that were generally less aggregated. Sample collections also varied geographically. The commercial fishery, test fishery, and acoustic survey all occurred in both southwestern and eastern PWS, whereas longline and bottom surveys sampled throughout PWS. Sagittal otoliths were removed for aging of pollock during all years. Substantial uncertainty exists regarding the appropriate techniques to determine the true age of pollock (Munk *in press*). To date, age data are available from the 1995 bottom trawl survey and from commercial and test fisheries in 1996-2000. For this report, age data from commercial and test fisheries were pooled within years and pollock ages are reported as derived through standard techniques applied by the ADF&G Age Determination Unit.

Length distribution in the 1995 PWS commercial fishery ranged from 44 to 65 cm (Figure 3), with males comprising 46% of all samples. The most abundant male pollock measured 51 cm,

whereas the most abundant female pollock measured 56 cm. Lengths in the 1995 summer trawl survey ranged from 18 to 74 cm, with males comprising 46% of all samples. For both male and female pollock in the 1995 summer trawl survey, the most abundant fish measured 52 cm. Age-7 pollock were the most abundant age class in the 1995 bottom trawl survey (Figure 4).

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 5). Length frequency data from the commercial pollock fisheries indicated PWS pollock were substantially larger than pollock caught in other GOA areas in 1996 (Bechtol 1998a). Age-8 pollock were the most abundant age class in the 1996 PWS fisheries (Figure 4). Length distribution in the longline survey ranged from 18 to 82 cm. Over 35% of the pollock from the longline survey were larger than 64 cm, the largest size sampled from the commercial fishery.

Length of pollock sampled from the winter spawning aggregations ranged from 20 to 69 cm in 1997. Male pollock comprised 55% of commercial fishery samples but only 45% of test fishery samples and 42% of acoustic survey samples. The most abundant sizes in the PWS commercial fishery were 53 cm for male pollock and 56 cm for female pollock (Figure 6). In test fishery samples, the most abundant pollock measured 56 cm for males and 58 cm for females. Acoustic survey samples were dominated by 54-cm fish for males and 57-cm fish for females. A mode of smaller fish, centered at 32-36 cm for male and female pollock, was also observed in the acoustic surveys. Length distribution in the summer bottom trawl survey ranged from 10 to 75 cm, with male pollock comprising 45% of the samples. The most abundant fish measured 50 cm for male and 58 cm for female pollock. In the longline survey, pollock lengths ranged from 36 to 74 cm. The most abundant size classes in longline samples were 58-59 cm. Age-7 pollock were the most abundant age class in the 1997 commercial and test fisheries (Figure 4). Age-7 males and age-7 females contributed 17% and 15%, respectively, of the commercial fishery and 17% and 20%, respectively, of test fishery samples.

Length of pollock sampled in 1998 ranged from 29 to 76 cm. Male pollock comprised 53% of all commercial samples, 78% of the test fish samples, 59% of the acoustic survey samples, and 20% of the fish for which sex was determined during the longline survey. The most abundant size modes were 55 cm for males and 57 cm for females in the commercial fishery, and 55 cm for males in the test fishery (Figure 7). Female size distribution in the test fishery was bimodal with peaks in abundance at 57 and 60 cm. In the March acoustic survey, the size distribution of male pollock was strongly bimodal with peaks in abundance at 27 and 56 cm, whereas 60-cm fish were the most abundant female pollock. Age-8 pollock were the most abundant fish in data combined across the commercial and test fisheries (Figure 4).

Pollock in the 1999 commercial fishery ranged from 35 to 65 cm, with male pollock comprising 50% of the samples (Figure 8). Length distributions in the commercial fishery were multimodal for both sexes with peaks in abundance observed at 40-42 cm and at 52-58 cm. Age-5 pollock were the most abundant fish in the commercial fishery (Figure 4). Pollock lengths in the summer bottom trawl survey ranged from 16 to 74 cm, with males comprising 45% of the pollock catch. The most abundant size modes were 40 cm for males and 51 cm for females. Pollock lengths in

the September longline survey ranged from 25 to 74 cm and 38% of the fish were male. Dominant size modes were 46 cm for males and 49 cm for females.

Pollock in the 2000 commercial fishery ranged from 26 to 79 cm; male pollock comprised 54% of the samples (Figure 9). The most abundant lengths were 46 cm for male and 48 cm for female pollock. In the 2000 test fishery, pollock sample lengths ranged from 40 to 65 cm and 59% of the fish were male. The most abundant pollock in the test fishery measured 46 cm for males whereas female pollock were multimodal with peaks in abundance at 53 cm and 57-59 cm. The September longline survey yielded pollock lengths of 47-75 cm and 22% of the fish were male.

Pollock in the 2001 commercial fishery ranged from 36 to 68 cm; male pollock comprised 63% of the samples (Figure 10). The most abundant lengths were 48 cm for male and 52 cm for female pollock. In the 2001 test fishery, pollock sample lengths ranged from 19 to 67 cm and 60% of the fish were male. The most abundant pollock in the test fishery measured 50 cm for males and 52 cm for female pollock. Pollock lengths in the summer bottom trawl survey ranged from 16 to 71 cm, with males comprising 47% of the pollock catch. The most abundant size modes were 50 cm for males and 57 cm for females. The September longline survey yielded pollock lengths of 51-62 cm and 30% of the fish were male.

In general, bottom trawl surveys caught a greater proportion of small pollock, and longline surveys caught a greater proportion of larger pollock, when compared to commercial fishery catches (Figures 6, 8, and 10). Length distributions of pollock sampled from the PWS commercial fisheries varied during 1995-2001 (Figure 11). The progression of strong cohorts is evident in the annual harvests from 1995 through 2001. The development of a younger cohort can particularly be seen in the 1998 size data and this cohort appears to develop and play a greater role in the commercial harvest until becoming the most abundant cohort in 2000 and 2001. Based on the abundance of age-5 fish in 1999, this progressive cohort appears to be the 1994 age class (Figure 4). By the 2000 fishery, older strong cohorts had died off substantially and the overall strength of the 1994 year class was apparent.

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 (Iwata 1975a, 1975b; Grant and Utter 1980).

Olsen et al. (*in press*) used allozyme, microsatellite, and mitochondrial DNA (mtDNA) data to test for spatial and interannual genetic diversity in walleye pollock from six spawning aggregations representing three geographic regions: Gulf of Alaska, eastern Bering Sea, and eastern Kamchatka. Interpopulation genetic diversity was evident primarily from the mtDNA and two allozyme loci (*SOD-2**, *MPI**). Permutation tests indicated \hat{F}_{ST} values for most allozyme and microsatellite loci did not differ significantly from zero. The microsatellite results suggest that high locus polymorphism may not be a reliable indicator of power for detecting

population differentiation in walleye pollock. Because mtDNA revealed population structure and most nuclear loci did not, the effective size of most walleye pollock populations is likely large with weak genetic drift, and migration is a relatively strong homogenizing force. The allozymes and mtDNA provided mostly concordant estimates of patterns of spatial genetic variation. These data showed significant genetic variation between North American and Asian populations. In addition, spawning aggregations in PWS and near Middleton Island appeared genetically distinct from pollock spawning in Shelikof Strait. Finally, the occurrence of interannual genetic variation was suggested for two of three North American spawning aggregations, similar in magnitude to the spatial variation among North American walleye pollock. Olsen et al. (*in press*) suggest this interannual variation may result from one or more of the following factors: highly variable reproductive success, adult philopatry, source-sink metapopulation structure, and intraannual variation in spawn timing among genetically distinct but spatially identical spawning aggregates.

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

For the 1996 fishery, 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 changes to the pollock population of the Eastern Gulf of Alaska Regulatory Area might be expected to effect a similar relative change in the PWS pollock population. As a result, the relative change from 1995 to 1996 in the allowable biological catch (ABC) for pollock in adjacent federal waters of the Eastern Gulf of Alaska Regulatory Area was used to scale changes in the PWS pollock guideline from 1995 to 1996 (Hollowed et al. 1995, 1996; Bechtol 1998a). Another approach would be to apply the relative change exhibited in the exploitable biomass between years. Estimated exploitable biomass of Gulf of Alaska pollock has declined in recent years, falling an estimated 20% from 1998 to 1999, but was projected to increase by 6% from 2000 to 2001 (Dorn et al. 1999, 2000). Part of this increase was attributed to assessment model improvements and part was attributed to the federal court order closing commercial fisheries in Steller sea lion critical habitat area, resulting in less than anticipated harvests during some of the 2000 federal pollock season. The preliminary assessment for 2001 suggests spawning biomass has declined by 22%, primarily due to a 65% decline in biomass detected during the National Marine Fisheries Service 2001 summer bottom trawl survey in the Gulf of Alaska (Martin Dorn, National Marine Fisheries Service, Seattle, personal communication). Application of a relative biomass change approach to the 2001 PWS GHL would have resulted in a 2002 GHL of 880 mt, based on a 22% decline in spawning biomass.

Fixed Harvest Level

A fixed annual harvest level may be applied for some fisheries to achieve sustainable yield amidst variable recruitment and fishing effort. This approach can also be used in the absence of new stock assessment information. A fixed harvest level was used to set the 1999 GHL of 2,100 mt and the 2001 GHL of 1,420 mt for PWS pollock (Bechtol 1998b; 2000). In both cases, a bottom trawl survey had not been conducted in the preceding summer and new summer biomass estimates were not available for the pollock population.

GUIDELINE HARVEST RECOMMENDATIONS

Winter acoustic surveys of prespawning pollock aggregations in PWS have yielded biomass estimates that were substantially greater than recent or historical summer population estimates. In particular, the 1998 survey observed a previously unassessed aggregation in eastern PWS in the mouth of Orca Bay. Among all PWS survey sites, the 1998 acoustic 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. Genetic analyses of PWS pollock stock structure have been inconclusive and somewhat contradictory to date (J. Seeb, ADF&G, Anchorage, AK, personal communication). In addition, size and sex data suggested a large component of the 1999 aggregation was new recruit pollock that should be allowed to further develop for optimal contribution to the fishery's target biomass. The 2001 winter assessment yielded a biomass estimate that suggested a continued decline in spawning biomass since 1998 (Table 3; Thomas et al. 2001; Thorne and Thomas *under review*). Further research is needed to explore: (1) the utility of winter acoustic data in determining exploitable biomass for the PWS pollock resources; and (2) the relationship of PWS pollock to pollock in the Gulf of Alaska.

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 (*EXXON Valdez* Oil Spill Trustee Council 1993), many of the studies encountering pollock 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 depth distributions 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 more recent summer surveys. Similarly, a fixed harvest level fails to incorporate new pollock biomass data from the most recent surveys.

Following standards for establishing harvest guidelines in federal water fisheries, PWS pollock would fall under Tier 5 because an estimate of the population biomass, albeit conservative, is available. Tier 5 standards set the harvest level as 75% of the product of the biomass estimate and estimated natural mortality. In this case, the natural mortality rate is assumed to be 0.30, which is applied for pollock in recent federal assessment models for the Gulf of Alaska (Dorn et al. 1999). It is thought unlikely that PWS pollock biomass has changed substantially since the most recent summer biomass estimate, the 7,664 mt estimated by the 2001 summer bottom trawl survey (Bechtol 1999b). Thus, the recommended guideline harvest level for Prince William Sound pollock is:

$$\text{GHL} = B \times M \times 0.75 = 7,664 \times 0.30 \times 0.75 \cong 1,700 \text{ mt.}$$

Continuing 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 will continue to examine pollock from inside and outside of PWS for isotope signatures. ADF&G will continue to conduct annual longline surveys, with most of the survey effort focusing on the northwest quadrants of PWS and one third of the effort rotating among the eastern and southwest areas of PWS. ADF&G will likely conduct another bottom trawl survey of PWS during 2003. The 2003 trawl survey would again occur at approximately the same time of year as the biennial trawl survey conducted by NMFS in the adjacent federal waters. In a cooperative effort between ADF&G and the Prince William Science Center, another acoustic survey of spawning aggregations of pollock may occur during the winter of 2001-2002. Although dependent upon available funding, this winter acoustic survey is tentatively planned to involve two survey legs, the first in late February and the second in late March. Finally, additional funding for pollock research throughout the Gulf of Alaska, including PWS, is being pursued by both federal and state biologists. Some specific potential research components include a summer acoustic survey and further trawl comparison studies to develop fishing power corrections for ADF&G bottom trawl nets relative to NMFS bottom trawl nets.

Fishery Management Measures

The fishing power of 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 to 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 include requirements for logbooks, observers, harvest reporting procedures, and other specifications. The following measures will likely be implemented for the 2001 fishery:

Fishing Season - The fishery will open at 12:00 noon on 20 January 2001, and will remain open until the guideline harvest level (GHL) is taken. This opening will coincide with the opening of trawl fishing for pollock in 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.

Pollock are a prey item of endangered Steller sea lions. To provide against localized pollock depletion in an effort to address declining Steller sea lion stocks, the Board further adopted regulations to geographically distribute pollock harvests in the PWS pollock fishery.

Harvest Distribution Among Areas - No more than 40% of the total PWS GHL will be taken from any one of the following sections:

1. Bainbridge Section - Inside District waters west of 148° W. long.
2. Knight Island Section - Inside District waters between 148° W. long. and 147° 20' W. long.
3. Hinchinbrook Section - - Inside District waters east of 147° 20' W. long.

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Table 1. Annual commercial walleye pollock harvest from Prince William Sound, Alaska during 1987-2001.

Year	Directed Fishery Effort		Trawl	Longline	Other	Total
	Vessels	Landings				
1987			0.0	0.4	0.0	0.4
1988			0.0	0.7	0.0	0.7
1989			0.4	0.2	<0.1	0.7
1990		4	3.0	0.3	0.0	3.3
1991			0.0	0.0	0.0	0.0
1992		9	2.7	<0.1	0.0	2.7
1993		4	2.5	0.1	0.0	2.6
1994			0.0	<0.1	2.5	2.5
1995	9	35	2,954.5	1.6	2.7	2,958.8
1996	11	25	1,671.4	0.3	0.6	1,672.3
1997	10	33	2,023.6	3.2	0.1	2,026.9
1998	10	29	2,107.1	1.2	0.0	2,108.3
1999	11	34	2,342.3	5.4	0.0	2,347.7
2000	5	22	1,191.6	1.8	0.0	1,193.4
2001 ^{a/}	4	18	1,592.0	<0.1	<0.1	1,592.0

5,176,678
2,631,447
3,510,300

^{a/} Preliminary data through 1 October 2001.

Table 2. Unweighted catch abundance and mean catch rates from the sablefish longline survey of Prince William Sound, 1996-2000.

	Sablefis	Pacific Cod	Polloc	Halibut	Arrowtooth Flounder	Demersal Rockfish	Slop Skates	Salmon Shark	Spiny Dogfish	Sleeper Shark	Other	Hooks Without Fish Baite Ineffective	Unbaited	Total Hooks		
1996 - Northwest PWS (n = 31 stations)																
Abundance	1,652	239	129	841	70	4	109	451	1	27	35	9	15,674	369	1,360	20,970
% of Hooks	7.9%	1.1%	0.6%	4.0%	0.3%	<0.1%	0.5%	2.2%	<0.1%	0.1%	0.2%	<0.1%	74.7%	1.8%	6.5%	100.0%
% of Catch	46.3%	6.7%	3.6%	23.6%	2.0%	0.1%	3.1%	12.6%	<0.1%	0.8%	1.0%	0.3%				
Fish/Set	53.3	7.7	4.2	27.1	2.3	3.5	0.1	14.5	0.0	0.9	1.1	0.3				
1997 - Northwest and Southwest PWS (n = 34 stations)																
Abundance	1,559	260	138	945	104	3	92	339	0	91	59	32	17,275	536	1,517	22,950
% of Hooks	6.8%	1.1%	0.6%	4.1%	0.5%	<0.1%	0.4%	1.5%	0.0%	0.4%	0.3%	0.1%	75.3%	2.3%	6.6%	100.0%
% of Catch	43.0%	7.2%	3.8%	26.1%	2.9%	0.1%	2.5%	9.4%	0.0%	2.5%	1.6%	0.9%				
Fish/Set	45.9	7.6	4.1	27.8	3.1	2.7	0.1	10.0	0.0	2.7	1.7	0.9				
1998 - Northwest and Eastern PWS (n = 38 stations)																
Abundance	2,698	476	187	975	111	2	99	622	1	1,948	103	11	16,147	1,322	948	25,650
% of Hooks	10.5%	1.9%	0.7%	3.8%	0.4%	<0.1%	0.4%	2.4%	<0.1%	7.6%	0.4%	<0.1%	63.0%	5.2%	3.7%	100.0%
% of Catch	37.3%	6.6%	2.6%	13.5%	1.5%	0.0%	1.4%	8.6%	0.0%	26.9%	1.4%	0.2%				
Fish/Set	71.0	12.5	4.9	25.7	2.9	2.6	0.1	16.4	0.0	51.3	2.7	0.3				
1999 - Northwest and Southwest PWS (n = 30 stations)																
Abundance	1,833	169	107	668	83	0	64	179	0	51	128	7	14,735	1,092	1,134	20,250
% of Hooks	9.1%	0.8%	0.5%	3.3%	0.4%	0.0%	0.3%	0.9%	0.0%	0.3%	0.6%	<0.1%	72.8%	5.4%	5.6%	100.0%
% of Catch	55.7%	5.1%	3.3%	20.3%	2.5%	0.0%	1.9%	5.4%	0.0%	1.6%	3.9%	0.2%				
Fish/Set	61.1	5.6	3.6	22.3	2.8	2.1	0.0	6.0	0.0	1.7	4.3	0.2				
2000 - Northwest and Eastern PWS (n = 36 stations)																
Abundance	3,101	146	47	513	50	0	80	432	0	47	92	4	17,666	1,543	579	24,300
% of Hooks	12.8%	0.6%	0.2%	2.1%	0.2%	0.0%	0.3%	1.8%	0.0%	0.2%	0.4%	0.0%	72.7%	6.3%	2.4%	100.0%
% of Catch	68.7%	3.2%	1.0%	11.4%	1.1%	0.0%	1.8%	9.6%	0.0%	1.0%	2.0%	0.1%				
Fish/Set	86.1	4.1	1.3	14.3	1.4	0.0	2.2	12.0	0.0	1.3	2.6	0.1				
Means Among Years																
% of Hooks	9.5%	1.1%	0.5%	3.5%	0.4%	0.0%	0.4%	1.8%	0.0%	1.9%	0.4%	0.1%	71.4%	4.3%	4.9%	100.0%
% of Catch	48.8%	5.8%	2.7%	17.7%	1.9%	0.0%	2.0%	9.1%	0.0%	9.7%	1.9%	0.3%				
Fish/Set	64.2	7.6	3.6	23.3	2.5	0.1	2.6	12.0	0.0	12.8	2.5	0.4				

Table 3. Walleye pollock biomass estimates from several Prince William Sound surveys, 1989-2001.

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.
1997 Bottom Trawl Survey	28,676	Summer	Few stations in SE and no stations in NW
21 1998 Hydroacoustic Survey	114,344	Winter	Prespawning aggregation.
1999 Bottom Trawl Survey	6,304	Summer	Few stations in SE and no stations in NW
2000 Hydroacoustic Survey	28,227	Winter	Prespawning aggregation.
1996-2000 Longline Surveys.	NA	Fall	Relative abundance, distribution, and size data
2001 Hydroacoustic Survey	26,676	Winter	Prespawning aggregation; multiple survey legs.
2001 Bottom Trawl Survey	7,664	Summer	No stations in NW.

Table 4. Bottom trawl survey catch of walleye pollock in Prince William Sound, Summer 2001.

Tow No.	Station	Date	Tow Midpoint		Distance (nmi)	Depth (fathoms)		Scope (fathoms)	Pollock (lb/nmi)
			Latitude	Longitude		Minimum	Maximum		
01501	AG10	7/17	59.9424	147.888	0.99	114	103	350	163.6
01502	AE11	7/17	60.0142	147.779	1.00	150	145	450	4.0
01503	AC14	7/17	60.1018	147.569	1.01	70	67	210	479.2
01504	105	7/17	60.2994	147.29	0.99	75	68	210	294.9
01505	104	7/18	60.3498	147.288	1.01	79	78	225	15.8
01506	109	7/18	60.4727	147.139	1.00	104	103	300	0.0
01507	112	7/18	60.435	147.018	0.99	133	119	350	16.2
01508	106	7/18	60.487	147.183	0.82	100	95	300	3.7
01509	101	7/18	60.4754	147.307	0.70	101	98	300	51.4
01510	111	7/19	60.4138	147.059	1.01	90	86	275	4.0
01511	110	7/19	60.45	147.112	1.00	106	101	300	0.0
01512	107	7/19	60.42	147.228	1.00	95	90	275	0.0
01513	102	7/19	60.45	147.257	0.99	127	118	350	6.1
01514	103	7/19	60.40	147.262	0.99	73	65	210	0.0
01515	108	7/19	60.38	147.179	1.01	66	57	200	0.0
01516	12	7/20	60.56	146.46	0.99	70	62	200	0.0
01517	17	7/20	60.57	146.397	1.05	70	67	210	3.8
01518	19	7/20	60.56	146.299	0.99	70	64	200	3.3
01519	20	7/20	60.57	146.245	1.01	75	74	225	4.0
01520	22	7/20	60.56	146.138	0.99	83	82	225	4.0
01521	23	7/20	60.57	146.056	1.00	106	93	300	2.3
01522	24	7/21	60.61	145.912	1.02	101	99	300	68.6
01523	21	7/21	60.79	146.124	0.94	82	75	225	0.0
01524	13	7/22	60.72	146.152	1.00	103	100	300	24.0
01525	14	7/22	60.69	146.263	1.00	74	75	225	38.0
01526	15	7/22	60.65	146.343	0.98	70	69	210	6.1
01527	18	7/22	60.59	146.221	1.00	76	74	225	5.0

Table 4. (page 2 of 2)

Tow No.	Station	Date	Tow Midpoint		Distance (nmi)	Depth (fathoms)		Scope (fathoms)	Pollock (lb/nmi)
			Latitude	Longitude		Minimum	Maximum		
01528	16	7/22	60.60	146.393	1.01	66	64	200	2.0
01529	11	7/22	60.61	146.468	1.02	66	55	200	0.0
01530	10	7/23	60.53	146.54	0.99	64	63	200	2.7
01531	9	7/23	60.56	146.523	1.01	72	72	200	5.9
01532	5	7/23	60.59	146.551	1.01	70	68	210	0.0
01533	6	7/23	60.57	146.629	0.99	64	60	200	0.0
01534	7	7/23	60.54	146.623	1.00	68	65	210	2.0
01535	8	7/23	60.50	146.607	1.00	83	73	250	0.0
01536	4	7/23	60.43	146.737	0.99	122	118	375	10.1
01537	3	7/24	60.47	146.684	1.02	92	89	275	39.2
01538	2	7/24	60.51	146.683	1.01	104	95	300	2.0
01539	1	7/24	60.65	146.714	0.99	78	70	225	2.0
01540	27	7/25	60.78	146.624	1.00	96	93	300	5.0
01541	26	7/25	60.80	146.492	0.99	106	107	325	10.1
01542	25	7/25	60.81	146.322	1.01	112	107	335	23.8
01544	28	7/25	60.78	146.701	1.01	91	86	275	2.0
01545	I25	7/26	60.94	146.636	0.98	63	56	150	51.0
01546	H23	7/26	60.97	146.811	0.91	210	164	500	8.8
01547	E26	7/26	61.11	146.516	1.00	134	130	325	26.0
01548	E27	7/26	61.11	146.469	1.03	132	130	325	17.5
01549	E25	7/26	61.10	146.641	0.99	137	135	350	50.5
01550	AB11	7/27	60.14	147.818	0.99	170	160	475	16.2
01551	AB09	7/27	60.16	147.932	1.02	177	160	475	11.8
01552	AA09	7/28	60.18	147.948	1.02	226	189	550	17.6
Total					50.47				1,509.3

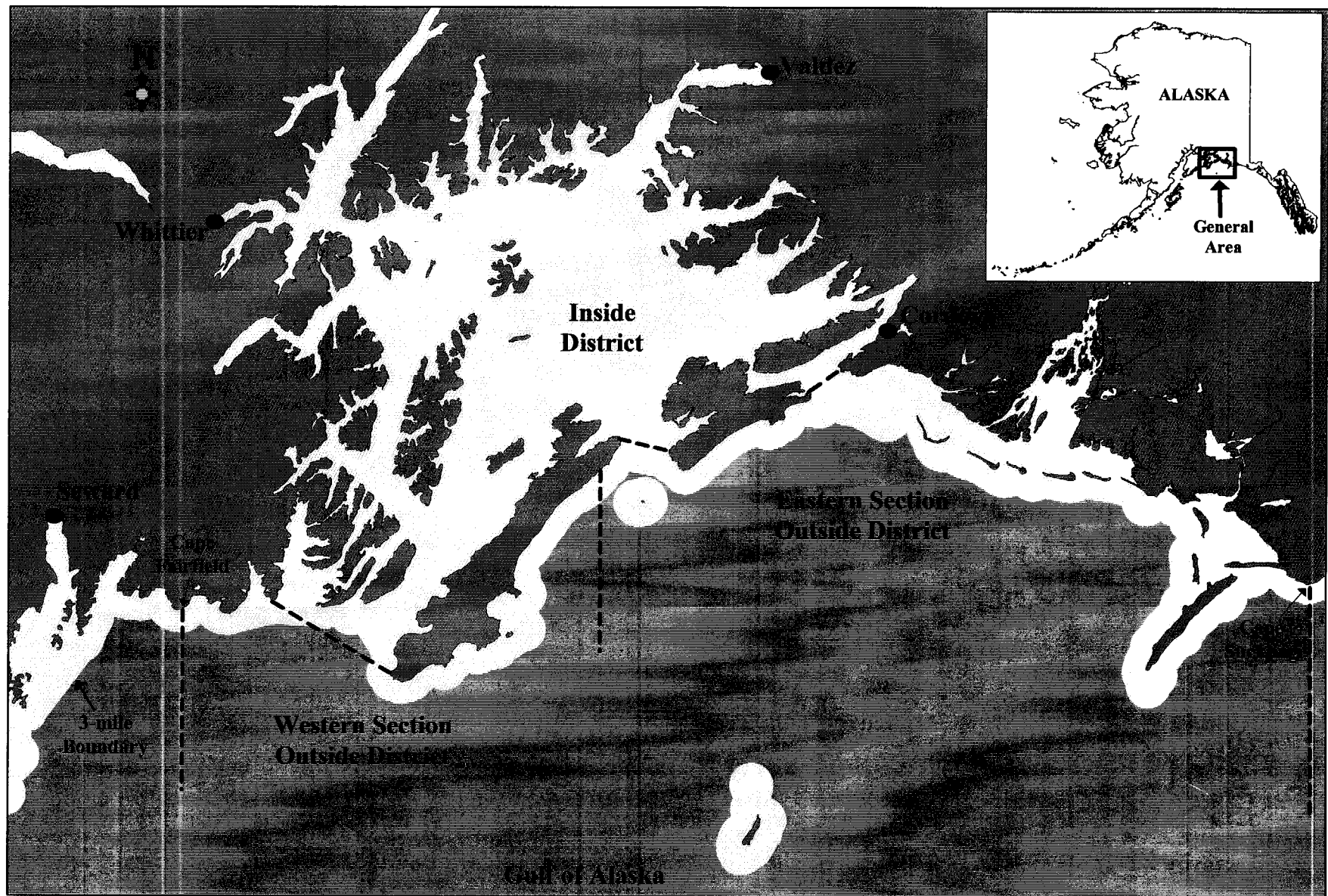


Figure 1. Groundfish management districts of the Prince William Sound Management Area.

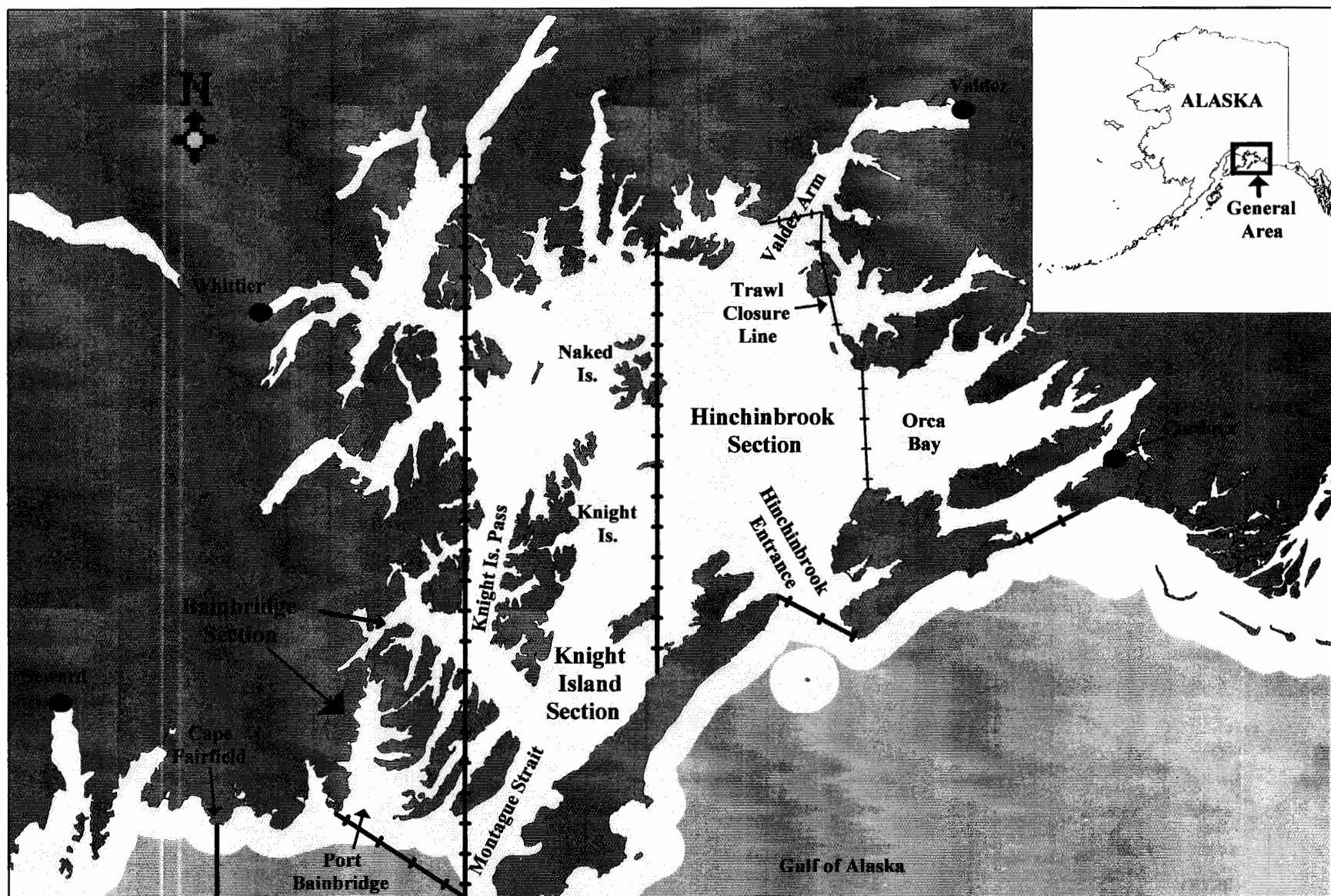


Figure 2. Locations of interest in Prince William Sound.

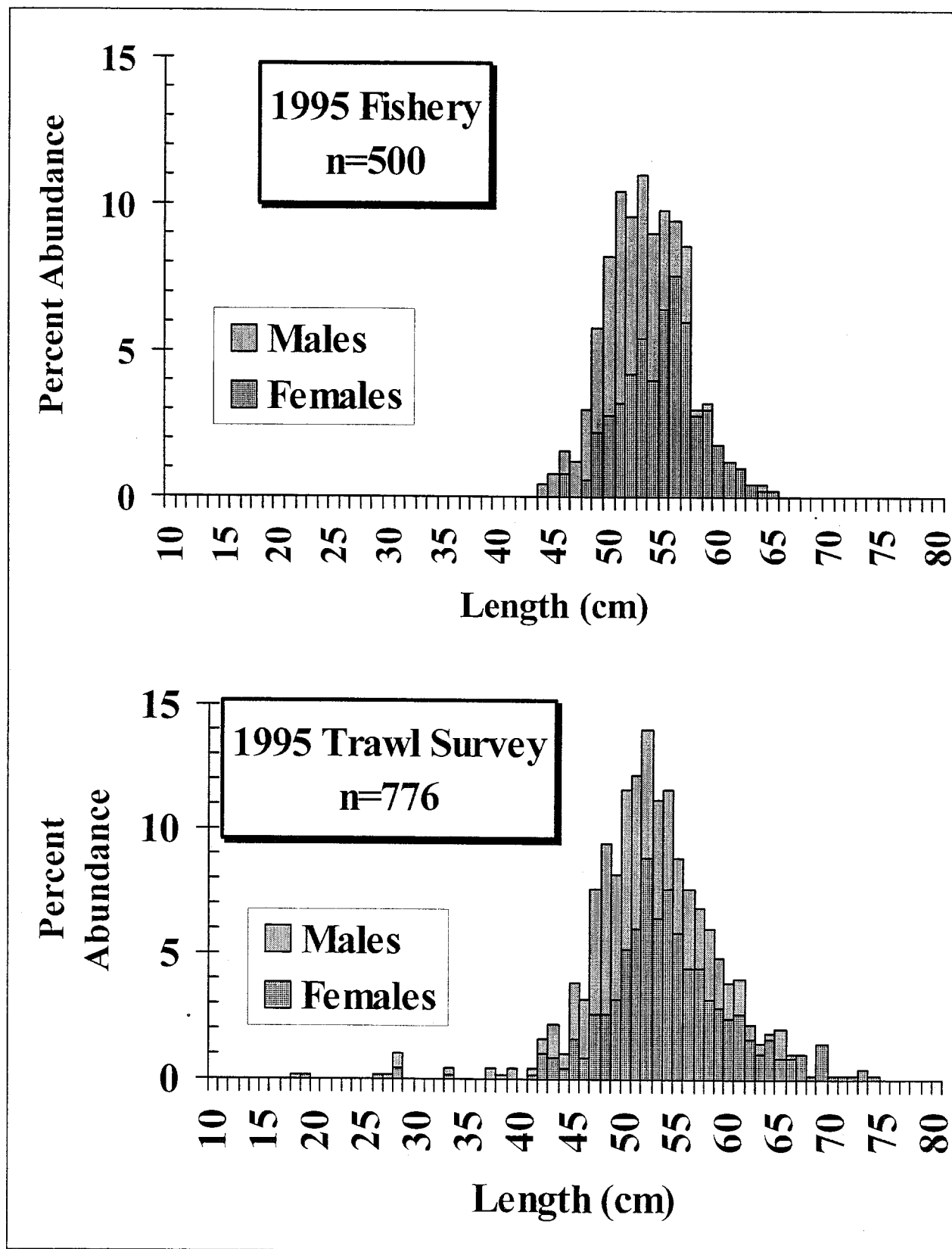


Figure 3. Length distribution of Prince William Sound pollock, 1995.

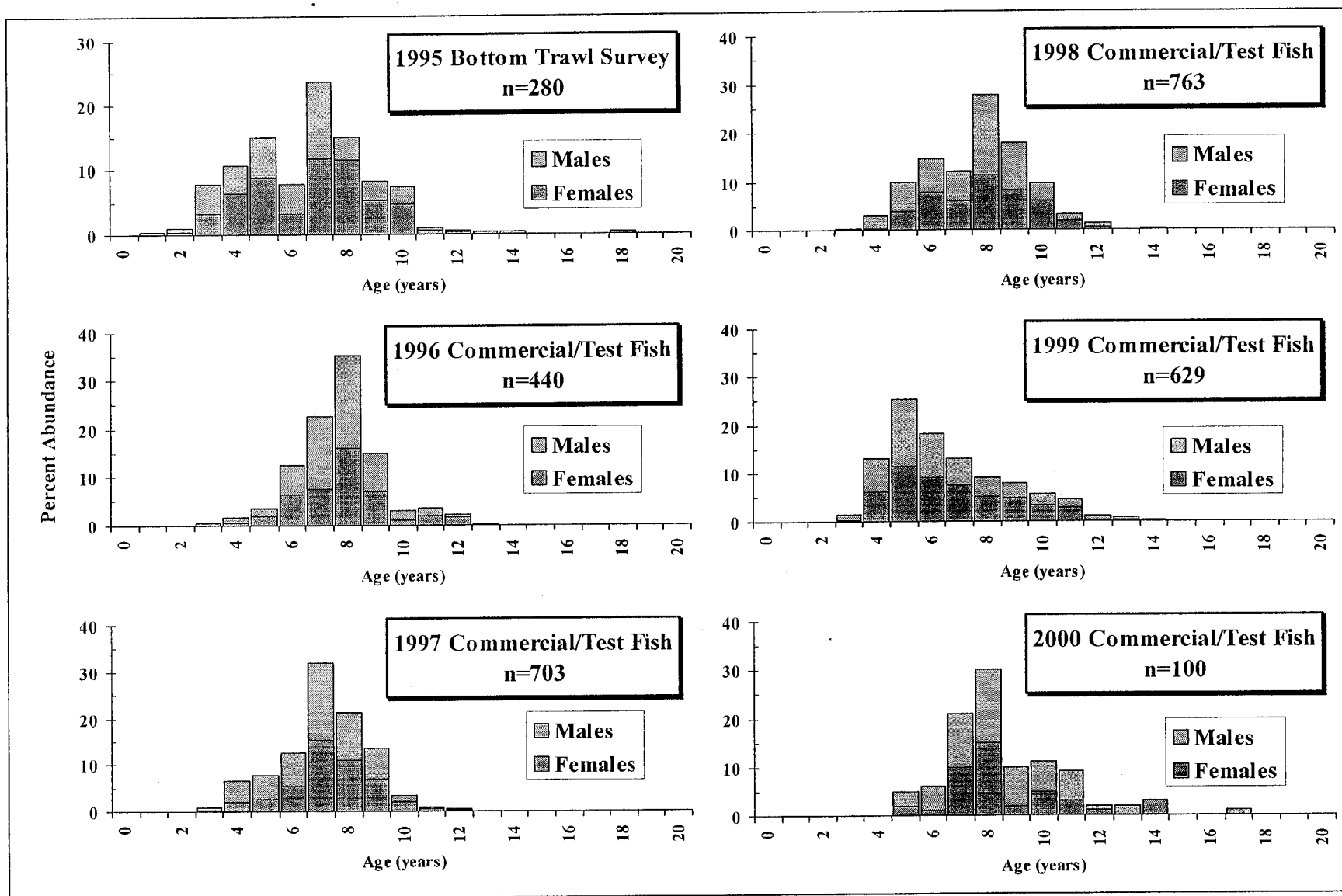


Figure 4. Age composition of pollock sampled from Prince William Sound, 1995-2000.

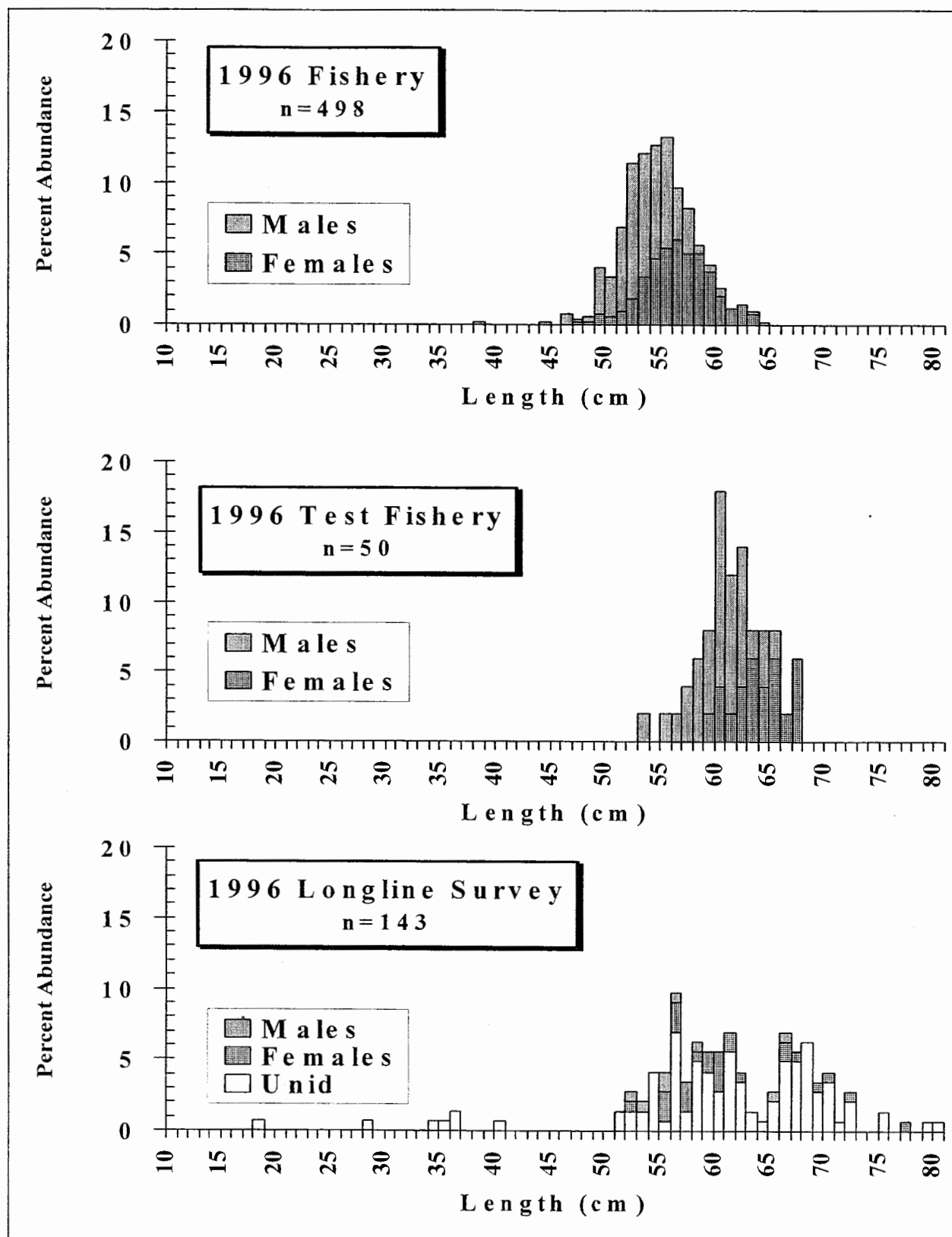


Figure 5. Length distribution of Prince William Sound pollock, 1996.

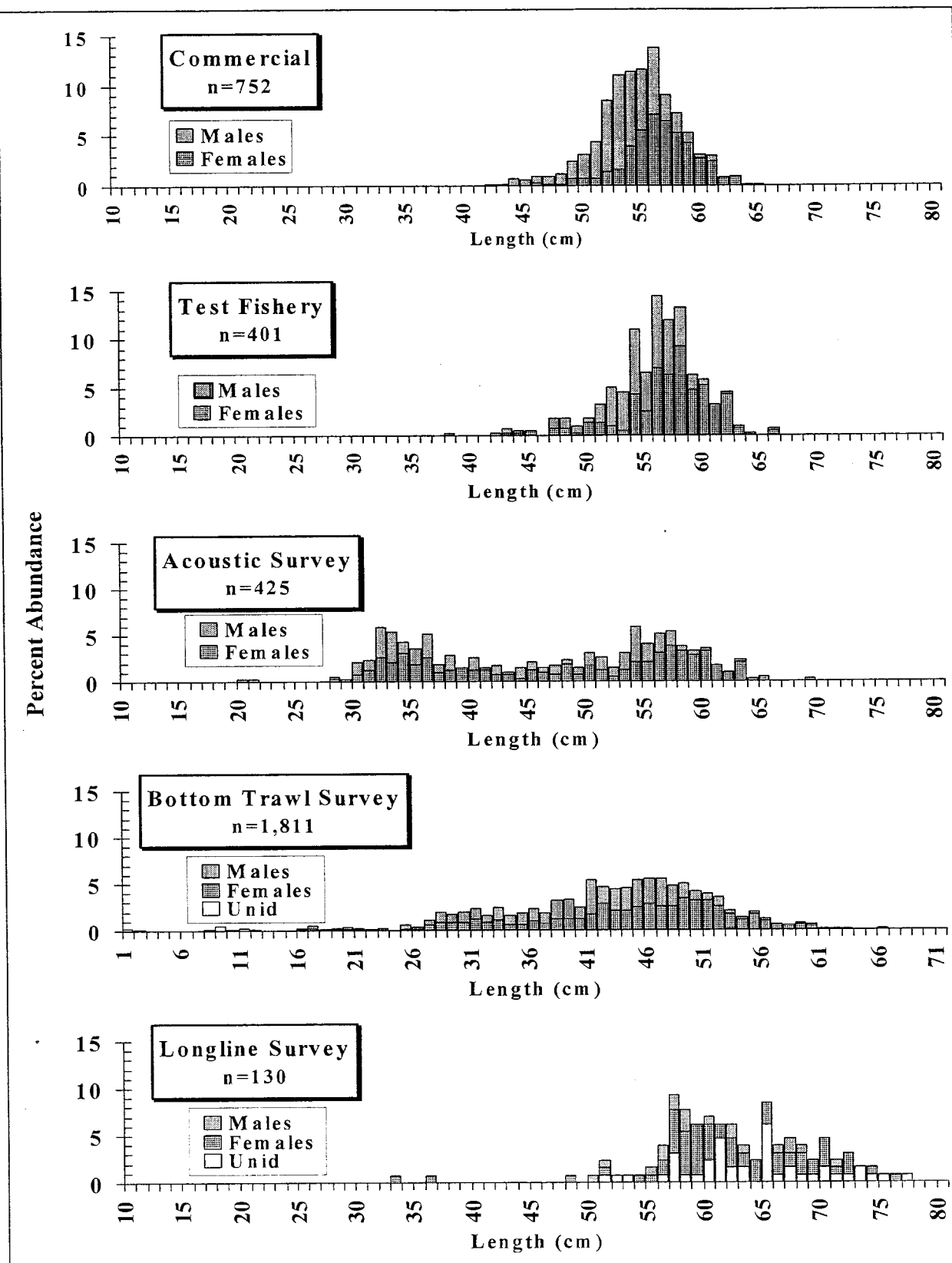


Figure 6. Length distribution of Prince William Sound pollock, 1997.

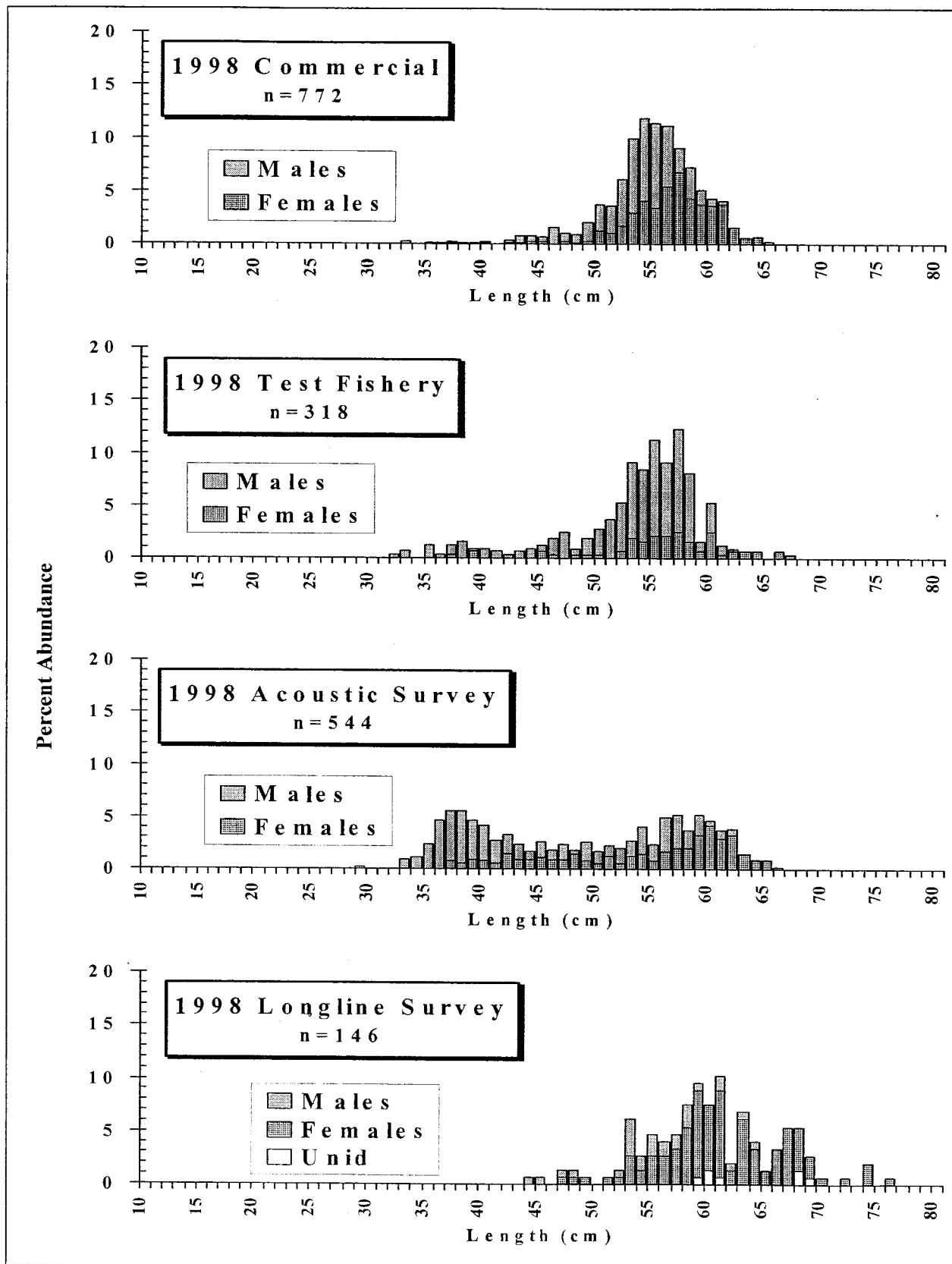


Figure 7. Length distribution of Prince William Sound pollock, 1998.

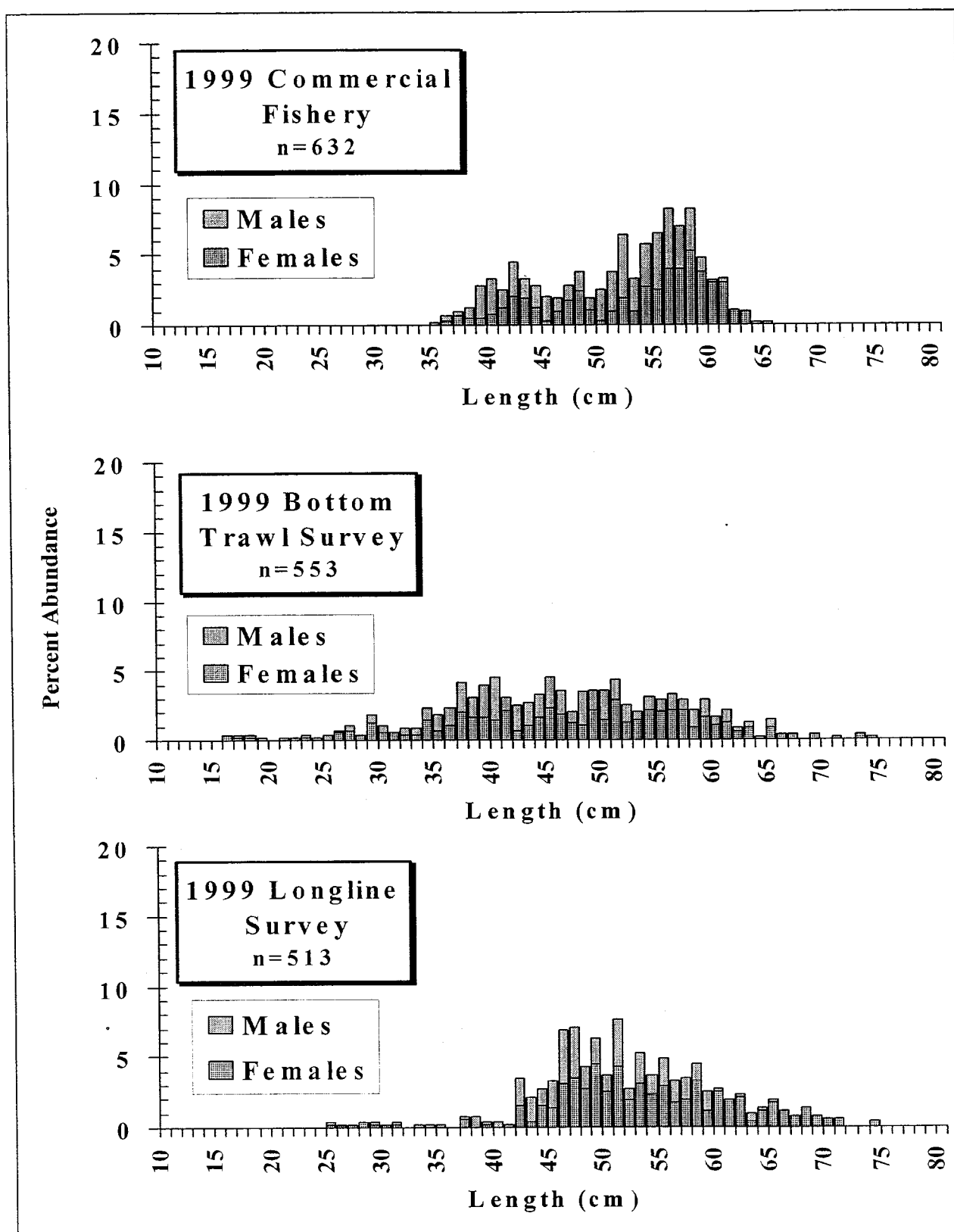


Figure 8. Length distribution of Prince William Sound pollock, 1999.

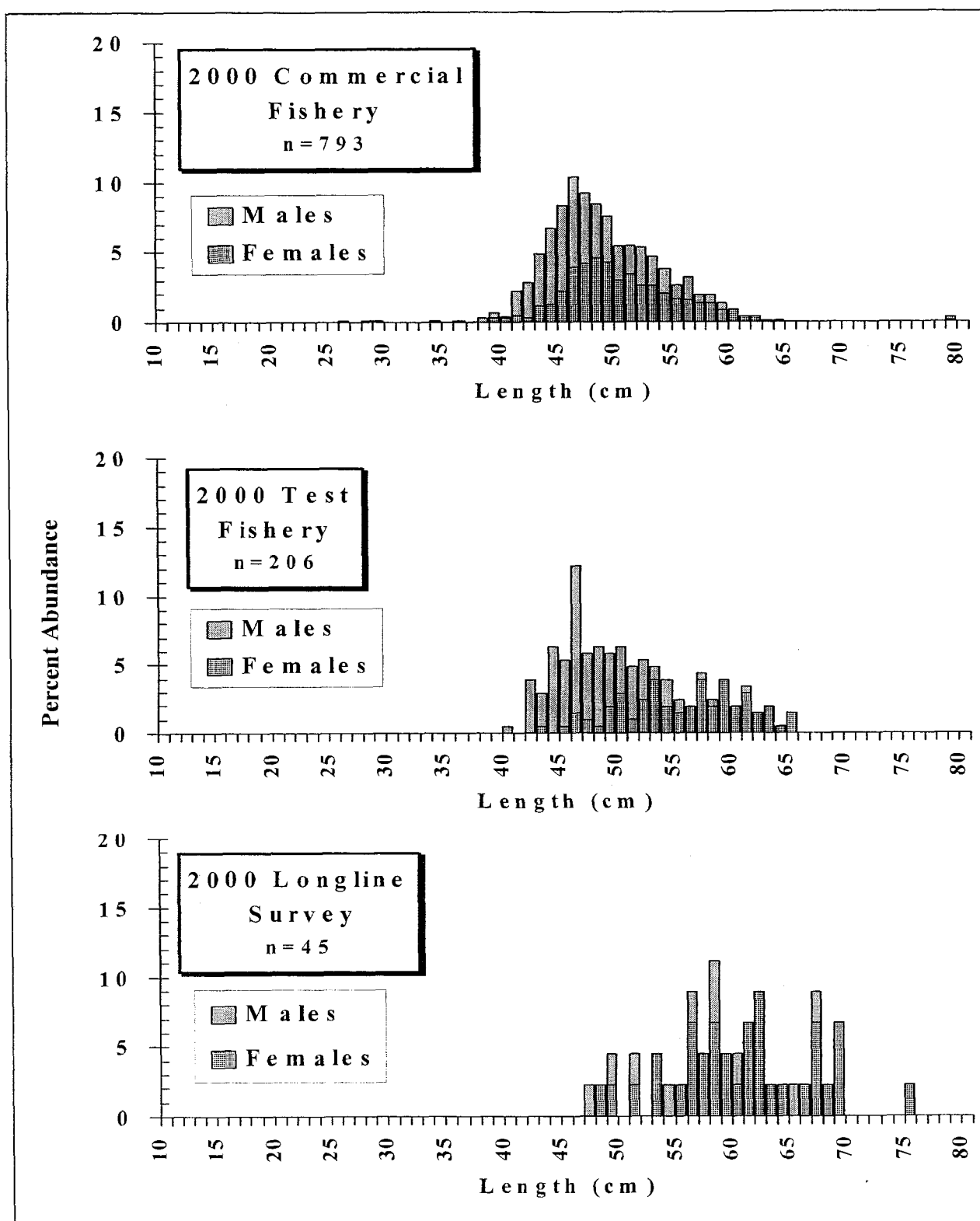


Figure 9. Length distribution of Prince William Sound pollock, 2000.

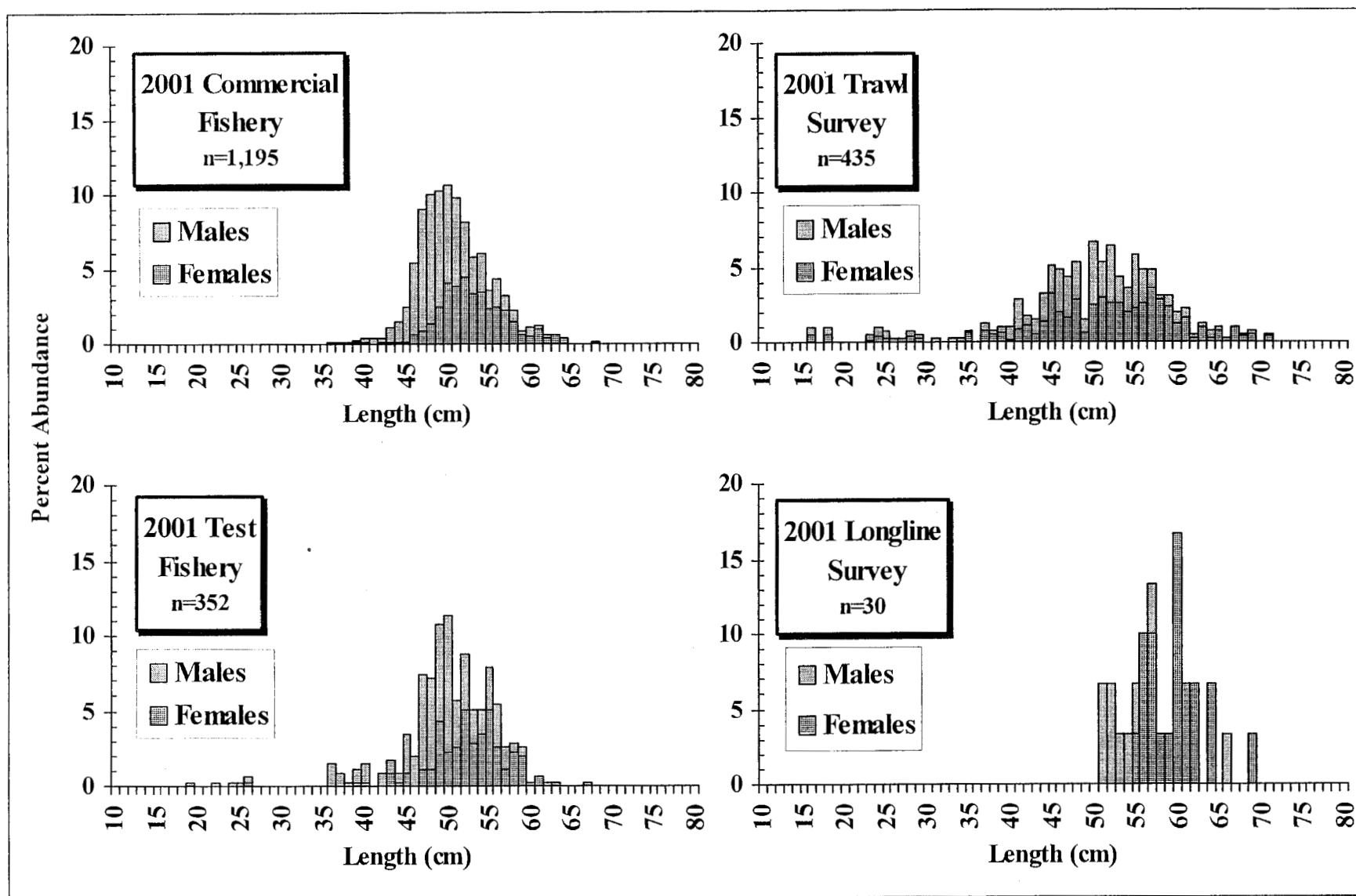


Figure 10. Length distribution of Prince William Sound pollock, 2001.

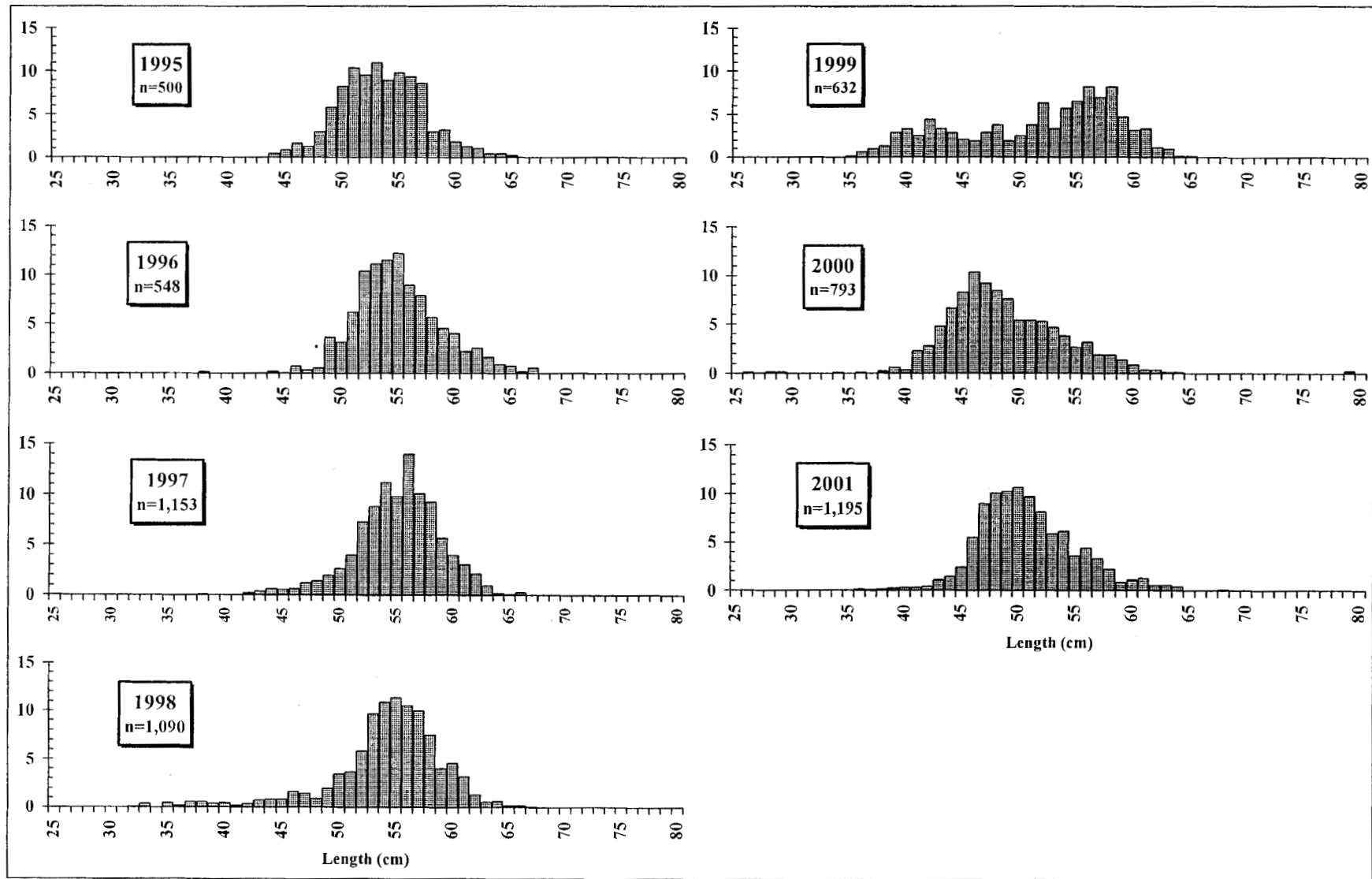


Figure 11. Length distribution (percent abundance) of walleye pollock in commercial harvests from Prince William Sound, 1995-2001.

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