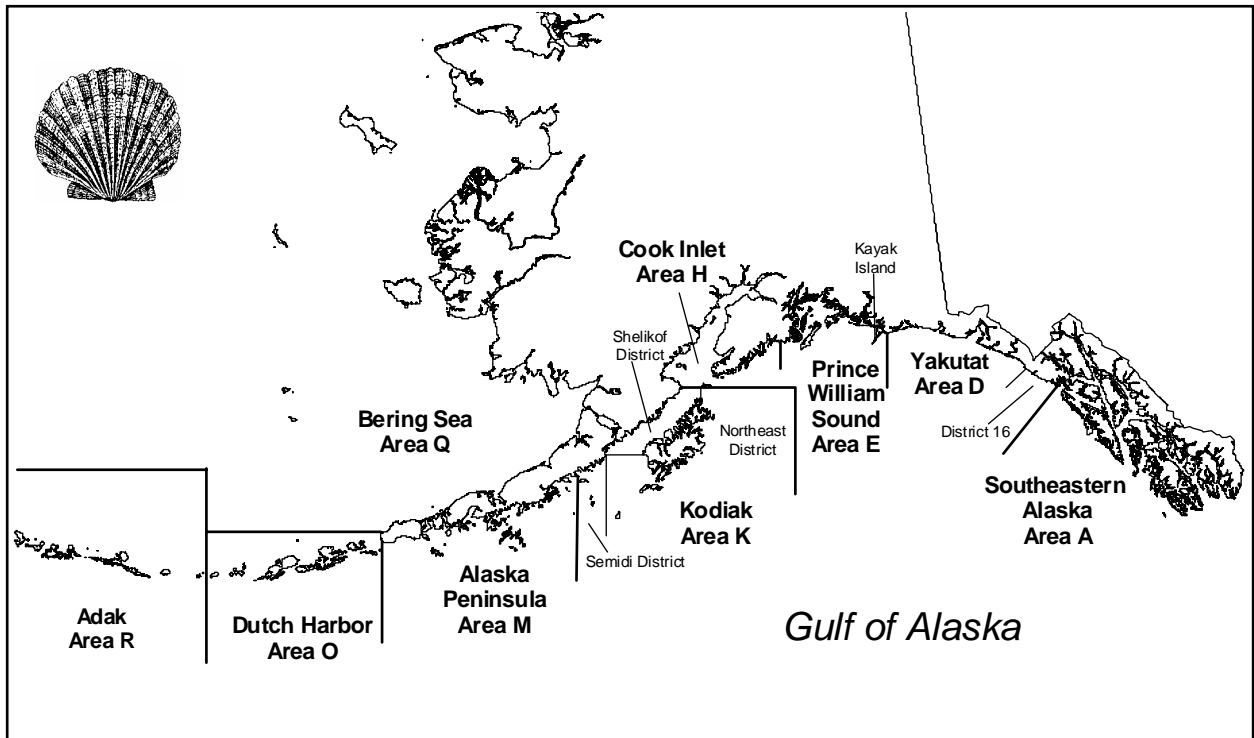


**STOCK ASSESSMENT AND FISHERY EVALUATION REPORT**  
**FOR THE WEATHERVANE SCALLOP**  
**FISHERY OFF ALASKA**



Compiled by

**The Scallop Plan Team**

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## 1.0 Introduction:

The *National Standard Guidelines for Fishery Management Plans* published by the National Marine Fisheries Service (NMFS) require that a stock assessment and fishery evaluation (SAFE) report is prepared and reviewed annually for each fishery management plan (FMP). The SAFE report summarizes the current biological and economic status of the fishery and analytical information used in fishery management such as guideline harvest ranges (GHRs) and harvest strategies. The report is assembled by the scallop plan team with contributions from the State of Alaska Department of Fish and Game (ADF&G), the National Marine Fisheries Service (NMFS), and the North Pacific Fishery Management Council (NPFMC). The SAFE report is presented to the Council on an annual basis and is also available to the public.

The Scallop Plan Team met in Anchorage on March 3, 2005 to review the status of the weathervane scallop stocks, to discuss additional issues of importance in scallop management and to compile the annual SAFE report. The Plan Team review was based on presentations by staff of the NPFMC, NMFS and ADF&G with opportunity for public comment and input. Members of the Plan Team who compiled the report were Jeff Barnhart (chair), Gregg Rosenkranz, Diana Stram, Gretchen Harrington, Scott Miller, and Herman Savikko.

The scallop fishery in Alaska's Exclusive Economic Zone (EEZ; 3-200 miles offshore) is jointly managed by the state and federal government under the FMP. Most aspects of scallop fishery management are delegated to the State of Alaska, while limited access and other federal requirements are under jurisdiction of the federal government. The FMP was developed by the NPFMC under the Magnuson Stevens Act and approved by NMFS on July 26, 1995.

Although the FMP covers all scallop stocks off the coast of Alaska including weathervane scallops (*Patinopecten caurinus*), pink or reddish scallops (*Chlamys rubida*), spiny scallops (*Chlamys hastata*), and rock scallops (*Crassadoma gigantea*), the weathervane scallop is the only commercially exploited stock at this time. Commercial fishing for weathervane scallops occurs in the Gulf of Alaska, Bering Sea, and Aleutian Islands. Scallop registration areas are shown in Figure 1 while major scallop fishing locations in Alaska coastal waters during the 2003/2004 season are shown in Figure 2.

In 1996, optimum yield (OY) was established as 0 to 1.8 million pounds of shucked scallop meats. A more conservative approach was taken in 1998, when OY was defined as 0 to 1.24 million pounds of shucked scallop meats. Statewide scallop harvest has not exceeded OY, and scallop stocks are not overfished.

### 1.1 Summary of New Information Included in the SAFE Report:

This SAFE Report includes updated information through the 2003/2004 fishing year. New information which is included in this report since the previous report (NPFMC 2003) includes the following:

- 1) Updated catch and effort data through 2003/2004 fishing year;
- 2) Dredge hours by season and registration area;
- 3) Shell height histograms by season and registration area for areas: Yakutat, Kodiak (Northeast District, Shelikof); Alaska Peninsula, Bering Sea
- 4) Total catch statewide compared with MSY;
- 5) Additional descriptive information on the observer program and observer training manual;
- 6) List of Crab Bycatch Limits (CBLs) by area;
- 7) Revenue statistics for the fishery from 1967-2003;

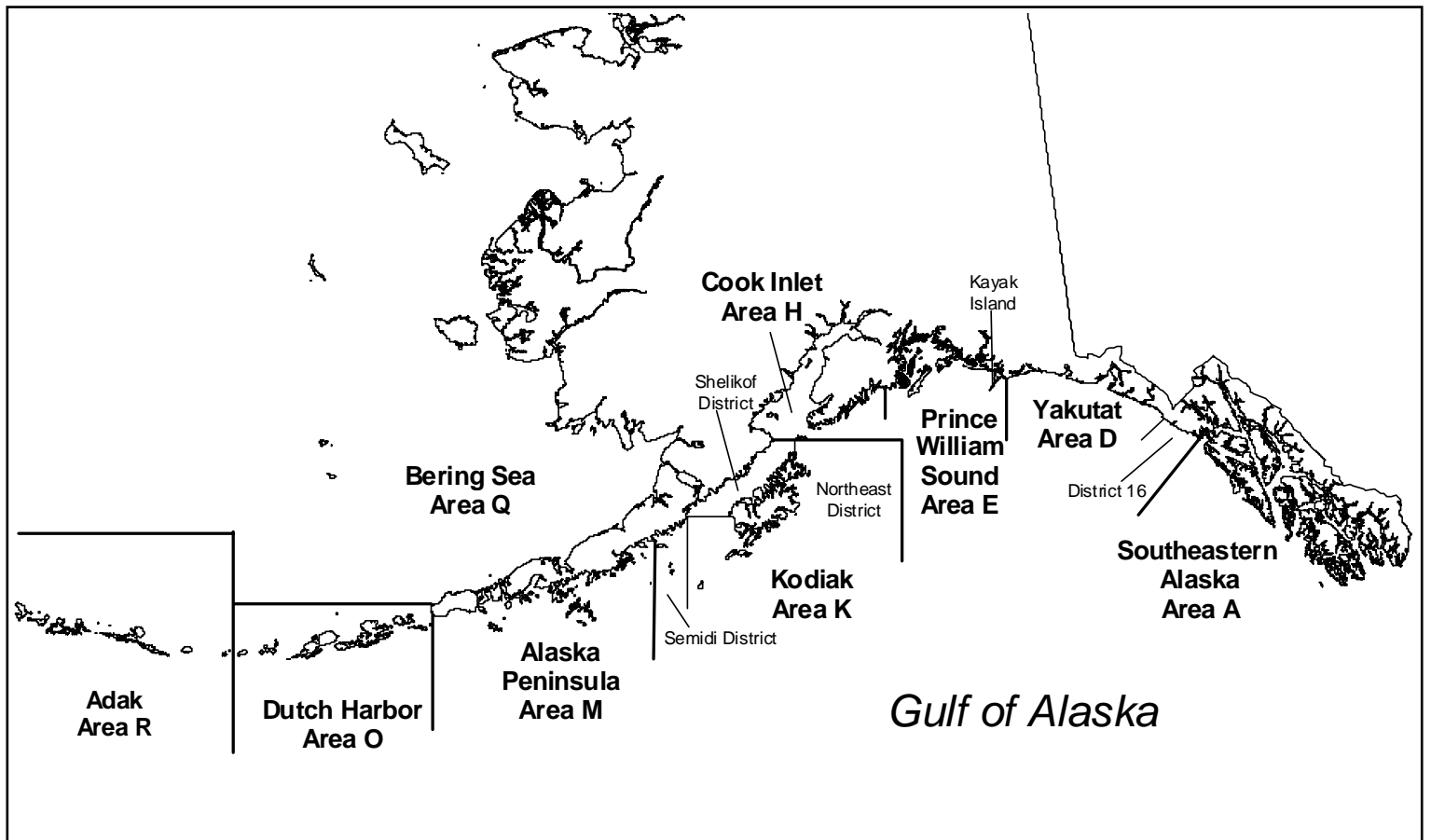


Figure 1. Alaska weathervane scallop fishing registration areas.

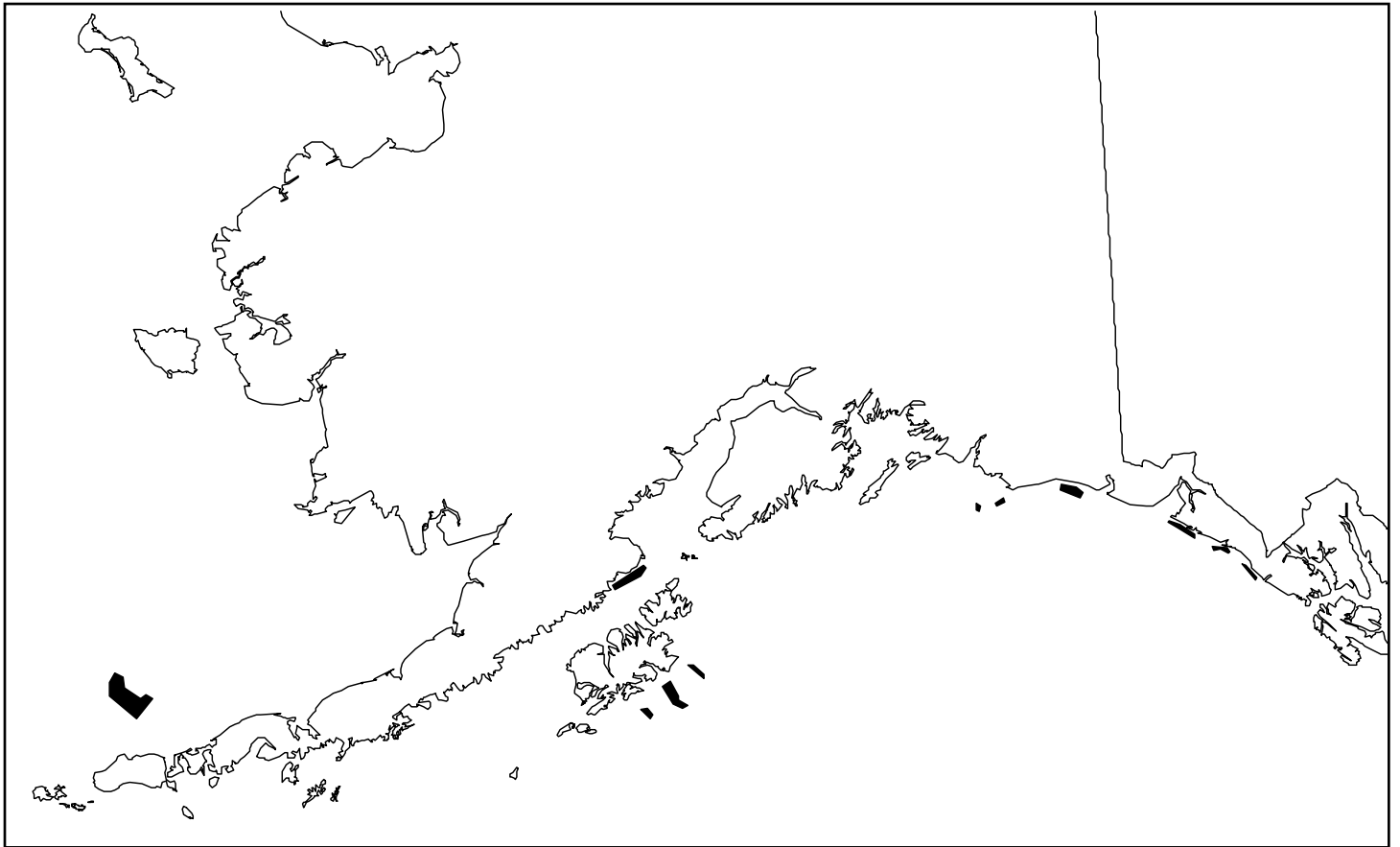


Figure 2. Scallop fishing locations (dark polygons) outside Cook Inlet during the 2003/04 season.

## 1.2 Historical overview of the scallop fishery

Alaskan weathervane scallop *Patinopecten caurinus* populations were first evaluated for commercial potential in the early 1950s by both government and private sector research. However, it was not until the late 1960s as catches declined in the U.S. and Canadian scallop fisheries on Georges Bank that interest in a fishery off Alaska began to take shape. Initial commercial fishing effort took place in 1967 when two vessels harvested weathervane scallops from fishing grounds off the eastside of Kodiak Island. By the following year, 19 vessels consisting of New England type scallop vessels, converted Alaskan crab boats, salmon seiners, halibut longliners, and shrimp trawlers entered the fishery.

From the inception of the fishery in 1967 through mid May 1993, the scallop fishery was passively managed employing minimal management measures. Closed waters and seasons were established to protect crabs and crab habitat. As catches declined in one bed, vessels moved to better grounds. While this may have been generally acceptable for a sporadic low intensity fishery, increased participation led to boom and bust cycles (Barnhart 2003).

In the early 1990s, the Alaska weathervane scallop fishery expanded rapidly with an influx of scallop boats from the East Coast of the United States. Concerns about bycatch (in particular crab bycatch) and overharvest of the scallop resource prompted the Commissioner of ADF&G, under 5 AAC 39.210, to designate the weathervane scallop fishery a high impact emerging fishery on May 21, 1993. This action required ADF&G to close the fishery and implement an interim management plan prior to reopening. The interim management plan contained provisions for king and Tanner crab bycatch limits (CBLs) for most areas within the Westward Region. Since then, crab bycatch limits have been established for the Kamishak District of the Cook Inlet Registration Area and the Prince William Sound Registration Area. The commissioner adopted the regulations and opened the fishery on June 17, 1993, consistent with the measures identified in the interim management plan. The interim management plan included a provision for 100% onboard observer coverage to monitor crab bycatch and to collect biological and fishery-based data. In March 1994, the Alaska Board of Fisheries (BOF) adopted the interim regulations identified as the Alaska Scallop Fishery Management Plan, 5 AAC 38.076.

From 1967 until early 1995, all vessels participating in the Alaska scallop fishery were registered under the laws of the State of Alaska. Scallop fishing in both state and federal waters was managed under state jurisdiction. In January 1995, the captain of a scallop fishing vessel home-ported in Norfolk, Virginia returned his 1995 scallop interim use permit card to the State of Alaska Commercial Fisheries Entry Commission in Juneau and proceeded to fish scallops in the EEZ with total disregard to harvest limits, observer coverage, and other management measures. In response to this unanticipated event, federal waters in the EEZ were closed to scallop fishing by emergency rule on February 23, 1995. The initial emergency rule was in effect through May 30, 1995, and was extended for an additional 90 days through August 28, 1995. The intent of the emergency rule was to control the unregulated scallop fishery in federal waters until an FMP could be implemented closing the fishery. Prior to August 28, NPFMC submitted a proposed FMP which closed scallop fishing in the EEZ for a maximum of one year, with an expiration date of August 28, 1996. The final rule implementing Amendment 1 to the FMP was filed July 18, 1996 and published in the Federal Register on July 23, 1996. It became effective August 1, 1996, allowing the weathervane scallop fishery to reopen in the EEZ. Scallop fishing in state waters of the Westward Region was delayed until August 1, 1996 to coincide with the opening of the EEZ. The state continued as the active manager of the fishery with in-season actions duplicated by the federal system (Barnhart 2003).

In March 1997, the NMFS approved Amendment 2, a vessel moratorium under which 18 vessels qualified for federal moratorium permits to fish weathervane scallops in federal waters off Alaska. By February 1999, the Council recommended replacing the federal moratorium program with an LLP, which became Amendment 4



to the FMP. The Council's goal was to reduce capacity to approach a sustainable fishery with maximum net benefits to the Nation, as required by the Magnuson-Stevens Act.

NPFMC's preferred alternative created a total of nine licenses with no area endorsements; each vessel is permitted to fish statewide. However, vessels that fished exclusively in the Cook Inlet Registration Area during the qualifying period are limited to fishing a single 6-foot dredge, which was the existing gear restriction in Cook Inlet during the qualifying period. This gear restriction has recently been reevaluated by the Council (see section 7.2).

## **2.0 Description of Fishery and Management**

The scallop fishery is managed jointly by NMFS and ADF&G under the Federal Fishery Management Plan (FMP) for the Scallop Fishery off Alaska. Most management measures under the FMP are delegated to the State for management under Federal oversight. ADF&G management of the weathervane scallop fishery covers both state and federal waters off Alaska.

The regulatory fishing season for weathervane scallops in Alaska is July 1 through February 15 except in the Cook Inlet Registration Area. In the Kamishak District of Cook Inlet, the season is August 15 through October 31, and in all other districts of Cook Inlet, the season is from January 1 through December 31 under conditions of an exploratory permit. Scallop fishing in any registration area in the state may be closed by emergency order prior to the end of the regulatory season. Scallop guideline harvest ranges (GHRs) and crab bycatch limits (CBLs) are typically announced by ADF&G approximately one month prior to the season opening date (see section 3.0 for GHRs; section 2.2 for CBLs).

The weathervane scallop fishery is prosecuted with standard New Bedford style scallop dredges. On average, a 15-foot dredge weighs approximately 2,600 pounds and a 6-foot dredge weighs about 900 pounds. The frame design provides a rigid, fixed dredge opening. Attached to and directly behind the frame is a steel ring bag consisting of 4-inch (inside diameter) rings connected with steel links. A sweep chain footrope is attached to the bottom of the mesh bag. The top of the bag consists of 6-inch stretched mesh polypropylene netting which helps hold the bag open while the dredge is towed along the ocean floor. A club stick attached to the end of the bag helps maintain the shape of the bag and provides for an attachment point to dump the dredge contents on deck. Steel dredge shoes that are welded onto the lower corners of the frame bear most of the dredge's weight and act as runners, permitting the dredge to move easily along the substrate. Each dredge is attached to the boat by a single steel wire cable operated from a deck winch.

All vessels fishing inside the Cook Inlet Registration Area are limited to a single dredge not more than 6 feet in width. Unless otherwise restricted by the LLP (see section 7.2), vessels fishing in the remainder of the state may simultaneously operate a maximum of 2 dredges that are 15 feet or less in width. Vessels used in the weathervane scallop fishery range in size from 58 feet to 124 feet length overall with a maximum of 1,200 horsepower.

Scallop fishing operations involve the following steps: a) dredge deployment; b) dredge towed for 50 to 60 minutes on the bottom at an average speed of 4.7 knots; c) dredge retrieved; d) dredge contents emptied on deck; e) retained scallops sorted from the catch and bycatch discarded overboard; f) baskets of retained scallops moved from the deck to the shucking area; g) gear prepared for the next set; h) gear deployed; and i) shuck, wash, grade, package and freeze scallop meats. The scallop meat is the single adductor muscle that is removed from the scallop by crew members using specialized hand-held scallop knives. Scallop meats represent approximately 8-12% of the total live weight depending on area and season (Barnhart and

Rosenkrantz 2003). Scallop meats are graded by size and sold to domestic seafood markets (Kruse et al. in press).

The State of Alaska Fishery Management Plan For Commercial Scallop Fisheries in Alaska, requires 100% onboard observer coverage. The primary purposes of the onboard observer program are to collect biological and fishery-based data, monitor bycatch, and provide for regulatory enforcement (see section 2.1 for observer program information).

Commercial weathervane scallop fishing in federal waters is limited by a federal license limitation program (LLP), while participation in state waters (0-3 nautical miles) is limited by a vessel-based limited entry program. The LLP limits participation in the statewide scallop fishery in Federal waters to nine vessels (see section 2.3).

In 1997, the Alaska legislature approved legislation (AS 16.43.906) establishing a scallop vessel moratorium in state waters (0-3 miles). In 2001, the legislature authorized a 3-year extension of the moratorium, due to expire July 1, 2004. During the 2002 legislative session, passage of HB206 resulted in changes to the state's limited entry statutes. These changes authorized use of a vessel-based limited entry program in the weathervane scallop fishery. However, vessel entry permits issued for the statewide weathervane scallop fishery will expire on December 31, 2008 unless statutory authority is extended. Prior to the July 1, 2004 expiration of the state vessel moratorium, a vessel permit limited entry system for the statewide weathervane scallop fishery was in place. Eight vessel owners received permits to fish for weathervane scallops in state waters.

Three vessels with LLP permits, including one limited by American Fisheries Act (AFA) sideboards, participate in the federal water portion of the fishery and harvest the majority of the scallop quota in the statewide fishery outside Cook Inlet. Three smaller vessels with LLP permits participate in the Cook Inlet fishery. Occasionally, one of the smaller vessels participates in the scallop fishery outside of Cook Inlet.

LLP permits have been consolidated by the fleet through a voluntary industry cooperative. Six scallop vessel owners formed a fishing cooperative in May 2000. This program is self-regulated and is neither endorsed nor managed by ADF&G or NMFS. Within the cooperative, vessel owners allocate themselves shares based on previous fishing history. Some owners opted to remove their boats from the fishery and arranged for their shares to be caught by other members of the cooperative. Since formation of the cooperative, harvest rates have slowed and fishing effort occurs over a longer time period each season.

Vessel owners within the cooperative have taken an active role in reducing crab bycatch. Vessel operators provide confidential in-season fishing information to an independent consulting company contracted by the cooperative. This firm reviews crab bycatch data, fishing locations, and scallop harvest, which allows for real time identification of high crab bycatch areas. When these areas are identified, the fleet is provided with the information and directed to avoid the area.

Many areas along the Alaska coast are closed to scallop dredging (Figure 3). These closures (some of which have been in place over 30 years) are instituted for a variety of reasons including the need to protect king and Tanner crab habitat and populations.

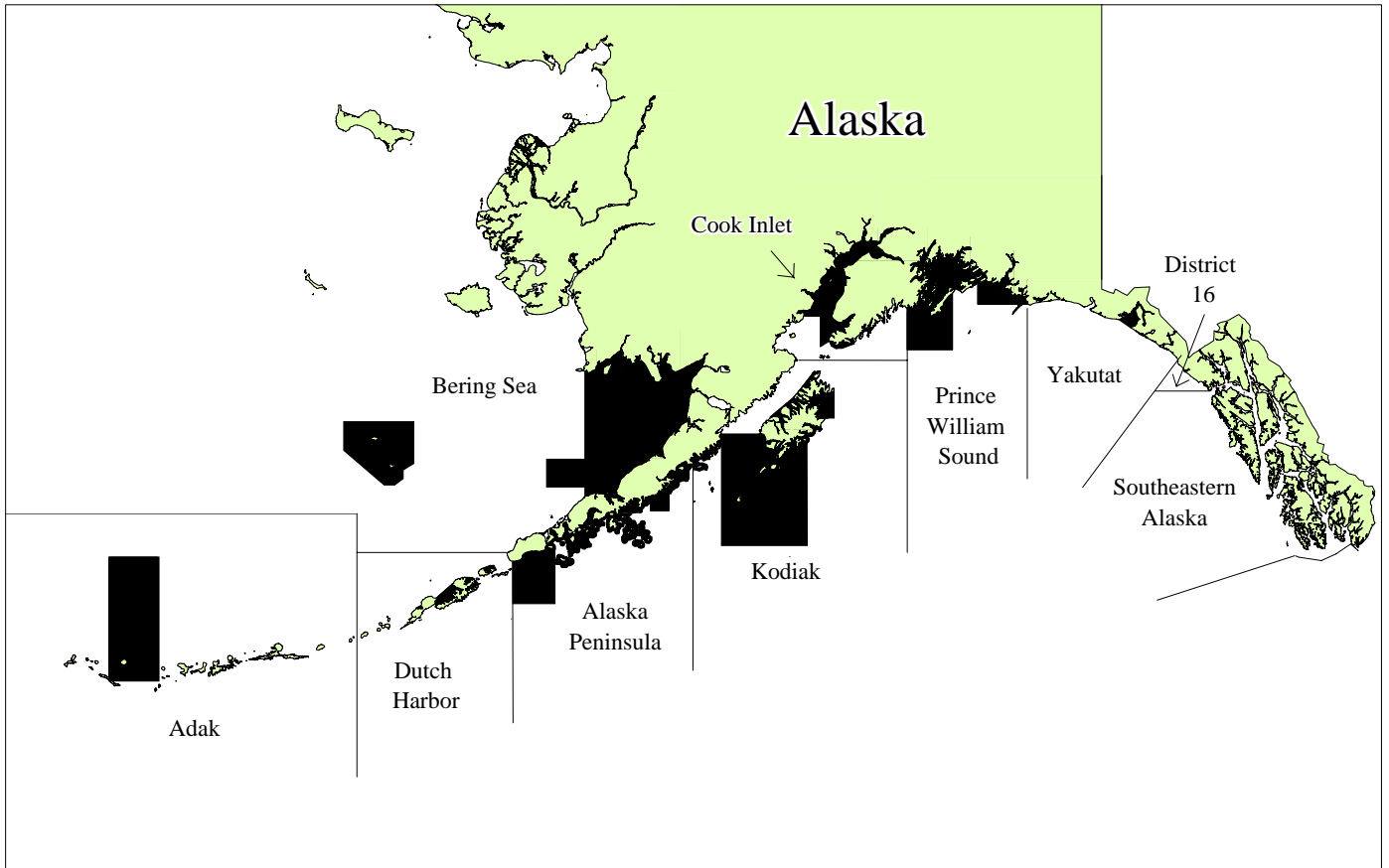


Figure 3. Alaska coastal areas closed to scallop fishing (shaded areas).

## 2.1 Observer Program Overview

The primary purposes of the onboard scallop observer program are to collect a variety of biological and fishery-based data, monitor bycatch, and provide for regulatory enforcement. Data are collected on crab and halibut bycatch, discarded scallop catch, retained scallop catch, catch composition, scallop meat-weight recovery, location, area and depth fished, and catch per unit effort. Observers report scallop harvest, number of tows, area fished, and crab bycatch to ADF&G tri-weekly during the season by radio or email. Data are used to manage the fishery in-season and to set GHRs for the following season. Observer-collected data are used to manage the fishery in-season and to set guideline harvest ranges (GHRs) for the following season. Data are provided to local advisory committees, BOF, NPFMC, NMFS and the public to help answer a myriad of questions pertaining to the weathervane scallop fishery. Regulatory decisions, in the absence of observer-collected data, may have had different outcomes. These data have been invaluable for preparing Essential Fish Habitat (EFH) and Habitat Areas of Particular Concern (HAPC) documents. Observer data were particularly useful in showing that the proposed HAPC would have a minimal impact. For analyzing fine-scale spatial impacts, observer data are critical.

Some Alaska weathervane scallop fishery participants formed a vessel cooperative program prior to the 2000/01 regulatory season. Within this cooperative, vessel owners allocate vessel shares based on fishing history. Some owners opted to remove their boats from the fishery and arranged for their coop shares to be caught by other vessels within the cooperative. Not all fishery participants are members of the cooperative.

The cooperative has led to fewer vessels in the fishery, so it is important that all remaining vessels have observer coverage in order to collect adequate data to manage the fishery and ascertain its impacts.

Under state regulation 5AAC 39.141, “The Board of Fisheries finds that in particular shellfish fisheries, observers on board fishing vessels would greatly enhance management, primarily by facilitating information gathering, and by improving regulatory compliance”. Furthermore, “Onboard observer may be the only practical fishery monitoring, data-gathering or enforcement mechanism...”. Regulation 5AAC 39.654 states “The Board of Fisheries finds that onboard observers provide the only effective means of collecting essential biological and management data from catcher-processor and floating processor vessels that process shellfish...”. “These data are necessary to achieve the requirements set out in 16 U.S.C. 1801-1883 (Magnuson-Stevens Act) and the federal Fisheries Management Plan ... including the sustained yield of the shellfish resource without overfishing”.

Onboard observer coverage is funded by industry through direct payments to independent contracting agents. Independent contracting agents provide the onboard observers who are trained at the University of Alaska North Pacific Fisheries Observer Training Center in Anchorage, Alaska. Onboard observer coverage is paid for by industry (Barnhart 2003). Observer training is funded by a federal grant. The updated Observer Training Manual is attached as appendix A. Federal assistance is provided to the State of Alaska by a NOAA grant award to cover additional costs incurred to meet federal oversight. ADF&G funds scallop stock assessments and day to day management of the resource including staff salaries and indirect costs incurred by field offices throughout the state.

Observer costs to those vessels limited to a single 6-ft dredge in federal waters were addressed in Amendment 10, section 6.8 of the Scallop FMP. “The Council recommended Amendment 10, because it found that it is not economically viable for vessels to operate outside of Cook Inlet (as authorized by authority of the LLP license) with the existing 6-ft dredge gear restriction. The Council determined that given existing observer requirements and their associated costs, the single 6-ft dredge restriction created a disproportionate economic hardship when fishing in federal waters (NPFMC 2004). Amendment 10 has the potential to provide these two vessels with an opportunity to capture a larger share of the total catch, thus allowing them to offset observer costs and perhaps enhance their economic viability.

In summary, under 5 AAC 38.076 (g) of the Alaska Scallop Fishery Management Plan “The department may require a vessel fishing in the scallop fishery ... to carry an observer unless the department determines that carrying an observer will not serve the purpose of the onboard observer program”. Clearly, carrying an observer does serve the purpose of the program. Data collected from the scallop fishery are used to manage the fishery inseason, set GHRs for the following seasons, monitor crab bycatch and ensure established crab bycatch caps are not exceeded, provide for regulatory enforcement, and answer a host of questions about catch composition, bycatch, habitat, and the health of the scallop resource. These data are necessary to achieve the requirements set out in the Magnuson-Stevens Act and the Federal Fisheries Management Plan for the Scallop Fishery Off Alaska including the sustained yield of the shellfish resource without overfishing. In most areas of the state, the department does not conduct scallop stock assessment surveys, so observer-collected data are even more vital to the management of the resource. In areas where fishery independent assessment surveys do occur, fishery data provides another perspective on the health of the stock.

## **2.2 Crab Bycatch Limits**

Bycatch of crabs in the scallop fishery is controlled through the use of Crab Bycatch Limits (CBLs) based on individual crab stock abundance. Crab bycatch limits (CBLs) were first instituted by the state in July 1993. Methods used to determine CBLs in 1993 and 1994 were approved by the BOF and the NPFMC and, with few exceptions, remain unchanged. Annual CBLs are established pre-season by ADF&G based on the most

current crab resource abundance information. However, in some registration areas or districts, the CBL is a fixed number of crabs and is not adjusted seasonally.

In the Kodiak, Alaska Peninsula, and Dutch Harbor Registration Areas, the CBLs are set at 0.5% or 1.0% of the total crab stock abundance estimate based on the most recent survey data (Table 1). In registration areas or districts where red king crab or Tanner crab abundance is sufficient to support a commercial crab fishery, the cap is set at 1.0% of the most recent red king crab or Tanner crab abundance estimate. In registration areas or districts where the red king crab or Tanner crab abundance is insufficient to support a commercial fishery, the CBL is set at 0.5% of the most recent red king crab or Tanner crab abundance estimate. Bycatch caps are expressed in numbers of crabs and include all sizes of crabs caught in the scallop fishery.

In the Kamishak District of the Cook Inlet Registration Area, the Tanner crab bycatch limit is set at 0.5% of the total crab stock abundance and the red king crab limit is fixed at 60 crabs. In the Prince William Sound Registration Area the CBL for Tanner crab is fixed at 0.5% of the total crab stock abundance, although this is a recent change from a fixed number of crabs.

Table 1. Statewide crab bycatch limits, in percent of the crab abundance estimate or number of crab.

Scallop Registration Areas	Red King Crab	C. bairdi	C. opilio
Yakutat (D)			
District 16	NA	NA	NA
Remainder of Area D	NA	NA	NA
Prince William Sound (E)			
Eastern Section of outside District	NA	0.5% <sup>a</sup>	NA
Cook Inlet (H)			
Kamishak District	0.5% <sup>a</sup>	60 crabs <sup>a</sup>	NA
Outer/Easter/Barren Island Districts	NA	NA	NA
Kodiak (K)			
Shelikof District	0.5% or 1.0%	0.5% or 1.0%	NA
Northeast District	0.5% or 1.0%	0.5% or 1.0%	NA
Semidi District	Regulated inseason	Regulated inseason	NA
Alaska Peninsula (M)	0.5% or 1.0%	0.5% or 1.0%	NA
Bering Sea (Q)	500 crabs <sup>a</sup>	Three Tier Approach	Three Tier Approach
Dutch Harbor (O)	0.5% or 1.0%	0.5% or 1.0%	NA
Adak (R)	50 <sup>b</sup>	10,000 <sup>b</sup>	NA

NA= Not applicable

<sup>a</sup>Fixed CBL

<sup>b</sup>Bycatch limit set to allow scallop fleet adequate opportunity to explore and harvest scallop stocks while protecting the crab resource.

CBLs in the Bering Sea (registration Area Q) have evolved from fixed numbers in 1993 to a three tier approach used in the current fishery. In 1993, Bering Sea CBLs were set by ADF&G to allow the fleet adequate opportunity to explore and harvest scallop stocks while protecting the crab resource. CBLs were established at 260,000 *Chionoecetes* spp. and 17,000 red king crabs. In 1995, ADF&G recommended that CBLs be established at 0.003176 percent of the best available estimate of *C. opilio* (snow crab) and 0.13542 percent of the best available estimate of Tanner crab abundance in Registration Area Q. That equated to about 300,000 snow and 260,000 Tanner crabs based on 1994 crab abundance estimates in Registration area Q. In Amendment 1 of the federal scallop FMP, the NPFMC approved the CBLs established by ADF&G. The NPFMC also recommended that king crab bycatch limits be set within a range of 500 to 3,000 annually. Beginning with the 1996/97 fishing season ADF&G took a conservative approach and set the red king crab limit in Registration Area Q at 500 red king crabs annually.

From the 1996/97 through 1998/99 fishing seasons the CBL for *Chionoecetes* sp. in the Bering Sea was established annually by applying the percentages established for snow and Tanner crab limits in Amendment 1 of the FMP. In 1998, consistent with the Tanner crab rebuilding plan in the Bering Sea, crab bycatch limits were modified.

The current three tier approach was established utilizing the bycatch limits established in Amendment 1 of the FMP, 300,000 snow crab and 260,000 Tanner crab. The three tiers include (1) Tanner crab spawning biomass above minimum stock size threshold (MSST); bycatch limit is set at 260,000 crabs, (2) Tanner crab spawning biomass below MSST; bycatch limit is set at 130,000 crabs, and (3) Tanner crab spawning biomass is below MSST and the commercial fishing season is closed; Tanner crab limit is set at 65,000 crabs. A similar three tier approach was taken with the snow crab bycatch caps. The three tiers include (1) snow crab spawning biomass above the MSST; bycatch limit is set at 300,000 crabs, (2) snow crab spawning biomass below MSST; bycatch limit is set at 150,000 crabs, and (3) snow crab spawning biomass below MSST and the commercial fishing season is closed; the snow crab limit is set at 75,000 crabs.

Closures based on the fleet reaching crab bycatch limits have decreased over the years since inception of CBLs in 1993, possibly due to decreased crab abundance (Barnhart and Rosenkranz 2003). During the 1993/94 season four statewide areas were closed due to crab bycatch. Since the 2000/01 season one area has closed due to crab bycatch.

## **2.3 Scallop License Limitation Program**

The Federal Scallop License Limitation Program (LLP) became effective in 2001. NPFMC created the scallop LLP (under amendment 4 to the FMP) to limit the number of participants and reduce fishing capacity in the scallop fishery. More information on the analysis for Amendment 4 can be obtained through the Council office.

The LLP license is required on board any vessel deployed in the weathervane scallop fishery in federal waters off Alaska. NMFS granted 7 vessel owners licenses to fish statewide (outside of the Cook Inlet Registration Area) utilizing two 15-foot dredges. Additionally, NMFS granted two vessels owners licenses to fish statewide utilizing a single 6-foot dredge. Following implementation by NMFS of Council action on Amendment 10 to the FMP, these two vessel owners licenses may be utilized for up to two 10-foot dredges statewide. Implementation if this amendment is anticipated in 2005 (see section 7.2). All 9 licenses allow vessel owners to fish inside Cook Inlet with a single 6-foot dredge.

Vessel length is limited to that of the qualifying period. More information on the scallop LLP can be found on the NMFS Alaska Region web page at <http://www.fakr.noaa.gov/ram/smp.htm>.

### 2.3.1 Voluntary Scallop Cooperative

In May 2000, six of the nine LLP owners formed the North Pacific Scallop Cooperative under authority of the Fishermen's Cooperative Marketing Act, 48 Stat. 1213 (1934), 15 U.S.C. Sec. 521. The cooperative regulates individual vessel allocations within the GHR and crab bycatch caps under the terms of their cooperative contract. Non-coop vessels are not bound by any contract provisions.

Cooperative members negotiate allocations of scallops and crab bycatch among themselves annually and enforce those allocations through provisions in the cooperative contract. The cooperative contract provides financial penalties for violating scallop harvest or crab bycatch limits for coop members. Vessel operators report catch data inseason to a third party contractor to monitor bycatch rates and hot spots.

More information on the voluntary scallop cooperative can be found in the EA/RIR/IRFA for Amendment 10 to the Scallop FMP available on the Council website: <http://www.fakr.noaa.gov/npfmc/analyses/analyses.htm>

## 3.0 Stock Status

The State of Alaska Scallop Fishery Management Plan established 9 scallop registration areas in Alaska for vessels commercially fishing for scallops (Figure 1). These include the Southeastern Alaska Registration Area (Area A); Yakutat Registration Area (Area D and District 16); Prince William Sound Registration Area (Area E); Cook Inlet Registration Area (Area H); Kodiak Registration Area (Area K), which is subdivided into the Northeast, Shelikof and Semidi Districts; Alaska Peninsula Registration Area (Area M); Dutch Harbor Registration Area (Area O); Bering Sea Registration Area (Area Q); and Adak Registration Area (Area R). Scallop seasons are not opened in Area A, and effort occurred in Area R in 1995 only. Although the overfishing definition is based on the statewide scallop stock, ADF&G establishes GHRs and manages the fishery by registration areas within regions. Stocks in each area are independently assessed with methods that vary by region. Statewide estimates of stock size are not available, and funding to perform extensive statewide surveys of scallop abundance are not anticipated in the foreseeable future.

ADF&G conducts biennial dredge surveys in the Kamishak District of the Cook Inlet Registration Area and near Kayak Island in the Prince William Sound Registration Area. For registration areas without surveys, stocks are assessed and managed conservatively based on extensive data sets collected by the scallop observer program. These data consist of scallop catch and fishing effort, including total harvest, catch per unit effort (CPUE), fishing locations, size structure of the catch, and crab bycatch. Spatially explicit observer data that cannot be displayed in the SAFE report due to confidentiality requirements is examined in detail each year when GHRs are set. The observer program also provides management personnel with inseason summary reports. Areas may be closed due to concerns about localized depletion, overall trends in CPUE, or high crab bycatch. ADF&G research personnel have developed methodology for fishery-independent video surveys of scallop stocks in the highest-producing beds that are scheduled to begin in spring of 2006.

GHRs for registration areas where scallop fishing traditionally occurred were first established by the State of Alaska in 1993 under the Interim Management Plan for Commercial Scallop Fisheries in Alaska. The upper limit of the GHR (pounds of shucked meats) from traditional areas included Yakutat (250,000 pounds), Prince William Sound (50,000), Kamishak District of Cook Inlet (20,000 pounds), Kodiak (400,000 pounds), and Dutch Harbor (170,000) pounds. The combined upper limits of the GHRs totaled 890,000 pounds of shucked meats. GHRs for each area were determined by averaging historic catches from 1969 to 1992 excluding years when there was no fishing or a "fishing-up effect" occurred (Barnhart 2003). Production may be over-estimated by using "fishing-up" periods, when catches exceed sustainable levels when a newly established

fishery crops off large, old individuals from the population including concentrations on marginal beds that rebuild slowly.

Prior to the August 1, 1996 opening of the weathervane scallop fishery, ADF&G established GHRs for non-traditional registration areas. GHR upper limits were established for the Alaska Peninsula (200,000 pounds), Bering Sea (600,000 pounds), District 16 (35,000 pounds) and Adak (75,000 pounds). The historic high catches for each registration area were established as the GHR upper limit. The combination of GHRs from traditional and non-traditional areas totaled 1.8 million pounds of shucked scallop meats, which was defined as maximum sustainable yield (MSY) in Amendment 1 to the federal Fishery Management Plan for the Scallop Fishery off Alaska (FMP).

In 1998, the scallop plan team recommended a more conservative approach, defining MSY as 1.24 million pounds of shucked scallop meats based on average landings from 1990-1997, excluding 1995 when the fishery was closed most of the year. Subsequently, MSY was established in Amendment 6 of the FMP at 1.24 million pounds and optimum yield (OY) as a range from 0 to 1.24 million pounds. To accommodate the lower limits the department reduced the upper end of the GHR in Kodiak from 400,000 to 300,000 pounds, in Dutch Harbor from 170,000 to 110,000 pounds, and in the Bering Sea from 600,000 to 400,000 pounds.

### **3.1 Yakutat Registration Area**

GHRs for the 2003/04 season were set at 0–200,000 lbs of shucked meats for Yakutat Area D and 0–35,000 lbs for Yakutat District 16 (Tables 2–3, Figures 4 and 6). Two catcher-processors participated in the fishery and harvested 160,918 lbs from Area D and 1,072 lbs from District 16. Area D CPUE has remained stable at around 45 lbs meat/dredge hr over the past 4 seasons (Figure 4), while effort has been nearly negligible in District 16 during the past 2 seasons (Figure 6).

Several factors have contributed to reduced effort in the area. Formation of a vessel cooperative in 2000 reduced fishing capacity and led to slower harvest rates and longer seasons. At the same time, high scallop abundance off the east coast of Canada and the U.S. has held market prices down for smaller sizes of Alaskan scallops. Yakutat scallops have the slowest growth rate in the state (Jeff Barnhart, ADF&G, unpublished data) and tend to be the smallest that are commercially harvested. Fishing for larger scallops that are more commonly found in the vicinity of Kodiak Island and in the Bering Sea has become relatively more profitable and led to reduced effort in the Yakutat Area.

Yakutat Area D shell height (SH) distributions (Figures 5) indicate a relatively stable scallop population with periodic modest recruitment. In District 16 (Figure 7), strong recruitment observed during 1996-1998 has not recurred since. Insufficient data were available to create District 16 SH distribution plots for the most recent 2 seasons.



Table 2. Yakutat Area D scallop fishery summary statistics.

Season	Number vessels	GHR (lbs meat)	Dredge hours <sup>a</sup>	Catch <sup>a</sup> (lbs meat)	CPUE (lbs per dredge hr)
1993	7 <sup>b</sup>	250,000	1,999	139,057	70
1994	10 <sup>b</sup>	250,000	4,130	246,862	60
1995	8 <sup>c</sup>	250,000	4,730	237,417	50
1996	4	250,000	4,438	238,736	54
1997	4	250,000	3,956	243,810	62
1998/99	8	250,000	4,154	242,929	58
1999/00	3	250,000	3,840	249,681	65
2000/01	3	250,000	4,241	195,699	46
2001/02	2	200,000	2,406	103,800	43
2002/03	2	200,000	2,439	122,718	50
2003/04	2	200,000	3,360	160,918	48

<sup>a</sup>Confidential data released by vessel operators.

<sup>b</sup>One additional vessel fished by waiver without an observer; data not included.

<sup>c</sup>Two additional vessels fished by waiver without observers; data not included.

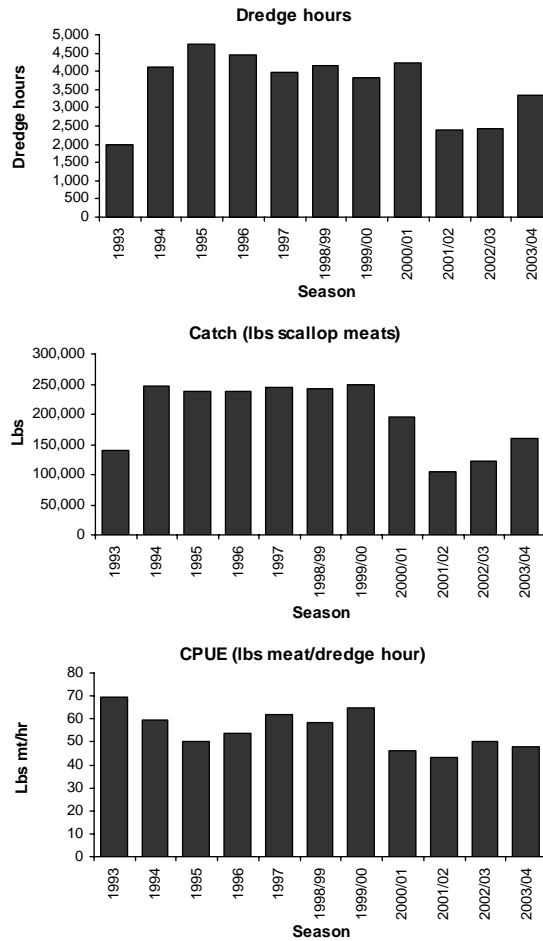


Figure 4. Barplots of Yakutat Area D scallop fishery statistics.

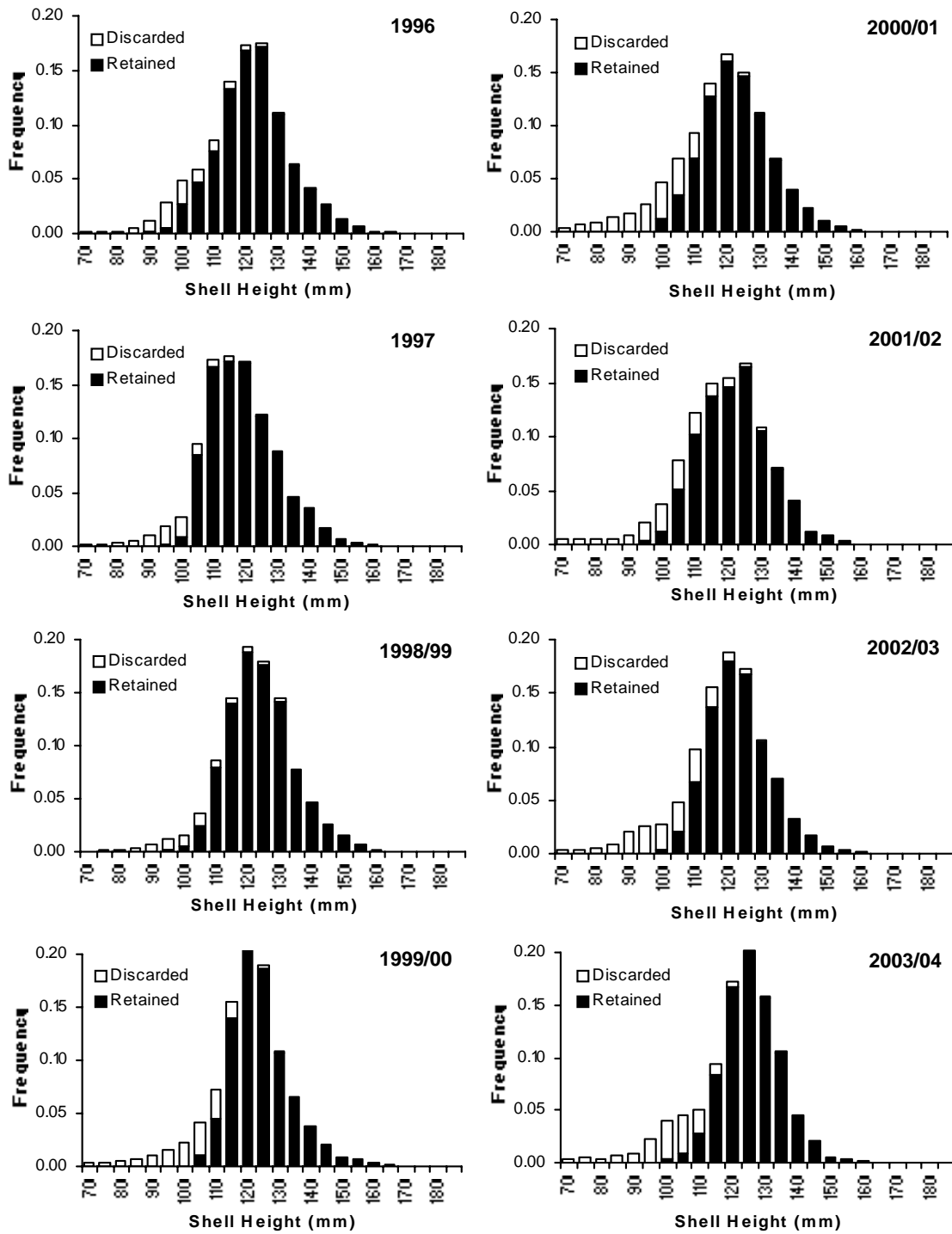


Figure 5. Shell height histograms from resampling Yakutat Area D observer data, 1996–2003/04 seasons.

Table 3. Yakutat District 16 scallop fishery summary statistics.

Season	Number vessels	GHR (lbs meat)	Dredge hours <sup>a</sup>	Catch <sup>a</sup> (lbs meat)	CPUE (lbs per dredge hr)
1993	1	35,000		confidenti	
1994	7 <sup>b</sup>	35,000	408	22,226	54
1995	6 <sup>b</sup>	35,000	1,095	33,302	30
1996	2	35,000	917	34,060	37
1997	4	35,000	561	22,020	39
1998/99	2	35,000	702	34,153	49
1999/00	2	35,000	674	34,624	51
2000/01	3	35,000	476	30,904	65
2001/02	2	35,000	417	20,398	49
2002/03	2	35,000	100	3,685	37
2003/04	2	35,000	18	1,072	59

<sup>a</sup>Confidential data released by vessel operators.

<sup>b</sup>One additional vessel fished by waiver without an observer; data not included.

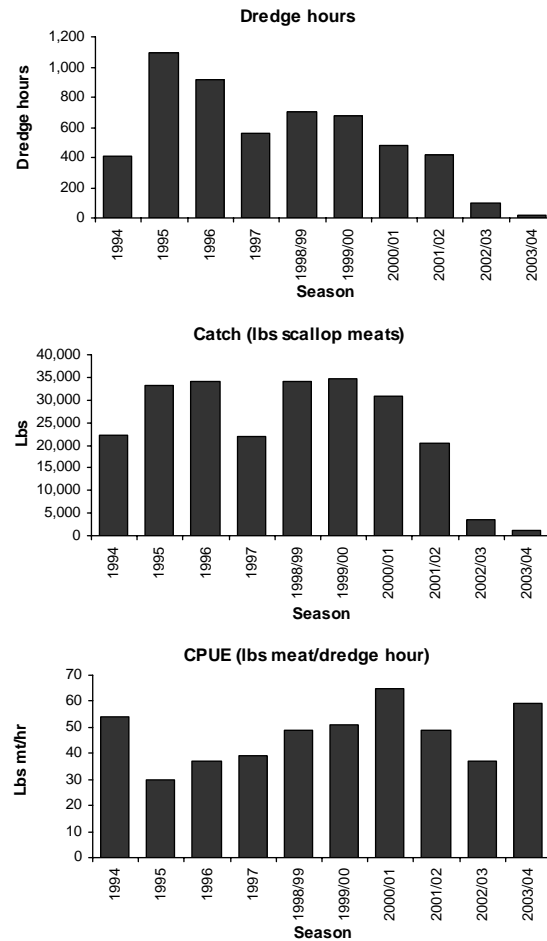


Figure 6. Barplots of Yakutat District 16 scallop fishery statistics.

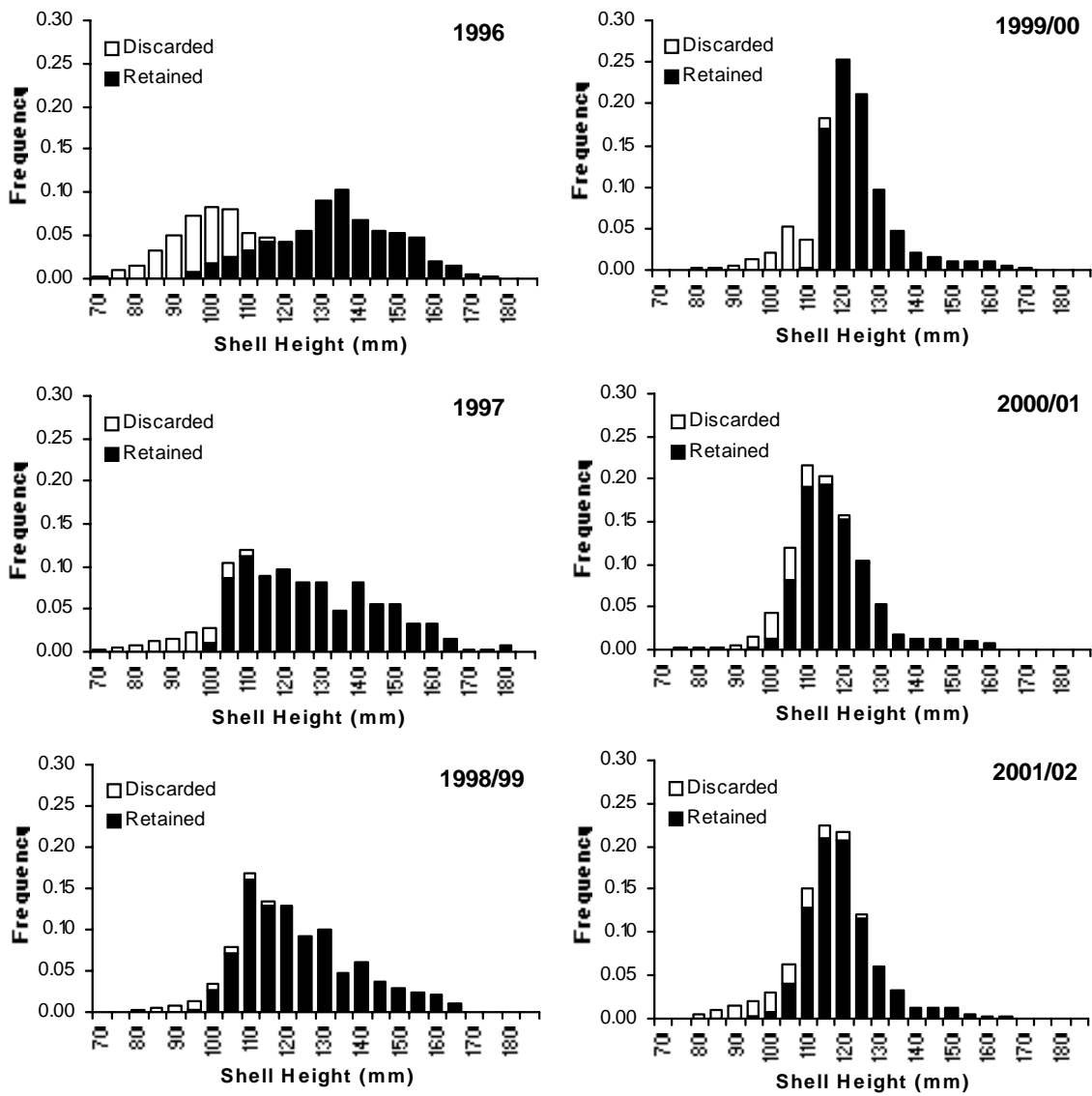


Figure 7. Shell height histograms from resampling Yakutat District 16 observer data, 1996–2001/02 seasons. Insufficient data were collected to produce plots for the 2002/03 and 2003/04 seasons.

### 3.2 Prince William Sound Registration Area

Scallop dredge surveys have been conducted biennially in Area E near Kayak Island (Figures 1 and 2) since 1996. Survey catches have varied considerably (Table 4), and some concerns have been raised about dredge efficiency and performance (William Bechtol, ADF&G, personal communication). The May 2004 survey produced a meat weight biomass estimate of over 750,000 lbs (Table 4), and small scallops that should recruit to the exploitable population during the next 2 years were detected (William Bechtol, ADF&G, unpublished data). The latest published survey report (Bechtol 2003) contains information on survey methodology as well as catch rates and size and age structure of the stock from previous surveys. GHRs are established by ADF&G Central Region staff based on conservative harvest rates and analysis of trends in recruitment and abundance.

Approximately 20,000 lbs of scallop meats were harvested from Area E during the 2003/04 season (Table 5). One catcher processor participated in the fishery and worked traditional grounds located on the east and southwest sides of Kayak Island (Figures 1 and 2). Seasonal CPUE (Table 5; Figure 8) remains the highest in the state, averaging over 100 lbs meat/dredge hr since 1997.

Illegal fishing in the area by a single vessel outside the jurisdiction of the state of Alaska occurred in 1995 and led to a statewide scallop fishing closure. Catch but no effort data are available for the illegal fishing incident.

Plots of Prince William Sound SH distributions (Figure 9) show that small scallops began to appear in catches during the 2003/04 season.

Table 4. Summary statistics from Area E scallop dredge surveys.

Survey year	Number stations	Area surveyed (km <sup>2</sup> )	Meat recovery (%)	Mean (lbs meat per km <sup>2</sup> )	Estimated biomass (lbs meat)
1996	41	281.25	7.9	612	172,021
1998	34	233.23	7.6	1,386	323,359
2000	41	281.25	7.4	2,719	764,763
2002	22	150.92	7.2	1,348	203,396
2004	41	281.25	6.6	2,752	774,144

Table 5. Prince William Sound Area E scallop fishery summary statistics.

Season	Number vessels	GHR (lbs meat)	Dredge hours <sup>a</sup>	Catch <sup>a</sup> (lbs meat)	CPUE (lbs per dredge hr)
1993	7	50,000	638	63,068	99
1994		Closed			
1995	3	50,000		108,000 <sup>b</sup>	
1996		Closed			
1997	1	17,200	171	18,000	105
1998/99	2	20,000	179	19,650	110
1999/00	2	20,000	149	20,410	137
2000/01	3	30,000	221	30,266	137
2001/02	1	30,000	263	30,090	114
2002/03	2	20,000	122	15,641	121
2003/04	1	20,000	216	19,980	93

<sup>a</sup>Confidential data released by vessel operators.

<sup>b</sup>Poundage includes illegal fishing by one vessel; effort data not available.

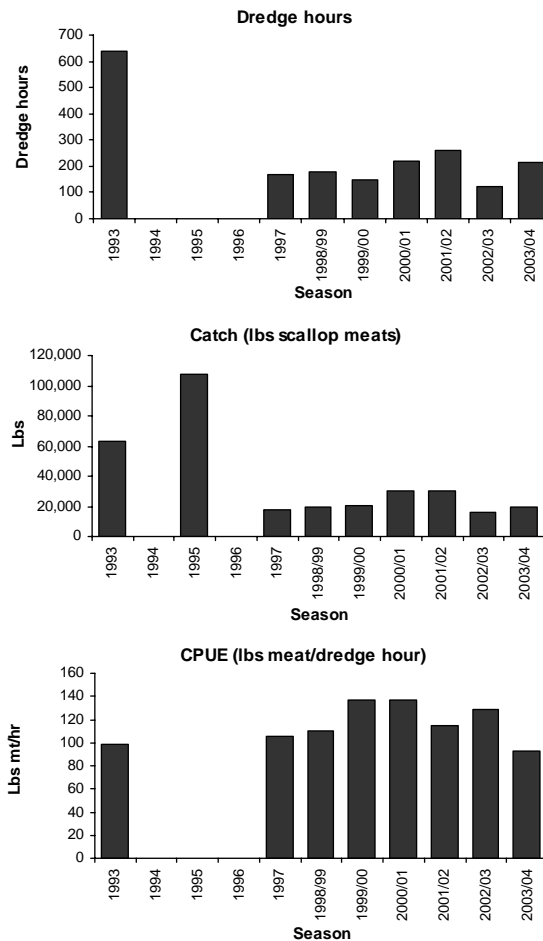


Figure 8. Barplots of Area E scallop fishery statistics.

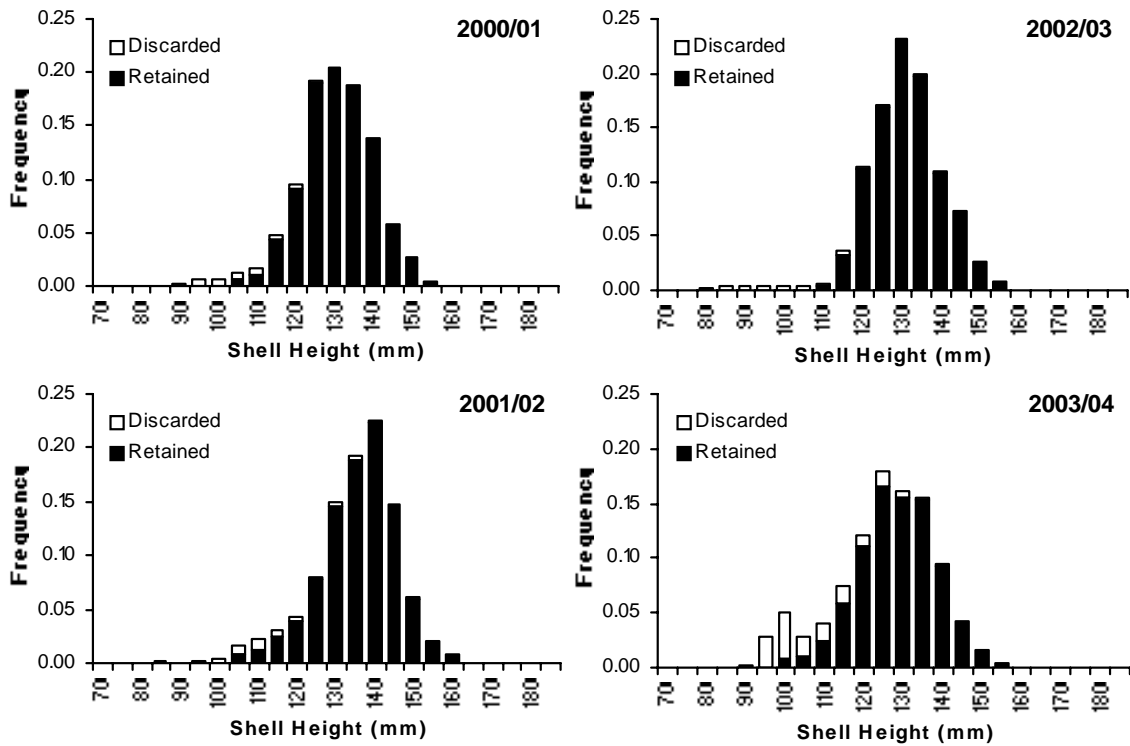


Figure. 9. Shell height histograms from resampling Area E observer data, 2000/01–2003/04. Insufficient data were collected to produce plots for earlier seasons.

### 3.3 Cook Inlet Registration Area, Kamishak District

The Cook Inlet scallop fishery is prosecuted in Kamishak Bay by vessels that are limited to one 6-foot dredge and are not required to carry onboard observers. Other areas of Cook Inlet were explored briefly but are not currently fished (Trowbridge and Bechtol 2003). Much of Cook Inlet is now closed to scallop dredging (Figure 3).

ADF&G conducted the first dredge survey of the Kamishak Bay scallop population in 1984, and regular biennial surveys began in 1996. Biomass estimates from these surveys (Table 6) have been relatively stable, ranging between 438,000 lbs and 612,000 lbs since 1996. Meat recovery percentages have declined over the same time period, and additional meat recovery experiments are planned in conjunction with a 2005 survey to be conducted in Kamishak Bay. Information on survey methodology as well as catch rates and size and age structure of the stock from earlier surveys are available in previously published reports (e.g., Bechtol and Gustafson 2002).

State regulations specify a maximum harvest of 20,000 lbs of scallop meats for the Kamishak Bay fishery (Table 7). During the 2003/04 season, 2 vessels participated in the fishery and harvest data are confidential (Table 7). Participation and CPUE in this small fishery vary widely (Table 7; Figure 10).

Table 6. Summary statistics from Area H scallop dredge surveys.

Survey year	Number stations	Area surveyed (km <sup>2</sup> )	Meat recovery (%)	Mean (lbs meat per km <sup>2</sup> )	Estimated biomass (lbs meat)
1984	47	192.07	10.1	1.090	209,305
1996	26	178.36	8.5	2,621	467,500
1998	14	198.93	7.1	2,202	438,154
1999	28	198.93	6.6	3,075	611,650
2001	25	178.36	6.4	2,863	510,701
2003	20	288.11	6.8	1,915	551,670



Table 7. Cook Inlet, Kamishak District scallop fishery summary statistics.

Season	Number vessels	GHR (lbs meat)	Dredge hours	Catch <sup>a</sup> (lbs meat)	CPUE (lbs per dredge hr)
1993	3		529	20,115	38
1994	4		454	20,431	45
1995		closed			
1996	5		534	28,228	53
1997	3	20,000	394	20,336	52
1998	1	20,000	390	confidential	
1999	3	20,000	333	20,315	61
2000	3	20,000	276	20,516	74
2001	2	20,000	406	confidential	
2002	3	20,000	311	8,591	28
2003	2	20,000		confidential	

<sup>a</sup> Includes estimated dead loss.

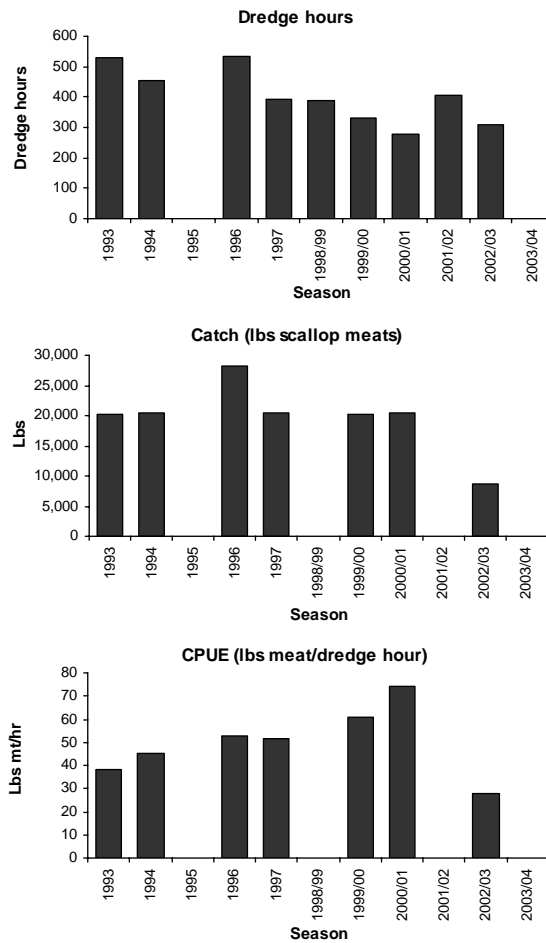


Figure. 10. Barplots of Cook Inlet scallop fishery statistics.

### **3.4 Kodiak Registration Area, Northeast District**

Approximately 80,000 lbs of scallop meats were harvested by 2 vessels from the Northeast District of the Kodiak Management Area during the 2003/04 season (Table 8; Figure 11). Catch and effort have remained stable in the fishery since the 1999/2000 season, with CPUE ranging from 56–73 lbs meat/dredge hr.

SH histograms (Figure 12) indicate that a broad range of scallop sizes (and presumably ages) are harvested in the fishery. These data also suggest that recruitment to the Kodiak Northeast District scallop population occurs more regularly than in other areas of the state.

Large portions of the district known to contain scallops are closed to scallop dredging (Figure 3). These closures were recommended by ADF&G and adopted by the Alaska BOF nearly 30 years ago to protect red king crab and Tanner crab habitat and populations.

Table 8. Kodiak Northeast District scallop fishery summary statistics.

Season	Number vessels	GHR (lbs meat)	Dredge hours	Catch <sup>a</sup> (lbs meat)	CPUE (lbs per dredge hr)
1993/94	10	NA	6,940	155,187	22
1994/95	7	NA	1,773	35,207	20
1995/96		closed			
1996/97	3	NA	581	11,430	20
1997/98	3	NA	2,604	95,858	37
1998/99	4	NA	2,749	120,010	44
1999/00	3	75,000	1,384	77,119	56
2000/01	4	80,000	1,101	79,965	73
2001/02	3	80,000	1,142	80,470	70
2002/03	2	80,000	1,350	80,000	59
2003/04	2	80,000	1,248	79,965	64

<sup>a</sup>Confidential data released by vessel operators.

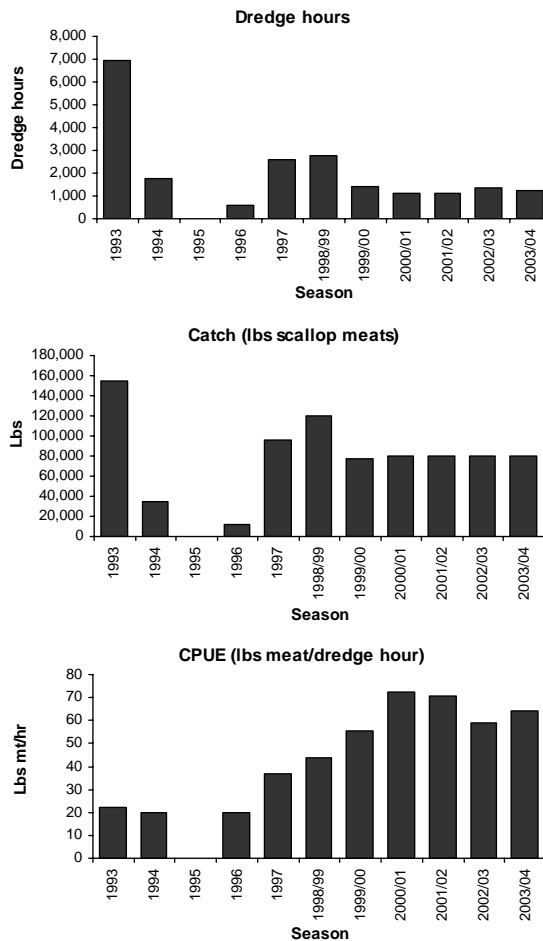


Figure 11. Barplots of Kodiak Northeast District scallop fishery statistics.

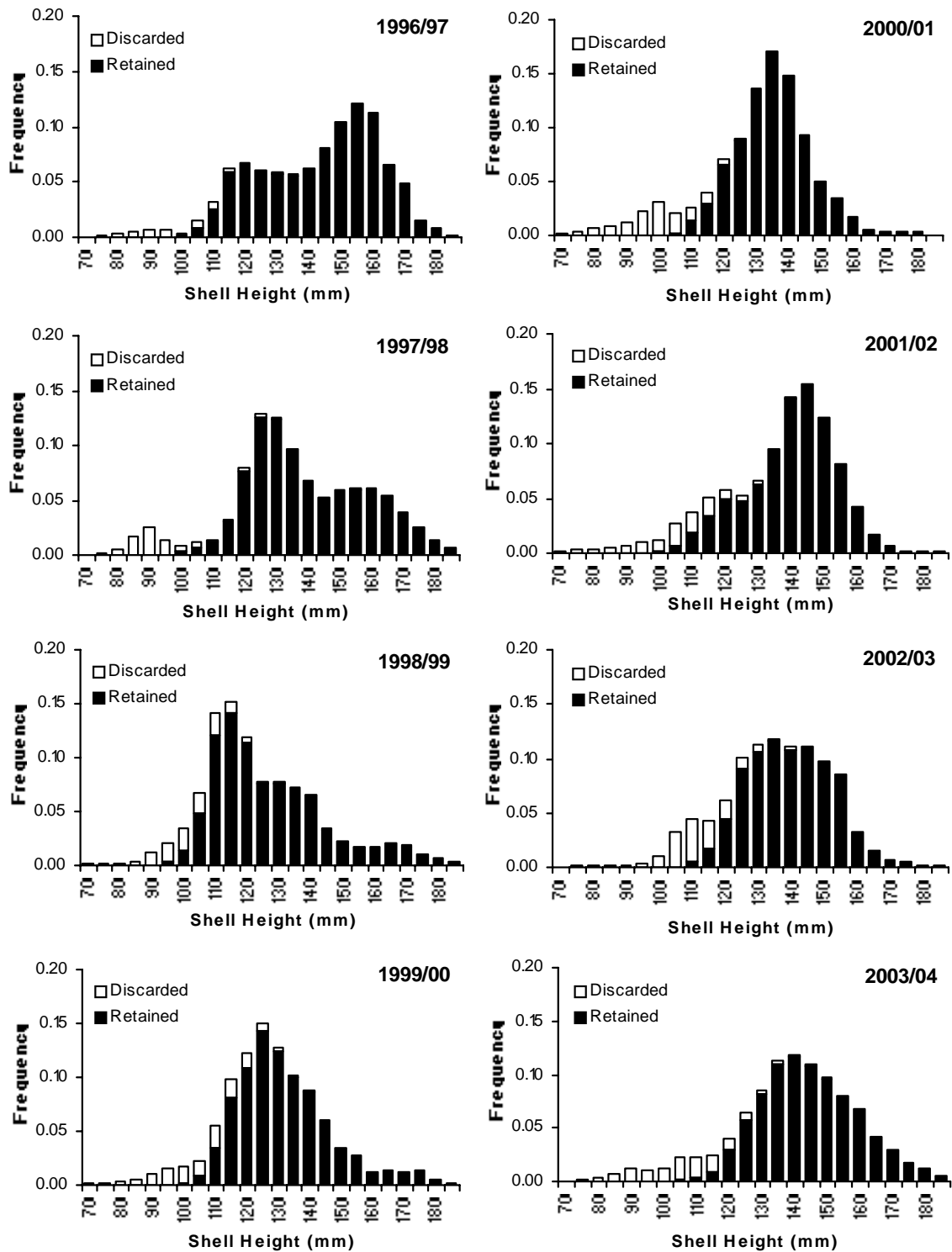


Figure 12. Shell height histograms from resampling Kodiak Northeast District scallop observer data, 1996/97–2003/04.

### **3.5 Kodiak Registration Area, Shelikof District**

Scallop harvests in the Shelikof District of the Kodiak Area have remained near 180,000 lbs each season since 1998/99 (Table 9; Figure 13). CPUE has remained remarkably steady during this period, ranging from 44–62 lbs meat/dredge hr. The majority of the catch comes from a traditional scalloping area along the northwest shore of the strait south of Cape Douglas (Figures 1–2).

Scallop SH histograms (Figure 14) indicate continuing recruitment to the harvestable population in this area. Recent fishery performance and the SH data together suggest that the fishery is sustainable at the current harvest level. Portions of the district known to contain scallops are closed to dredging to protect red king and Tanner crab habitat and populations (Figure 3).

Table 9. Kodiak Shelikof District scallop fishery summary statistics.

Season	Number vessels	GHR (lbs meat)	Dredge hours	Catch <sup>a</sup> (lbs meat)	CPUE (lbs per dredge hr)
1993/94	5	NA	2,491	105,017	42
1994/95	11	NA	8,662	314,051	36
1995/96		closed			
1996/97	3 <sup>b</sup>	NA	3,491	219,305	63
1997/98	4	NA	5,492	258,346	47
1998/99	8	NA	4,081	179,870	44
1999/00	6	180,000	4,304	187,963	44
2000/01	5	180,000	2,907	180,087	62
2001/02	4	180,000	3,398	177,112	52
2002/03	3	180,000	3,799	180,580	48
2003/04	2	180,000	3,258	180,011	55

<sup>a</sup>Confidential data released by vessel operators.

<sup>b</sup>One additional vessel fished but data are not available.

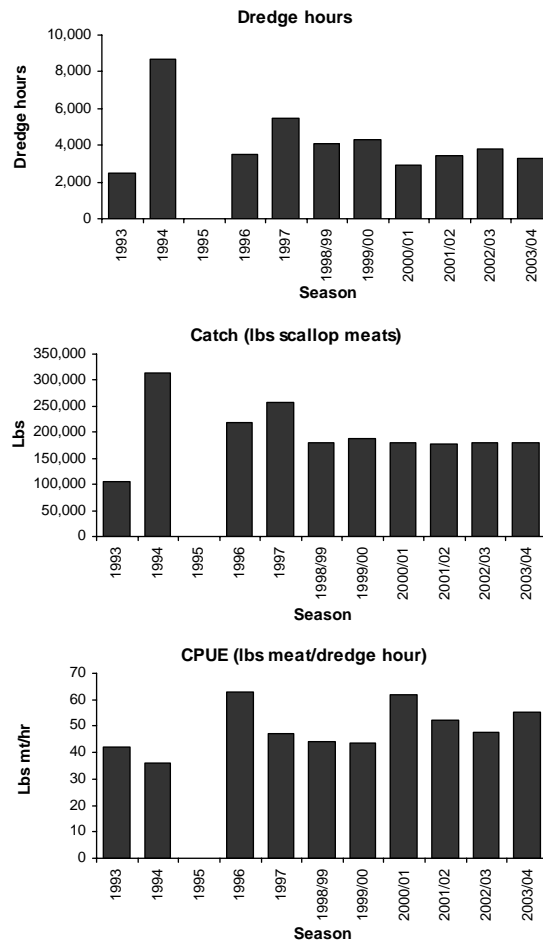


Figure 13. Barplots of Kodiak Shelikof District scallop fishery statistics.

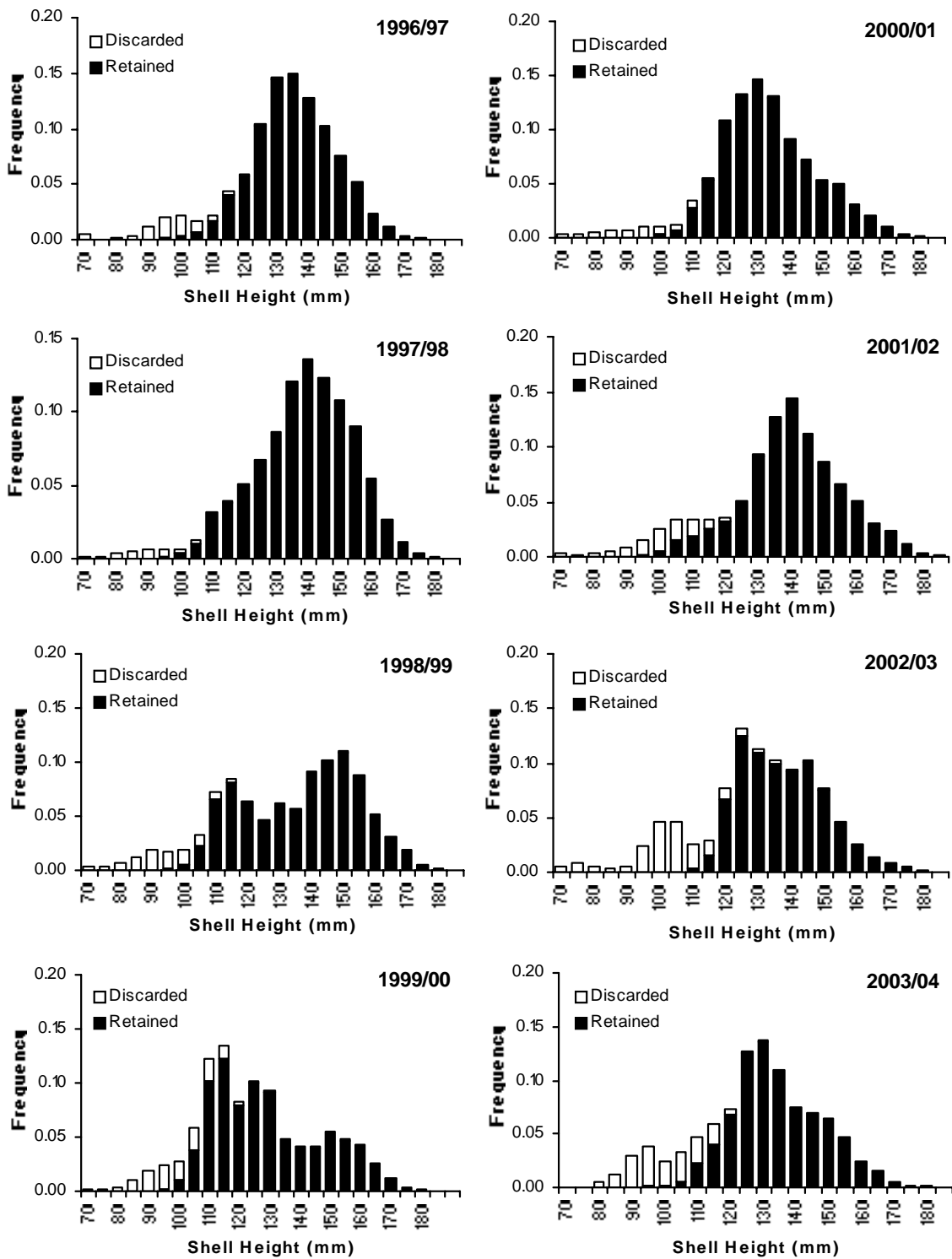


Figure 14. Shell height histograms from resampling Kodiak Shelikof District scallop observer data, 1996/97–2003/04.

### 3.6 Kodiak Registration Area, Semidi District

The most productive scallop fishing grounds of the Semidi District are located inside state waters that were closed to scallop dredging by the BOF in 2000 (Figure 3). Other parts of the district remain open to fishing, but no effort has occurred since the 1999/00 season (Table 10), as more profitable fishing opportunities are found by the fleet in other areas of the state.

Table 10. Kodiak Semidi District scallop fishery summary statistics.

Season	Number vessels	GHR (lbs)	Dredge hours <sup>a</sup>	Catch <sup>a</sup> (lbs)	CPUE (lbs per dredge)
1993/94	6 <sup>b</sup>	NA	1,819	55,487	32
1994/95	2	NA	272		
1995/96		closed			
1996/97	3	NA	1,017	37,810	37
1997/98	1	NA	349	6,315	18
1998/99	2	NA	106	1,720	16
1999/00	1	NA	45	930	21
2000/01		NA	0		
2001/02		NA	0		
2002/03		NA	0		
2003/04		NA	0		

<sup>a</sup>Confidential data released by vessel operators.

<sup>b</sup>Two additional vessels fished but data are not available.



### **3.7 Alaska Peninsula Registration Area**

The Alaska Peninsula Registration Area (Area M) scallop fishery has been closed for the 2000/01 season and 2002/03 seasons due to concerns about localized depletion. Effort was concentrated in 3 small beds near the Shumagin Islands, and exploratory tows in other parts of the area produced small catches; fishery managers concluded that harvest rates from the mid 1990s (Table 11; Figure 15) were not sustainable. For the 2—3/04 season, scallop grounds between 160° W. longitude and 161° W. longitude were closed to scallop fishing. However, the remainder of the area was open with a small exploratory GHR.

Alaska Peninsula SH histograms (Figure 16) suggest that most larger scallops were removed from the population prior to the 2000/01 season. Scallops are also found offshore and in state waters of the Alaska Peninsula that have been closed to scallop dredging for over 30 years to protect crab habitat and populations.

Table 11. Alaska Peninsula Area scallop fishery summary statistics.

Season	Number vessels	GHR (lbs meat)	Dredge hours <sup>a</sup>	Catch <sup>a</sup> (lbs meat)	CPUE (lbs per dredge hr)
1993/94	8	NA	1,847	112,152	61
1994/95	7	NA	1,664	65,282	39
1995/96		closed			
1996/97	2	200,000	327	12,560	38
1997/98	4	200,000	1,752	51,616	29
1998/99	4	200,000	1,612	63,290	39
1999/00	5	200,000	2,025	75,535	37
2000/01	3	33,000	320	7,660	24
2001/02		closed			
2002/03		closed			
2003/04		10,000			

<sup>a</sup>Confidential data released by vessel operators.

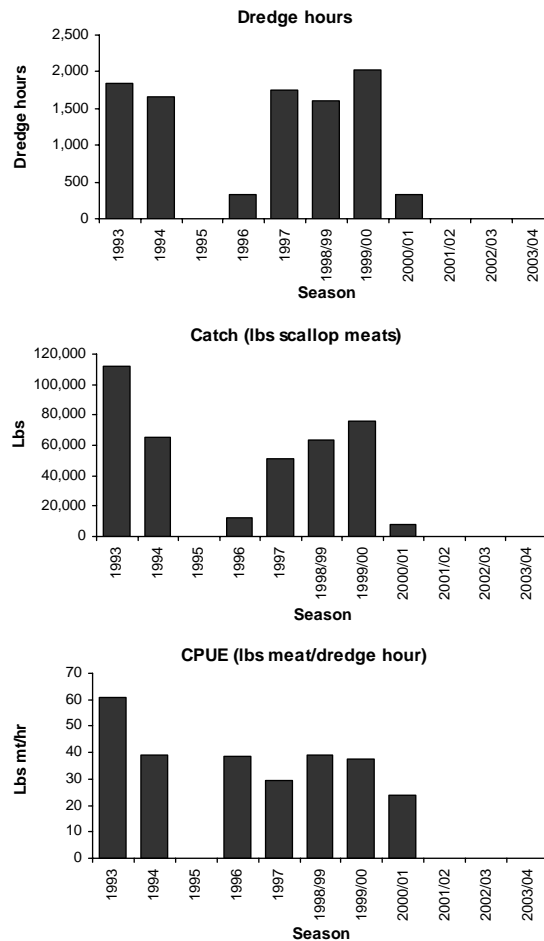


Figure 15. Barplots of Alaska Peninsula scallop fishery statistics.

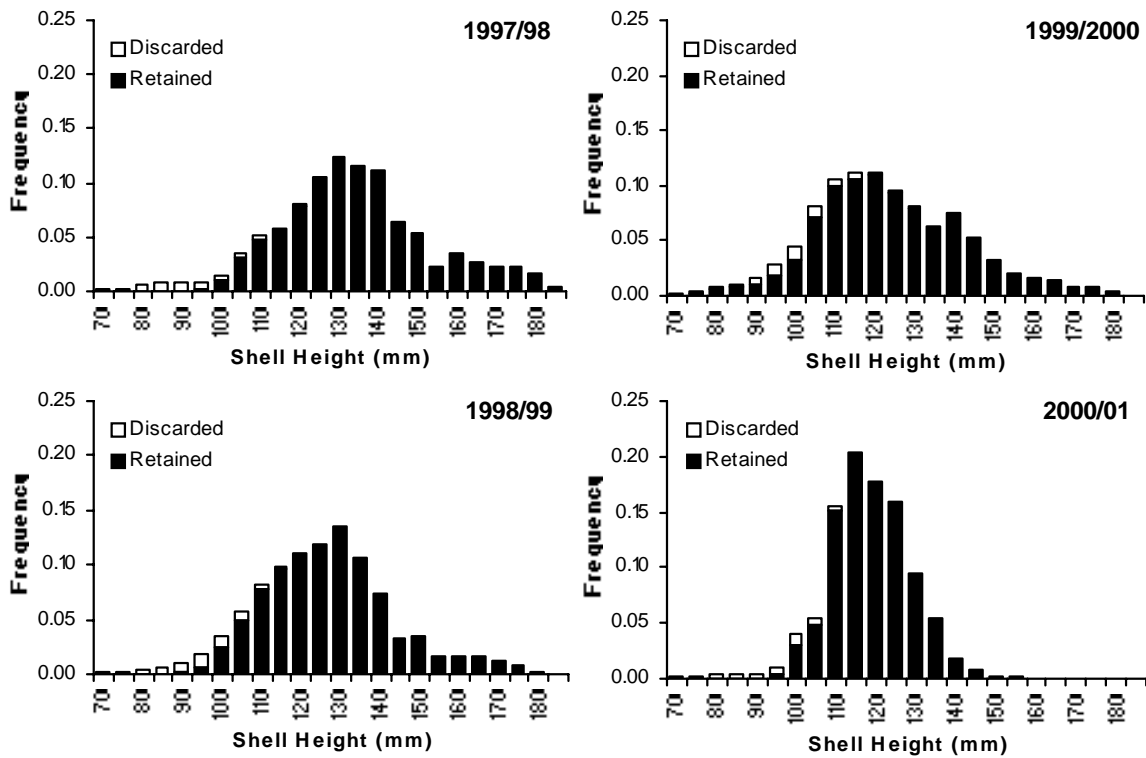


Figure 16. Shell height histograms from resampling Area M scallop observer data, 1997/98–2000/01.

### **3.8 Bering Sea Registration Area**

Scallop fishing in the Bering Sea (Area Q) occurs north of Unimak Island (Figures 1 and 2), where the stock appears to be spread over a wide area at low densities. Two vessels participated in the 2003/04 fishery and harvested 42,590 lbs of shucked scallop meats (Table 12; Figure 17) before the season was closed due to ADF&G's concerns about declining catch rates. Large catches taken during the early 1990s do not appear to be sustainable.

Bering Sea SH histograms (Figure 18) indicate that the last significant recruitment event occurred between the 1998/99 and 2000/01 seasons. ADF&G would like to see signs of renewed recruitment to the population in the fishery data before allowing harvests to return to levels taken between 1997/98 and 2002/03 (Table 12).

Large portions of the eastern Bering Sea shelf are closed to dredging to protect crab habitat (Figure 3).

Table 12. Bering Sea Area scallop fishery summary statistics.

Season	Number vessels	GHR (lbs meat)	Dredge hours <sup>a</sup>	Catch <sup>a</sup> (lbs meat)	CPUE (lbs per dredge hr)
1993/94	9	NA	5,764	284,414	49
1994/95	8	NA	11,113	505,439	45
1995/96		closed			
1996/97	1	600,000	2,313	150,295	65
1997/98	2	600,000	2,246	97,002	43
1998/99	4	400,000	2,319	96,795	42
1999/00	2	400,000	3,294	164,929	50
2000/01	3	200,000	3,355	205,520	61
2001/02	3	200,000	3,072	140,871	46
2002/03	2	105,000	2,038	92,240	45
2003/04	2	105,000	1,020	42,590	42

<sup>a</sup>Confidential data released by vessel operators.

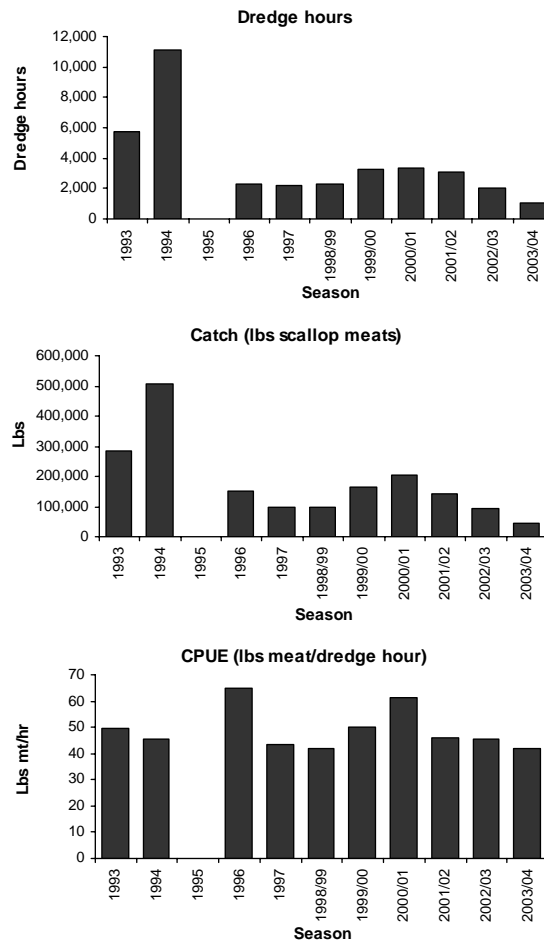


Figure 17. Barplots of Bering Sea scallop fishery statistics.

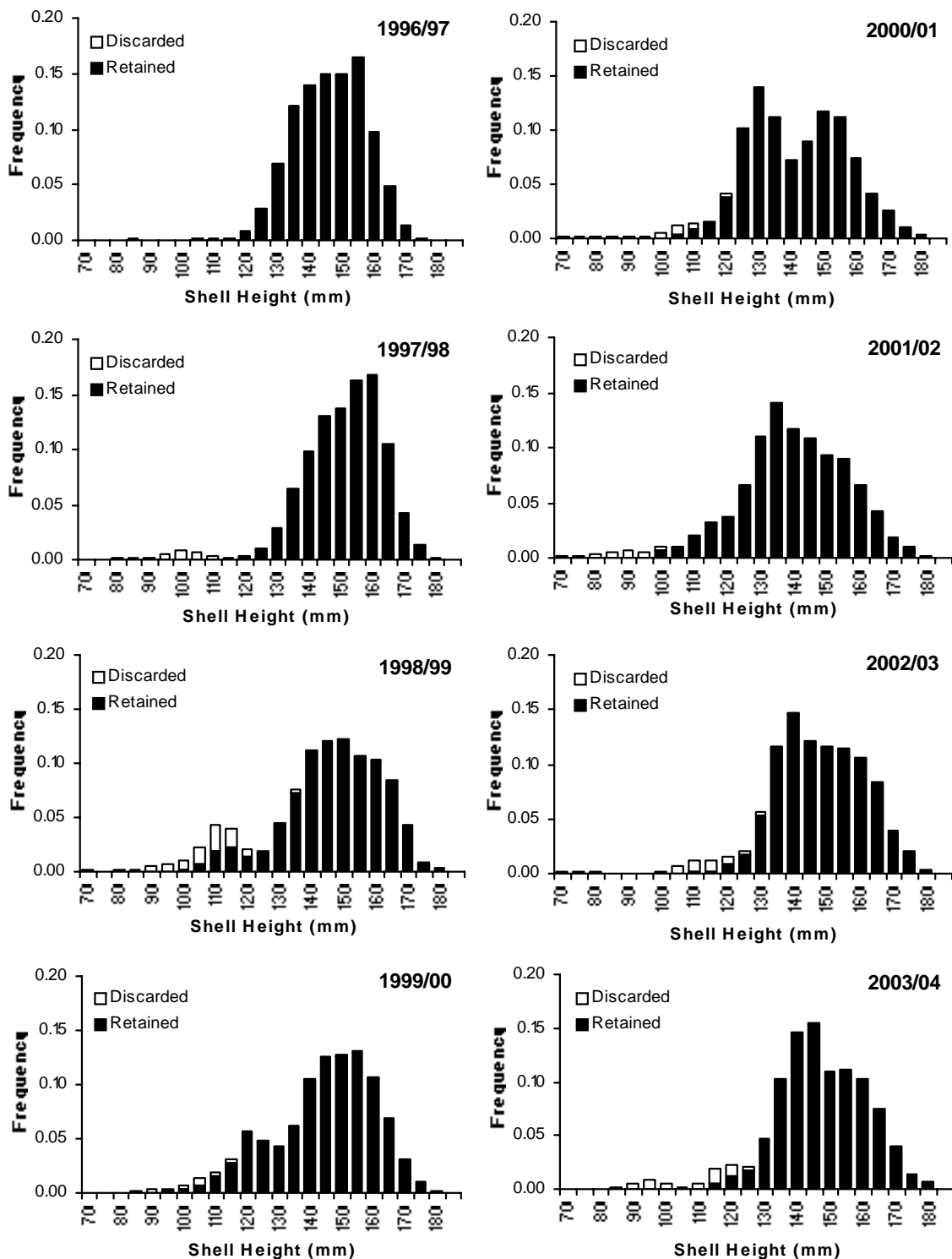


Figure 18. Shell height histograms from resampling Bering Sea scallop observer data, 1996/97–2003/04.

### 3.9 Dutch Harbor Registration Area

The Dutch Harbor Registration Area (Area O) was opened during 2002/03 for the first time since the 1999/00 season. One vessel fished briefly and harvested about 6,000 lbs of scallop meats (Table 13; Figure 19), with CPUE that was low but comparable to that obtained in earlier seasons. Managers decided in 2003 to close the area for at least 3 additional years, primarily because effort was focused in a few small beds. Inshore areas that historically supported the fishery were closed to dredging in 1986 to protect crab habitat and juvenile crabs (Figure 3).

Table 13. Dutch Harbor Area scallop fishery summary statistics.

Season	Number vessels	GHR (lbs meat)	Dredge hours <sup>a</sup>	Catch <sup>a</sup> (lbs meat)	CPUE (lbs per dredge hr)
1993/94	2	170,000	838	confidenti	46
1994/95	3	170,000	81	1,931	24
1995/96	1	170,000	1,047	26,950	26
1996/97		170,000	0		
1997/98	1	170,000	171	5,790	34
1998/99	4	110,000	1,025	46,432	45
1999/00	1	110,000	273	6,465	24
2000/01		closed			
2001/02		closed			
2002/03	1	10,000	184	6,000	33
2003/04		closed			

<sup>a</sup>Confidential data released by vessel operators.

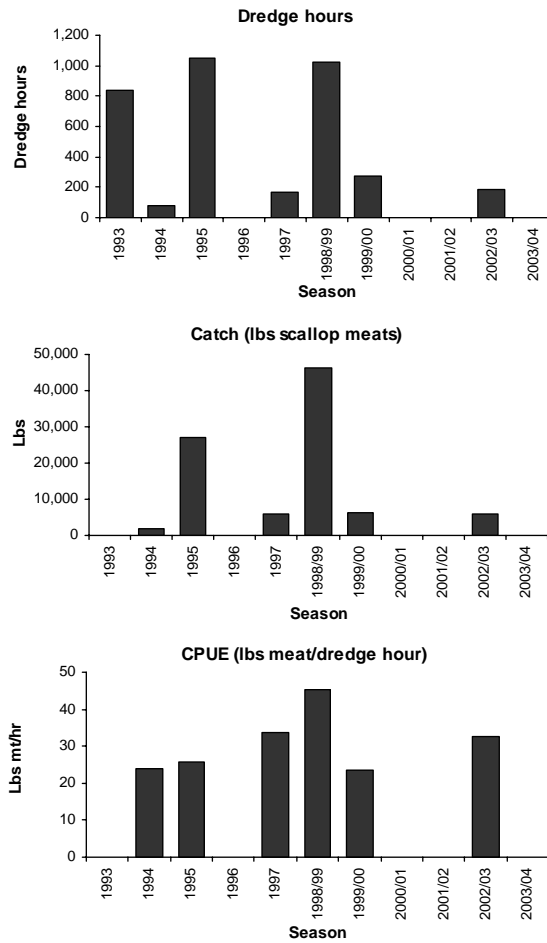


Figure 19. Barplots of Dutch Harbor Area scallop fishery statistics.

### 3.10 Adak Area

Scallops were last harvested from the Adak Registration Area in 1995. Effort was limited and little is known about the scallop population in the area. The continental shelf adjacent to the Aleutian Islands is narrow and hence provides limited habitat for weathervane scallops.



## 4.0 Overfishing Definition

Overfishing is a level of fishing mortality that jeopardizes the long-term capacity of a stock or stock complex to produce MSY on a continuing basis. MSY is defined as the largest long-term average catch that can be taken from a stock under prevailing ecological and environmental conditions. Amendment 6 to the scallop FMP established MSY for weathervane scallops at 1.24 million lbs of shucked meats based on the average catch from 1990-1997 excluding 1995. Optimum Yield (OY) was defined as 0-1.24 million lbs, and the overfishing control rule was defined as a fishing rate in excess of the natural mortality rate, which has been estimated as  $F_{\text{overfishing}} = M = 0.13$  (12% per year) statewide. At this time, abundance is estimated for only two of the nine registration areas and a determination of MSST cannot be made. The fishery is managed conservatively with harvest levels well below MSY. Figure 20 shows the statewide scallop catch and the MSY levels both prior to amendment 6 and following inception of the new MSY level in 1996. Since 1996, catch has averaged between 39 to 66% of MSY (Figure 20).

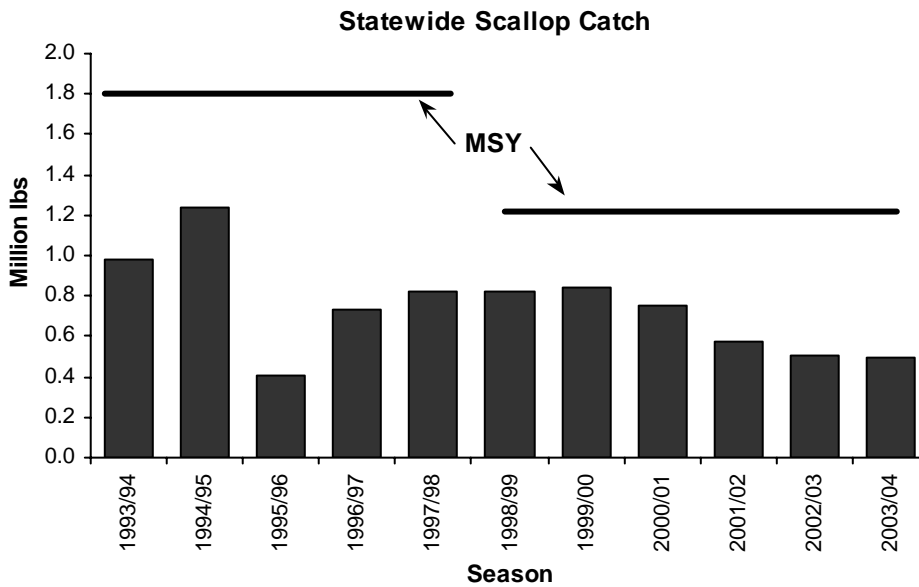


Figure 20. Statewide scallop harvest (pounds shucked scallop meats) and MSY levels from the FMP.

No control rules for other Alaskan scallop species have been developed as no commercial harvests occur for these species.

OY and MSY are established for the statewide stock despite the lack of a statewide biomass estimate. This appears to represent a disconnect between discrete scallop beds and fishing areas and the statewide overfishing definition. Amendment 6 to the FMP specified these definitions statewide based upon average landings, given a lack of available information at that time for either a statewide biomass estimate upon which to base MSY or area-specific biomass estimates upon which to base area-specific overfishing definitions.

These data limitations still hold for scallops stocks in Alaska. A statewide biomass estimate is not possible at this time given limitations in abundance information for many regions. Similarly, specification of area-specific overfishing definitions is also not feasible at this time given the absence of annual surveys in all regions as well as the need for improved abundance estimates in areas with available survey information.

## 5.0 Habitat

Major scallop fishing locations in Alaska coastal waters are shown in Figure 1. Many areas of Alaska's coast are closed to scallop dredging to protect habitats important to other species (Figure 3).

Weathervane scallops are found in patchy distributions along the continental shelf from Southeast Alaska to the Bering Sea and Aleutian Islands at depths of 40–250 m. Commercial fishing effort is concentrated in 75–120 m depths. Approximately 128 square nautical miles were dredged during the 2001/02 season (Barnhart and Rosenkranz 2003). Bottom substrate types inhabited by weathervane scallops are variable throughout the state and include mud, clay, silt, sand, and pebble. Weathervane scallops are associated with other benthic species such as flatfishes, and Tanner and king crabs.

Scallops are typically found in elongated beds oriented along the coast in the same direction as prevailing currents. A combination of large-scale (overall spawning population size and oceanographic conditions) and small-scale (site suitability for settlement) processes influence recruitment of scallops to these beds. Spawning occurs annually between May and early July. Spermatozoa and eggs are released directly into the water where fertilization occurs. Fertilized eggs settle to the bottom where they hatch into larvae within several days then rise in the water column. Larvae drift with prevailing currents in the upper water column for about a month while undergoing metamorphosis. They then settle to the bottom as juveniles and may attach to the substrate with byssal threads.

Essential Fish Habitat (EFH) descriptions for weathervane scallops are being revised under Amendment 9 to the Scallop FMP. There is no available life history information for other scallop species (pink, spiny and rock scallops). More information on EFH designations may be found at: <http://www.fakr.noaa.gov/habitat/efh.htm>

## 6.0 Bycatch

The scallop fishery has 100% observer coverage that provides excellent bycatch data. Bycatch in the scallop fishery includes prohibited species, other commercially important species of fish and invertebrates, miscellaneous non-commercial species, and natural and man-made debris. Prohibited species include king crab (*Paralithodes camtschaticus*), Tanner crab (*Chionoecetes bairdi*), snow crab (*C. opilio*), and Pacific Halibut (*Hippoglossus stenolepis*). Although a variety of marine vertebrates, invertebrates, and debris are caught incidentally in the scallop dredges, weathervane scallops predominate catches. Since 1996, the five most frequently caught species or items, by percent weight, from haul composition sampling are weathervane scallops 77%, numerous species of starfish 5%, natural debris (kelp, wood, etc.) 5%, empty bivalve shells 4%, and several species of skates 2%. Gorgonian (hard) corals are infrequently encountered during observer sampling of scallop dredges. Since 1996, corals have been observed in only 11 of the 15,836 tows sampled for catch composition and bycatch. Detailed catch composition data from observer sampling are available in annual reports produced by ADF&G (e.g., Barnhart and Rosenkranz 2003).

## 7.0 Recent Regulatory Actions

## **7.1 Update on Amendment 10 to the Federal Scallop FMP**

In October 2004, the Council took final action on the EA/RIR/IRFA for amendment 10 to the FMP. This amendment package evaluated alternatives for modifying the existing gear restriction endorsement on 2 of the 9 licenses under the Federal LLP. The Council selected alternative 3 as its preferred alternative. This alternative modified the gear restriction endorsement on those two licenses such that the vessels with the current endorsement would be allowed to utilize two 10ft dredges (or two dredges with a combined width of no more than 20 ft) when fishing in Federal waters outside of Cook Inlet. This amendment package has been forwarded to the Secretary of Commerce for approval. Regulations are expected to be promulgated in the summer of 2005. More information on this amendment can be obtained on the Council website at: <http://www.fakr.noaa.gov/npfmc/analyses/analyses.htm>

## **7.2 Update on State Vessel Based Limited Entry Program**

In 1997, the Alaska legislature approved legislation (AS 16.43.906) establishing a scallop vessel moratorium in state waters (0-3 miles). In 2001, the legislature authorized a 3-year extension of the moratorium, due to expire July 1, 2004. During the 2002 legislative session, passage of HB206 resulted in changes to the state's limited entry statutes. These changes authorized use of a vessel-based limited entry program in the weathervane scallop fishery. However, vessel entry permits issued for the statewide weathervane scallop fishery will expire on December 31, 2008 unless statutory authority is extended. Prior to the July 1, 2004 expiration of the state vessel moratorium, a vessel permit limited entry system for the statewide weathervane scallop fishery was in place. Eight vessel owners received permits to fish for weathervane scallops in state waters.

## **8.0 Economic Overview of the Scallop Fishery**

An overview of historic Alaska weathervane scallop harvest and wholesale revenue is presented in Table 14. This data is reprinted from Kruse et al. (in press). Vessel participation and numbers of landings in this fishery have varied considerably over time. Participation increased rapidly from an historic low of 2 vessels in 1967 to 19 in both 1968 and 1969. Similarly, only 6 landings occurred in 1967 but by 1969, 157 landings were made and that year is the historical peak in participation, landings, and catch and among the years with highest first wholesale gross revenue.

Following 1969, participation, landing, and catch trended downward through 1976. In 1977 and 1978 the fishery was open but fishermen opted not to fish. In 1980 there were 8 participants making 56 landings totaling more than 600,000 pounds of scallop meats. In the following years, participation, landings, and catch trended upwards until 1983 before cycling downward. There followed an upward trend in landings and catch through the mid 1990s. Since the mid 1990s, participation, landings, and catch have stabilized somewhat with catch consistently between 500,000 lbs and 850,000 pounds each year. Vessel participation has been limited in recent years by the formation of the voluntary cooperative in May 2000 and the implementation of the LLP in 2001. The Federal LLP limits the participation to 9 permit holders. Since 2000 no more than 8 vessels have participated and in recent years it has been even fewer.

Table 14 also provides historical statewide average price per pound of landed scallop meats as well as a consumer price index based inflation adjusted price. Total gross revenue is then calculated using landed pounds of meats multiplied by the adjusted price. Adjusted price converts the landed prices by year to year 2002/03 values so that comparisons can be made in present day dollar values, after accounting for inflation. It is important to note that landed scallop meats have been processed (shucked) and frozen at sea. Prior to 1996 almost all scallop meats were paced in muslin bags and iced (not frozen) at sea. Thus, although landed price

is often referred to as an ex-vessel price, it is actually a first wholesale price in that the landed product is a primary processed product. Thus, gross revenue is identified as first wholesale value here.

Adjusted price generally trended upwards during the late 1960s and through the 1970s. Following the three years of closure, prices rose dramatically to nearly \$7.5 per pound, possibly in response to shortage caused by the closures. Historic prices peaked in 1983 at \$8.56 per pound before trending downward through the mid 1990s, upward during the late 1990s and then back downward from 1999 through 2002-03 when adjusted prices averaged \$5.25 per pound. This trend may be directly related to U.S. east coast scallop stock conditions and related market prices and the dependence of market prices in the Alaska scallop fishery on east coast markets is a topic for further research.

First wholesale revenue in this fishery has varied considerably over the years as both price and landings have varied. The peak value in the fishery occurred in 1992 when about \$8.8 million was earned. Since that time, total first wholesale revenue in the fishery has trended downward along with landings, catch, and prices. In 2002-03, the fishery yielded about \$2.7 million in total first wholesale revenue.

**Table 14: Historic Statewide Commercial Weathervane Scallop Revenue Statistics, 1967-2002/03**

Year	Number of Vessels	Number of Landings <sup>a</sup>	Catch (lbs meats) <sup>b</sup>	Average Price/lb.	Inflation Factor	Adjusted Price	1st Wholesale Value
1967	2	6	778 <sup>c</sup>	\$0.70	0.219	\$3.20	\$2,487
1968	19	125	1,677,268	\$0.85	0.228	\$3.73	\$6,252,973
1969	19	157	1,849,947	\$0.85	0.238	\$3.57	\$6,606,954
1970	7	137	1,440,338	\$1.00	0.249	\$4.02	\$5,784,490
1971	5	60	931,151	\$1.05	0.260	\$4.04	\$3,760,418
1972	5	65	1,167,034	\$1.15	0.268	\$4.29	\$5,007,795
1973	5	45	1,109,405	\$1.20	0.285	\$4.21	\$4,671,179
1974	3	29	504,438	\$1.30	0.313	\$4.15	\$2,095,110
1975	4	56	435,672	\$1.40	0.339	\$4.13	\$1,799,235
1976	7	21	264,788	\$1.59	0.359	\$4.43	\$1,172,738
1977, 1978		<b>No Effort</b>					
1979	1	4	24,826	NA	NA	NA	NA
1980	8	56	616,717 <sup>c</sup>	\$3.60	0.484	\$7.44	\$4,587,151
1981	18	101	924,441	\$4.00	0.529	\$7.56	\$6,990,102
1982	13	120	913,996	\$3.25	0.561	\$5.79	\$5,294,986
1983	5	30	192,310	\$5.00	0.584	\$8.56	\$1,646,490
1984	6	52	383,512	\$4.00	0.607	\$6.59	\$2,527,262
1985	7	47	615,564	\$4.00	0.627	\$6.38	\$3,927,043
1986	8	74	667,258	\$4.25	0.639	\$6.65	\$4,437,944
1987	4	54	599,947 <sup>d</sup>	\$3.45	0.661	\$5.22	\$3,131,342
1988	4	47	341,070	\$3.68	0.685	\$5.37	\$1,832,318
1989	7	55	534,763	\$3.87	0.714	\$5.42	\$2,898,505
1990	9	144	1,481,136	\$3.43	0.750	\$4.57	\$6,773,729
1991	6	136	1,136,649	\$3.82	0.777	\$4.92	\$5,588,159
1992	8	136	1,785,673	\$3.96	0.796	\$4.97	\$8,883,499
1993 <sup>e</sup>	7	51	568,077	\$5.15	0.816	\$6.31	\$3,585,290
1993/94	15	111	984,583	\$5.15	0.816	\$6.31	\$6,213,974
1994/95	15	104	1,240,775	\$5.79	0.833	\$6.95	\$8,624,354
1995/96	10	29	410,743 <sup>d</sup>	\$6.05	0.853	\$7.09	\$2,910,834
1996/97	9	30	732,424	\$6.30	0.876	\$7.19	\$5,267,433
1997/98	9	31	818,913	\$6.50	0.895	\$7.26	\$5,947,413
1998/99	8	35	822,096	\$6.40	0.908	\$7.05	\$5,794,509
1999/00	10	22	837,971	\$6.25	0.927	\$6.74	\$5,649,751
2000/01	8	20	750,617	\$5.50	0.958	\$5.74	\$4,309,388
2001/02	6	26	572,838	\$5.25	0.984	\$5.34	\$3,056,300
2002/03	6	28	509,455	\$5.25	1.000	\$5.25	\$2,674,639

Notes: a: Prior to and including 1995, number of landings equals number of fish tickets. After 1995, the number of landings equals number of deliveries (off-loads). A delivery typically includes multiple tickets, normally one per week. b: Pounds of shucked scallop meats. c: Unshucked scallop deliveries were converted to shucked meats using a 10% conversion factor. d: Harvest includes those taken by a single vessel outside the jurisdiction of the State of Alaska in excess of the allowable limit. e: January 1 through June 30

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