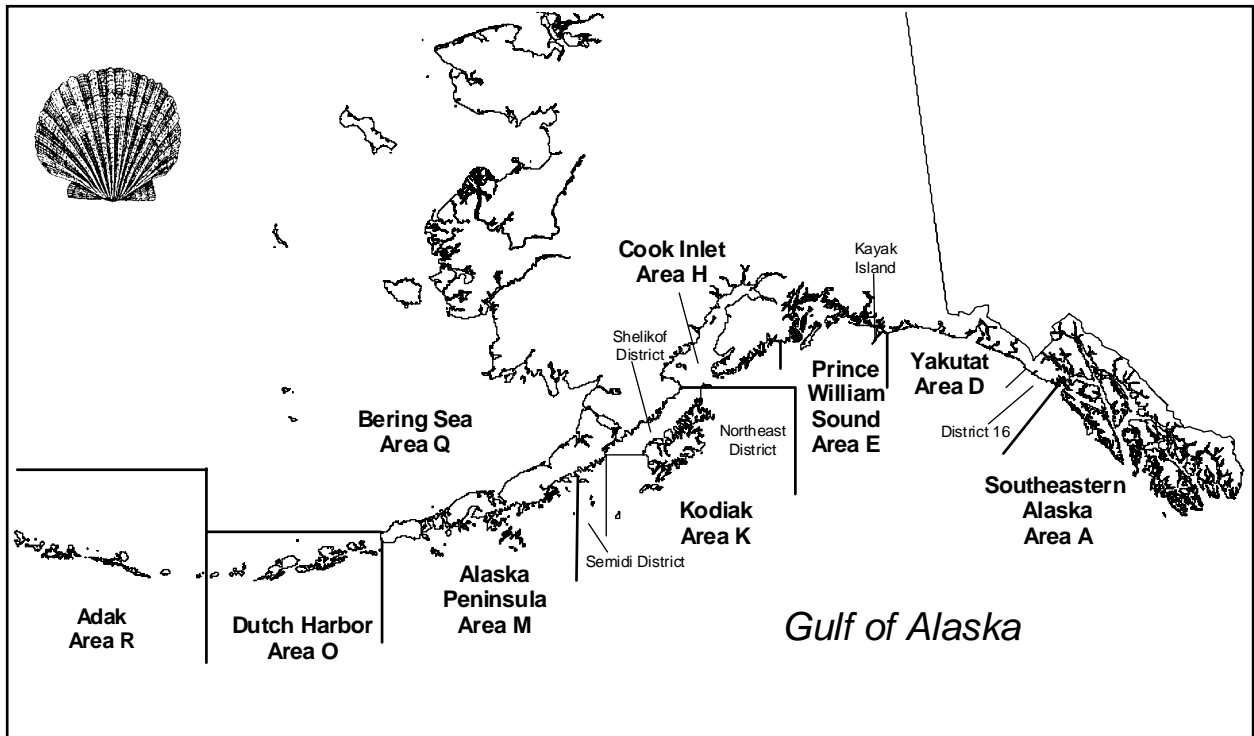


STOCK ASSESSMENT AND FISHERY EVALUATION REPORT
FOR THE WEATHERVANE SCALLOP
FISHERY OFF ALASKA



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 February 23-24th, 2006 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, Jie Zheng 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 2004/2005 fishing year. New information which is included in this report since the previous report (NPFMC 2005) includes the following:

- 1) Updated catch and effort data through 2004/2005 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) New section (including updated maps) on Trawl Survey Information;
- 5) Total catch statewide compared with MSY;
- 6) Updated information on Council and BOF actions with respect to the scallop fishery;
- 7) Overview paper of economic conditions in the scallop fishery;
- 8) Selected scallop management and research papers from 2004-2006.

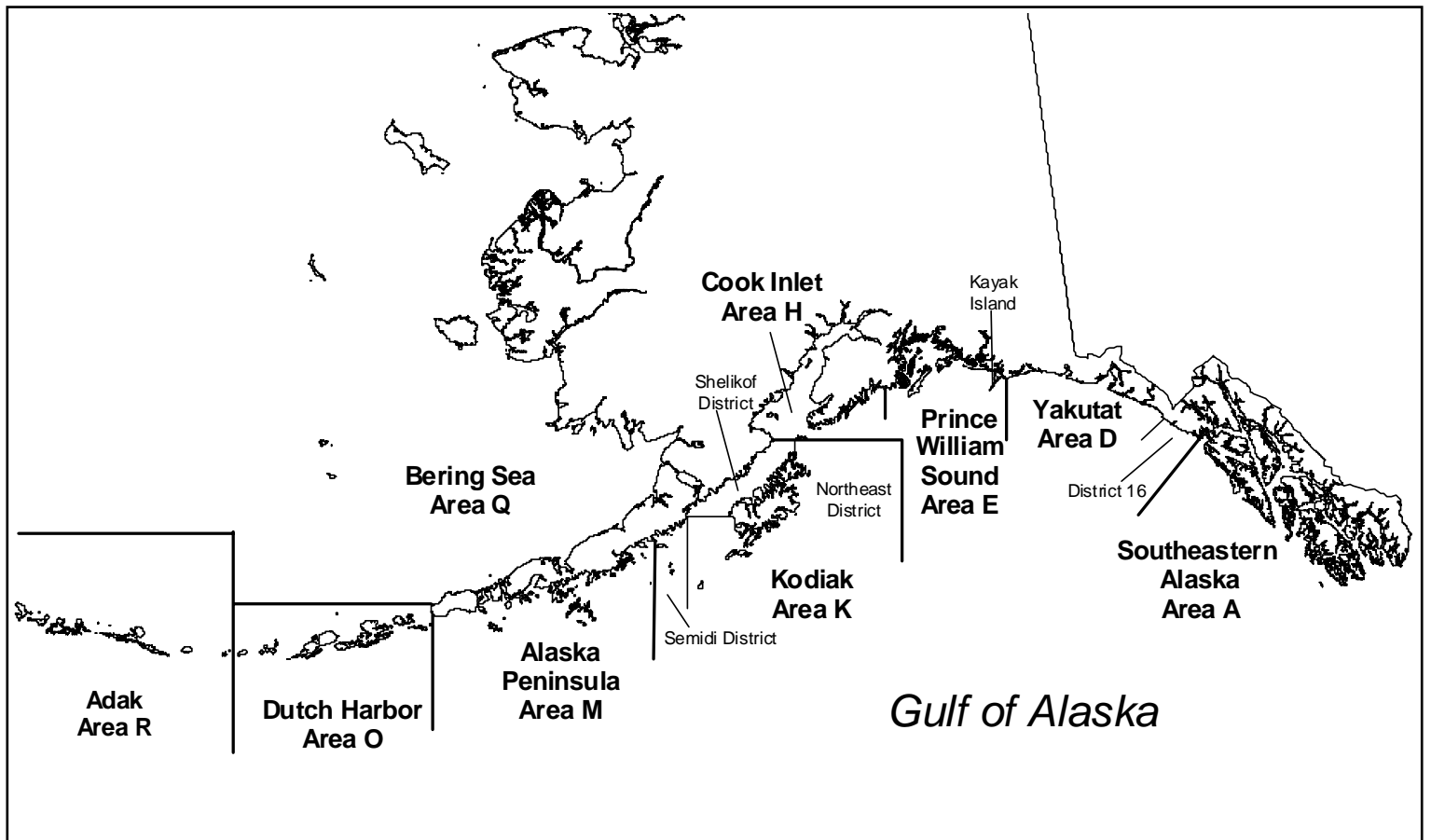


Figure 1. Alaska weathervane scallop fishing registration areas.

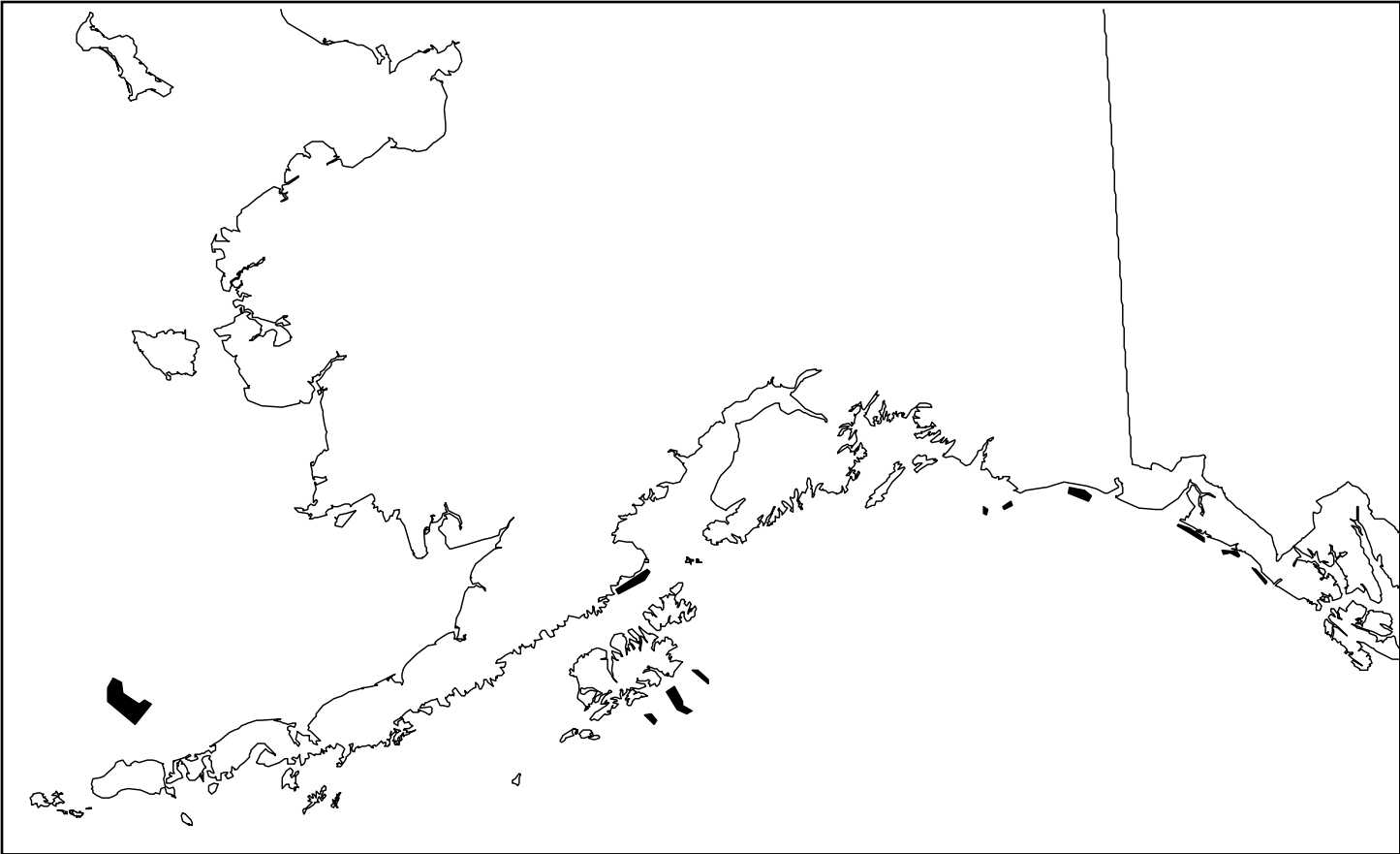


Figure 2. Scallop fishing locations (dark polygons) outside Cook Inlet during the 2003/04 season.

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 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 and regulations. 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 where a single 6-foot dredge was the legal gear type during the qualifying period were also limited to fishing a single 6-foot dredge in federal waters outside of Cook Inlet.

The Council modified this gear restriction in Amendment 10 to increase the dredge size to 2 dredges with a combined maximum dredge width of 20 feet. The Secretary approved Amendment 10 on June 22, 2005. NMFS published final regulations on July 11, 2005, which were effective August 10, 2005 (70 FR 39964). NMFS implemented Amendment 10 by reissuing the two LLP licenses with the larger gear restriction.

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 a minimum of 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 by state regulation 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) with a smaller amount going to foreign seafood markets (J. Barnhart, 2006, pers. comm.).

The Alaska Scallop Fishery Management Plan, 5 AAC 38.076 (g), allows the department to require a vessel, in a scallop fishery with a guideline harvest range established by regulation, to carry an onboard observer unless the department determines that carrying an observer in that fishery will not serve the purpose of the onboard observer program. The primary purposes of the onboard observer program are to collect biological and fishery-based data, monitor all bycatch including crab bycatch, and provide for regulatory enforcement of crab bycatch limits and other regulations (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, until July 1, 2004. During the 2002 legislative session, passage of CSHB206(RLS) am S resulted in significant changes to the state's limited entry statutes. The changes authorized use of a vessel-based limited entry program in the weathervane scallop and hair crab fisheries. However, the program has a sunset provision. The vessel entry permits issued for the statewide weathervane scallop fishery will expire on December 31, 2008 unless statutory authority is extended. Eight vessel owners received permits to fish for weathervane scallops in state waters.

Two vessels with multiple LLP permits as well as state vessel-based limited entry permits, harvest almost all the scallop quota in the statewide fishery outside of the Cook Inlet Registration Area. Three vessels 80 feet or less LOA, typically participate in the Cook Inlet Registration Area fishery. Occasionally, one or two of these vessels participate in the scallop fishery outside of the Cook Inlet Registration Area.

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. This mechanism only works if vessel operators submit their fishing data and the observer-collected crab bycatch data, to the independent consulting company in a timely fashion.

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 and to address potential gear conflicts.

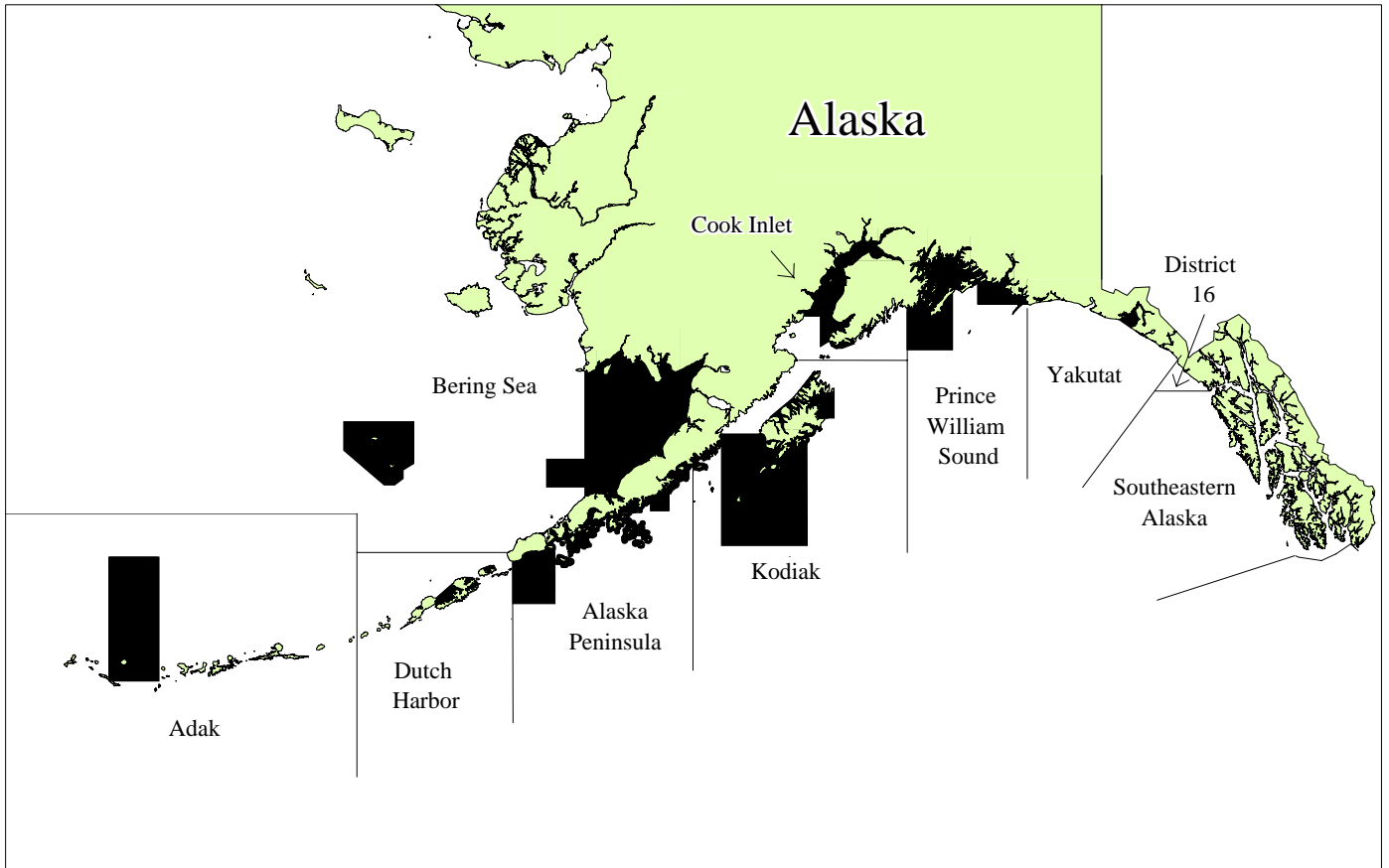


Figure 3. Alaska coastal areas closed to scallop fishing (shaded areas).

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. 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 and other parameters. 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. 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% ^a	NA
Cook Inlet (H)			
Kamishak District	0.5% ^a	60 crabs ^a	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 ^a	Three Tier Approach	Three Tier Approach
Dutch Harbor (O)	0.5% or 1.0%	0.5% or 1.0%	NA
Adak (R)	50 ^b	10,000 ^b	NA

NA= Not applicable

^aFixed CBL

^bBycatch 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 two areas have 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). Originally, NMFS granted two vessel owners licenses to fish statewide utilizing a single 6-foot dredge. In August, 2005, NMFS implemented Amendment 10 to the FMP, which modified the gear restriction to allow these two licenses to be used on vessels with up to two 10-foot dredges statewide. 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. The cooperative does not receive an exclusive allocation of the scallop harvest.

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 inseason catch data 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). However, 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 and districts 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 is 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 on-board scallop observer program. These data consist of scallop harvest and fishing effort, including catch per unit effort (CPUE), fishing locations, size structure of the catch, discarded scallop catch, retained scallop catch, scallop meat weight recovery, and crab bycatch. Spatially explicit observer data that cannot be displayed in the SAFE report due to State of Alaska confidentiality regulations are examined in detail by ADF&G staff each year when GHRs are set. The observer program also provides management personnel with inseason summary reports. A fishing area may be closed prior to attainment of the upper end of the GHR 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 and expect to survey the Yakutat area 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 2004/05 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 86,950 lbs from Area D and 24,430 lbs from District 16. Area D CPUE was 41 lbs meat/dredge hr during the most recent season and has ranged from 40 to 50 lbs meat/dredge hr over the past 5 years (Figure 4). District 16 CPUE for 2004/05 was 58 lbs meat/dredge hr, with a significant increase in harvest level compared to the previous two seasons (Figure 6).

Several factors have contributed to reduced effort in the Yakutat Area since 2000. Formation of a vessel cooperative lowered fishing capacity and has in general led to slower harvest rates and longer seasons. Yakutat scallops grow slower than scallops in other parts of the state (Jeff Barnhart, ADF&G, unpublished data). The majority of the catch is comprised of smaller-sized scallop meats which means that more labor is required to produce a pound of shucked scallop meats. When prices are low, fishing in Yakutat tends to be less profitable than in other statewide areas.

Yakutat Area D shell height (SH) distributions (Figures 5) indicate a relatively stable scallop population with regular but modest recruitment. In District 16 (Figure 7), strong recruitment observed during 1996 – 1998 has not recurred since.

Experimental scallop video research was conducted in the Yakutat Registration Area in 2002. A video stock assessment is planned for 2006.

Table 2. Yakutat Area D scallop fishery summary statistics.

Season	Number vessels	GHR ceiling (lbs meat)	Dredge hours ^a	Catch ^a (lbs meat)	CPUE (lbs meat per dredge hr)
1993	7 ^b	250,000	1,999	139,057	70
1994	10 ^b	250,000	4,130	246,862	60
1995	8 ^c	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
2004/05	2	200,000	2,132	86,950	41

^aConfidential data released by vessel operators.

^bOne additional vessel fished by waiver without an observer; data not included.

^cTwo additional vessels fished by waiver without observers; data not included.

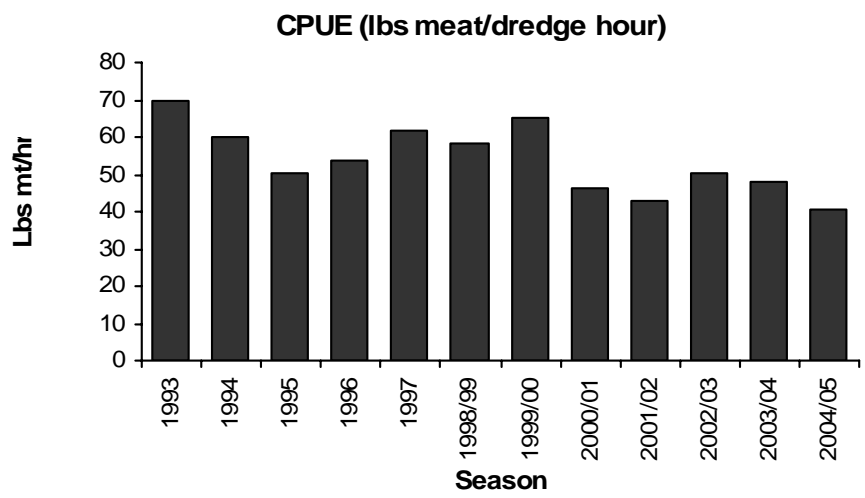
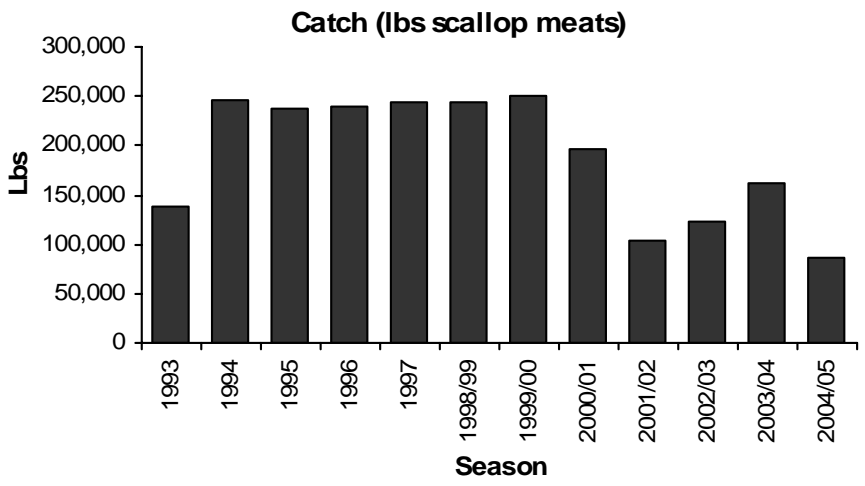
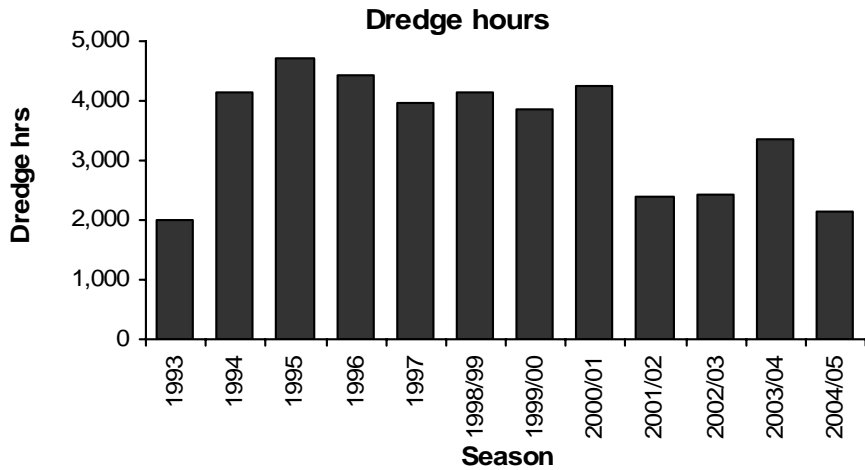


Figure 4. Barplots of Yakutat Area D scallop fishery statistics.

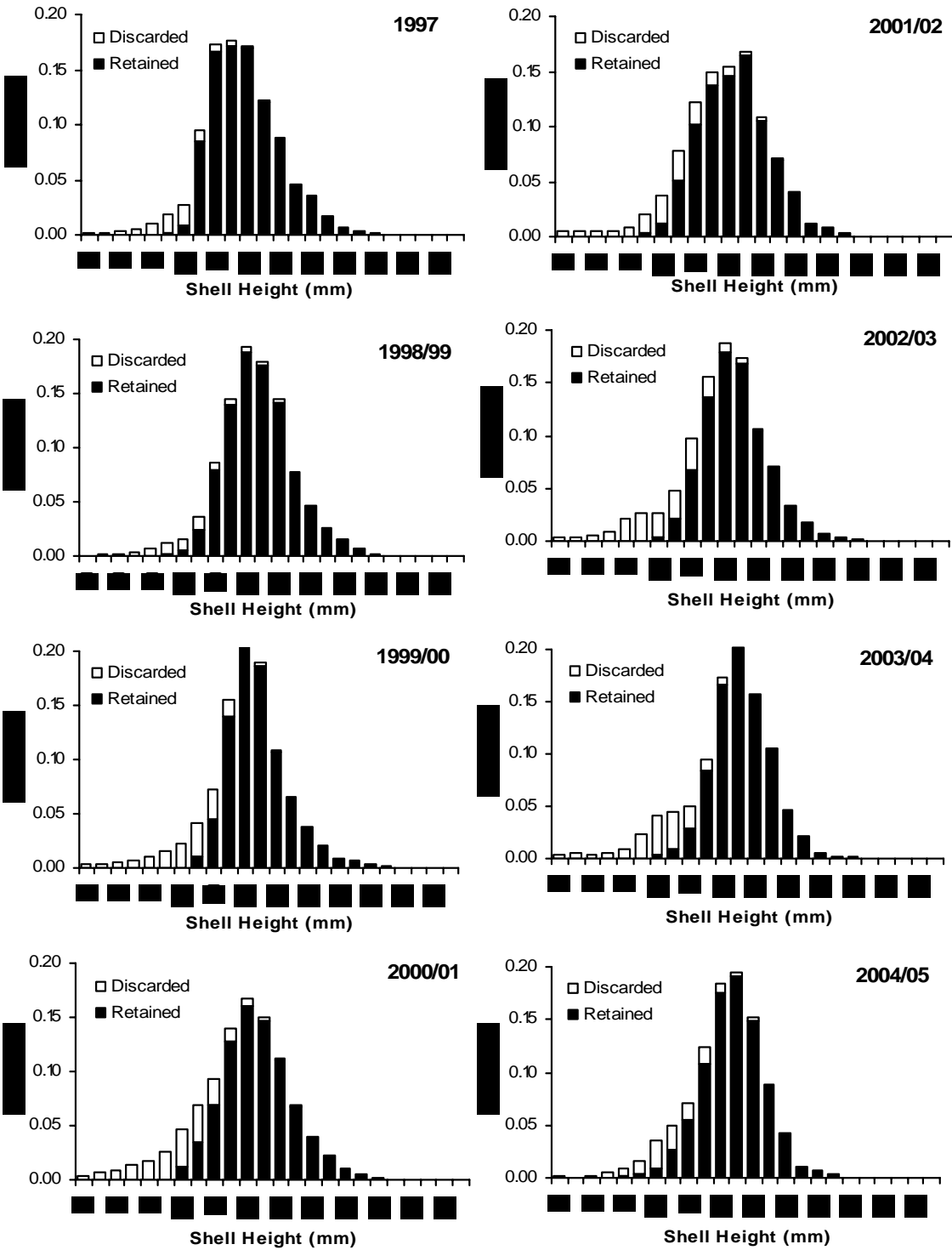


Figure 5. Shell height histograms from resampling Yakutat Area D observer data, 1997–2004/05 seasons.

Table 3. Yakutat District 16 scallop fishery summary statistics.

Season	Number vessels	GHR ceiling (lbs meat)	Dredge hours ^a	Catch ^a (lbs meat)	CPUE (lbs meat per dredge hr)
1993	1	35,000		confidential	
1994	7 ^b	35,000	408	22,226	54
1995	6 ^b	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
2004/05	2	35,000	419	24,430	58

^aConfidential data released by vessel operators.

^bOne additional vessel fished by waiver without an observer; data not included.

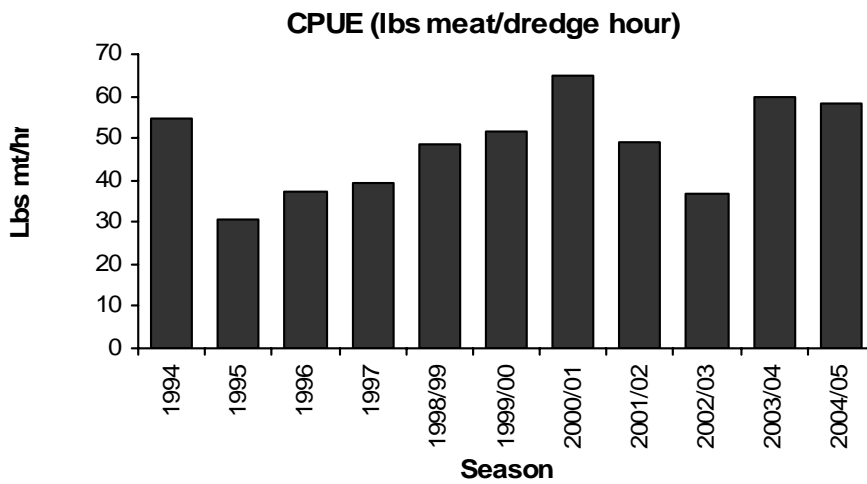
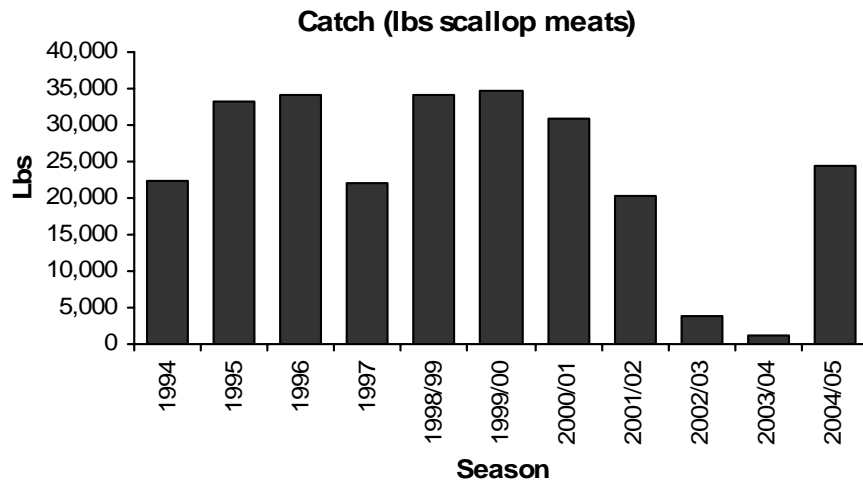
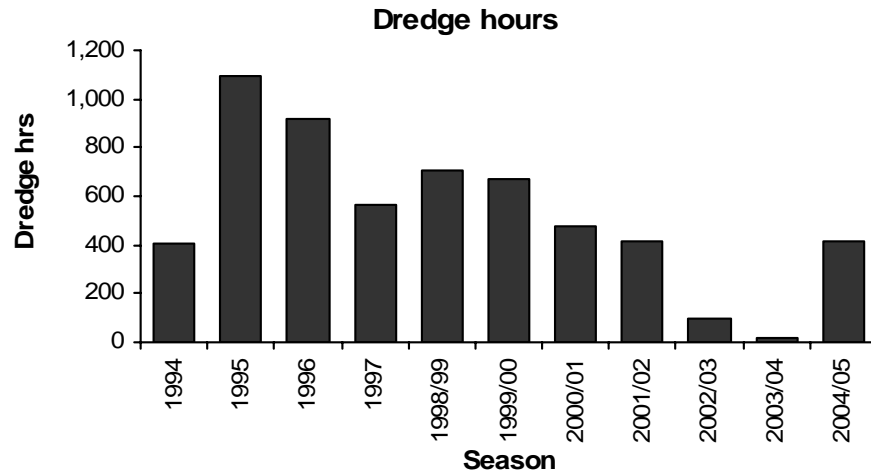


Figure 6. Barplots of Yakutat District 16 scallop fishery statistics.

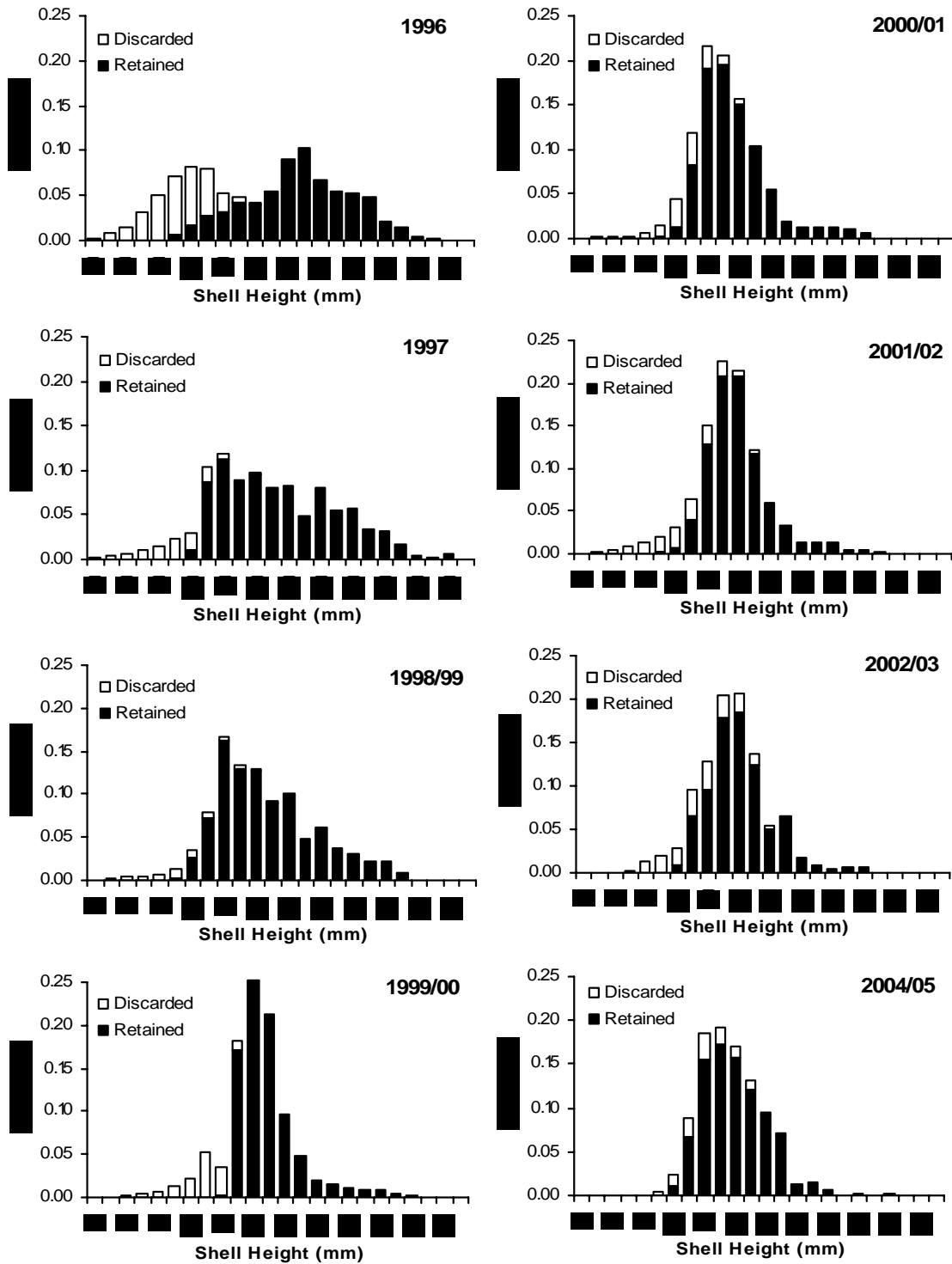


Figure 7. Shell height histograms from resampling Yakutat District 16 observer data, 1996–2004/05 seasons. Insufficient data were collected to produce a plot for the 2003/04 seasons.

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 concerns have been raised about dredge efficiency and performance (William Bechtol, ADF&G, personal communication). The 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 most recent 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. Another dredge survey of the area is planned for spring 2006. Area E GHRs are established by ADF&G Central Region staff based on survey and fishery data, conservative harvest rates, and analysis of trends in recruitment and abundance.

Two catcher processors participated in the 2004/05 Area E fishery, harvesting approximately 49,000 lbs of scallop meats (Table 5). Area E CPUE (Table 5; Figure 8) has declined over the past 3 seasons but remains the highest in the state.

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 in federal waters. Catch but no effort data are available for the illegal fishing incident (Table 5).

Plots of Prince William Sound SH distributions from the commercial fishery (Figure 9) show a pulse of small scallops that 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 ²)	Meat recovery (%)	Mean density (lbs meat per km ²)	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 ceiling (lbs meat)	Dredge hours ^a	Catch ^a (lbs meat)	CPUE (lbs meat per dredge hr)
1993	7	50,000	638	63,068	99
1994		Closed			
1995	3	50,000		108,000 ^b	
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
2004/05	2	50,000	614	49,320	80

^aConfidential data released by vessel operators.

^bPoundage includes illegal fishing by one vessel; effort data not available.

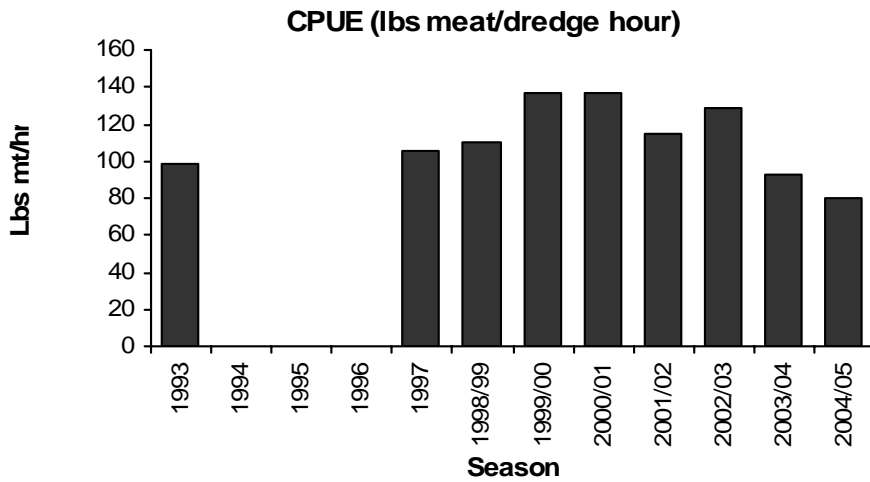
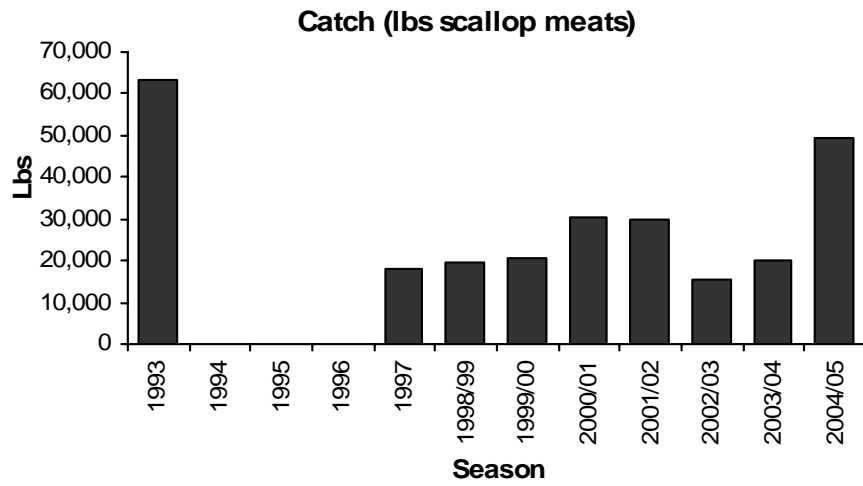
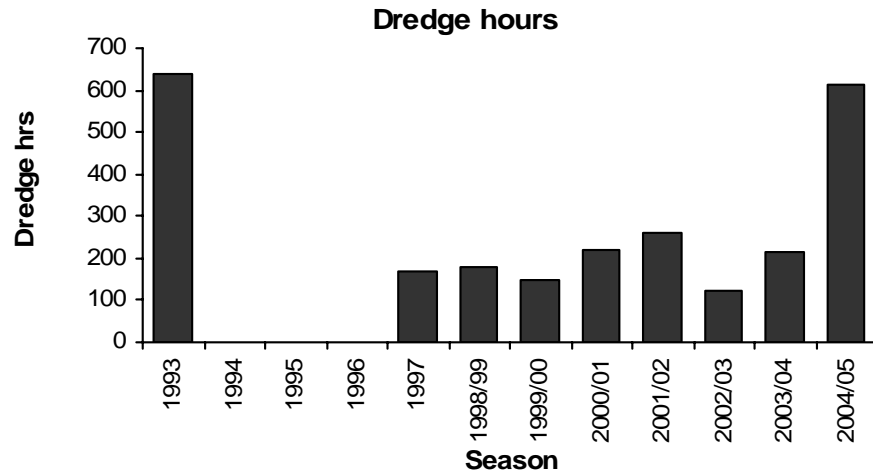


Figure 8. Barplots of Area E scallop fishery statistics.

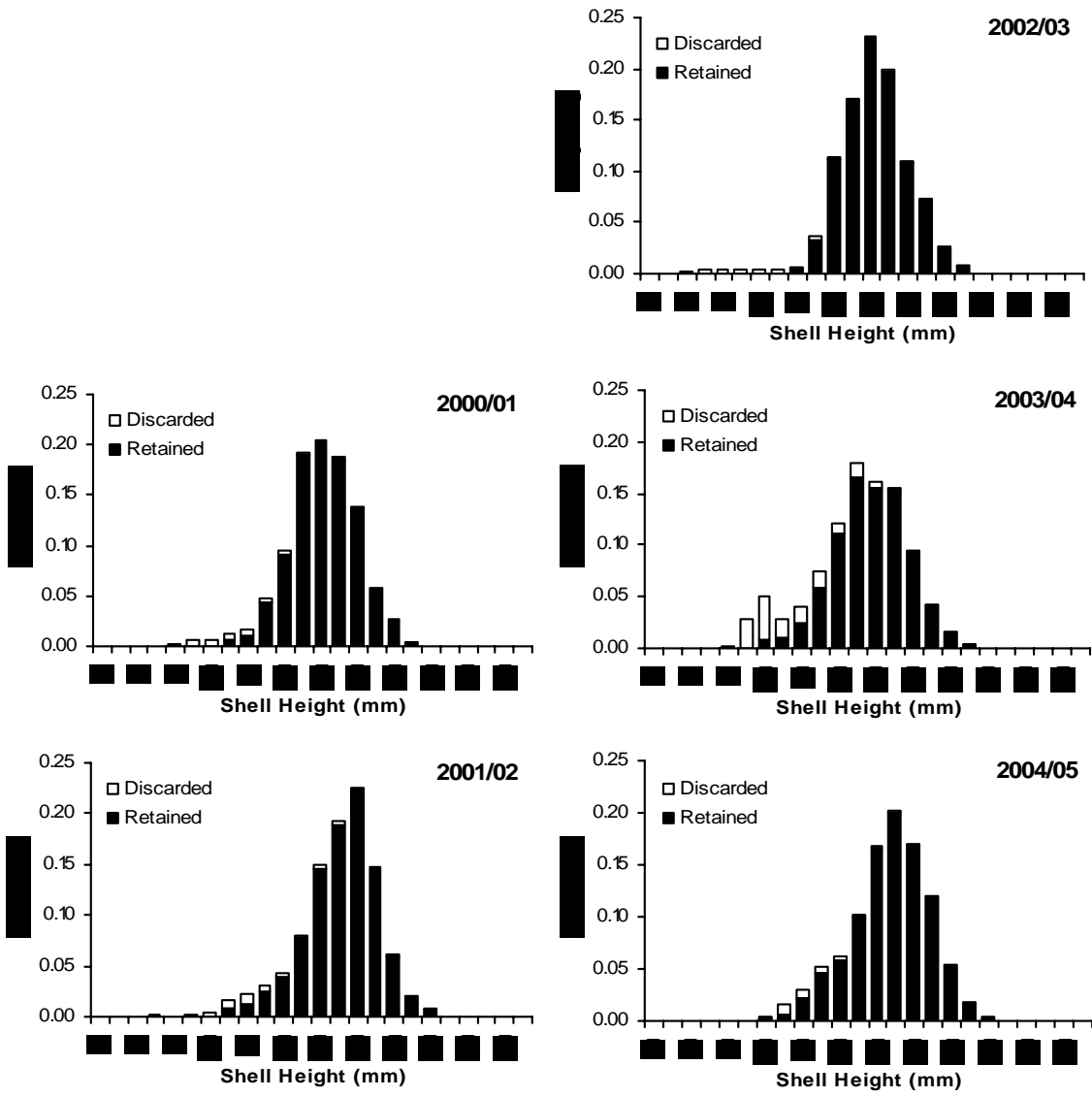


Figure 9. Shell height histograms from resampling Area E observer data, 2000/01–2004/05. Insufficient data were available to produce plots for earlier seasons.

3.3 Cook Inlet Registration Area, Kamishak District

The Cook Inlet scallop fishery is prosecuted in the Kamishak District by vessels that are limited to one 6-foot dredge. The third-party contract observer requirement is waived by the ADF&G fishery manager provided that participants accommodate an ADF&G observer when requested. Other areas of Cook Inlet were explored briefly but are not currently fished (Trowbridge and Bechtol 2003). Much of Cook Inlet, including all of Upper Cook Inlet, is closed to scallop dredging (Figure 3).

ADF&G conducted a dredge survey of the Kamishak District scallop population in 1984; however, it was not until 1996 that biennial surveys began. Biomass estimates from these surveys (Table 6) have ranged from 438,000 lbs to 612,000 lbs since 1996. Information on survey methodology, catch rates and size and age structure of the stock from earlier surveys are available in published reports (e.g., Bechtol and Gustafson 2002).

The guideline harvest range specified by state regulation for the Kamishak District is 10,000 to 20,000 pounds of shucked meats. During the 2004/05 season, 3 vessels participated in the fishery harvesting 6,117 lbs of scallop meats (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 ²)	Meat recovery (%)	Mean density (lbs meat per km ²)	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 ceiling (lbs meat)	Dredge hours	Catch ^a (lbs meat)	CPUE (lbs meat 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	
2004	3	20,000	NA ^b	6,117	NA ^b

^aIncludes estimated dead loss.

^bNot available.

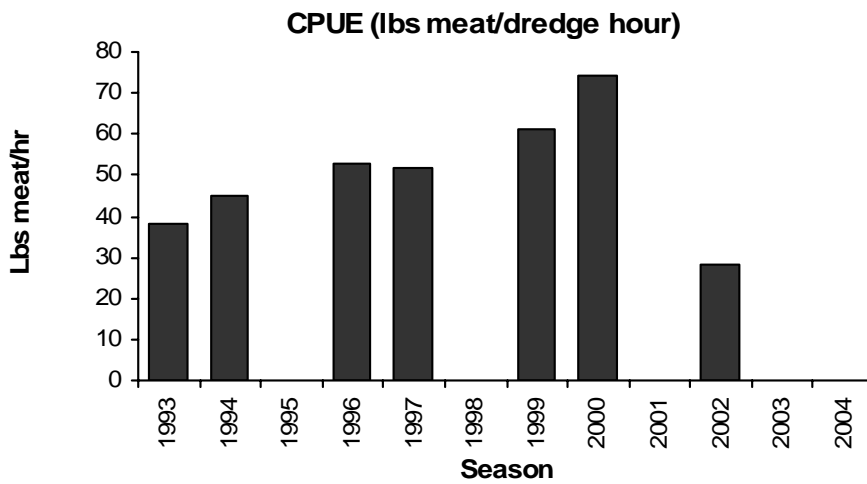
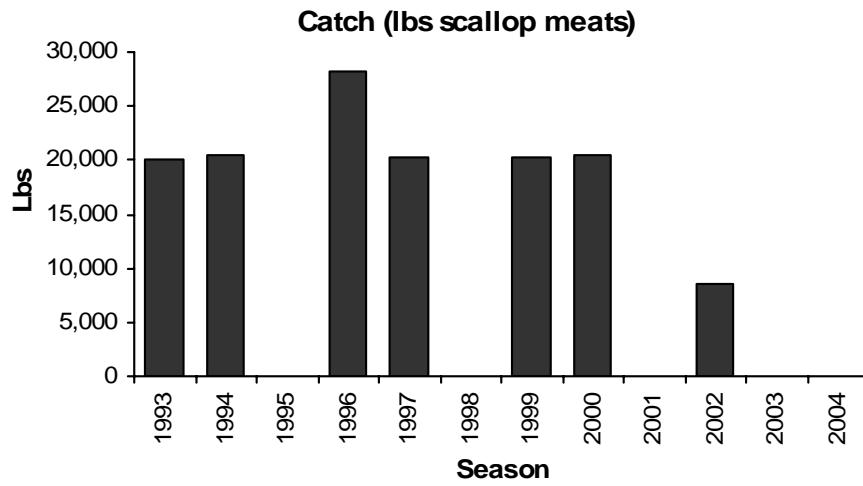
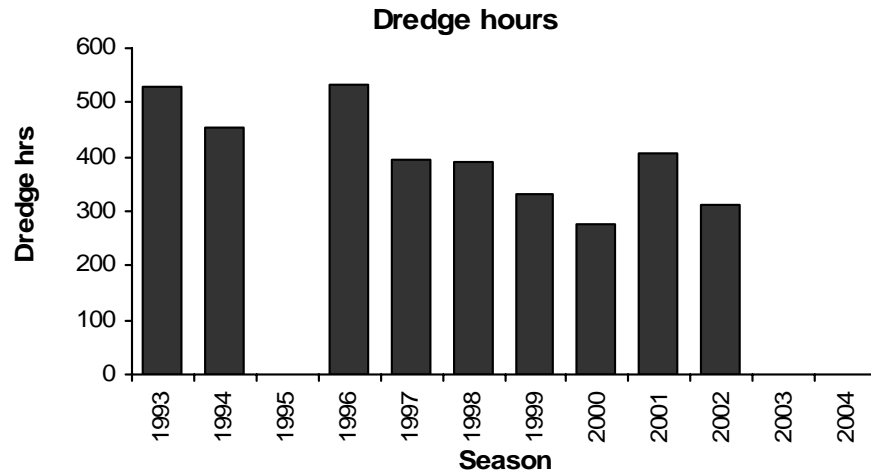


Figure 10. Barplots of Area H scallop fishery statistics.

3.4 Kodiak Registration Area, Northeast District

Two vessels harvested 80,105 pounds of scallop meats from the Northeast District of the Kodiak Management Area during the 2004/05 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 wide range of scallop sizes are harvested in the fishery. These data also indicate substantial recruitment to the harvestable population in recent years.

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 over 30 years ago due to concerns about red king crab bycatch and potential conflicts with other gear types.

The weathervane scallop population in the Northeast District of the Kodiak Registration Area is not currently surveyed and no estimate of abundance has been made.

Table 8. Kodiak Northeast District scallop fishery summary statistics.

Season	Number vessels	GHR ceiling (lbs meat)	Dredge hours	Catch ^a (lbs meat)	CPUE (lbs meat 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
2004/05	2	80,000	1,227	80,105	65

^aConfidential data released by vessel operators.

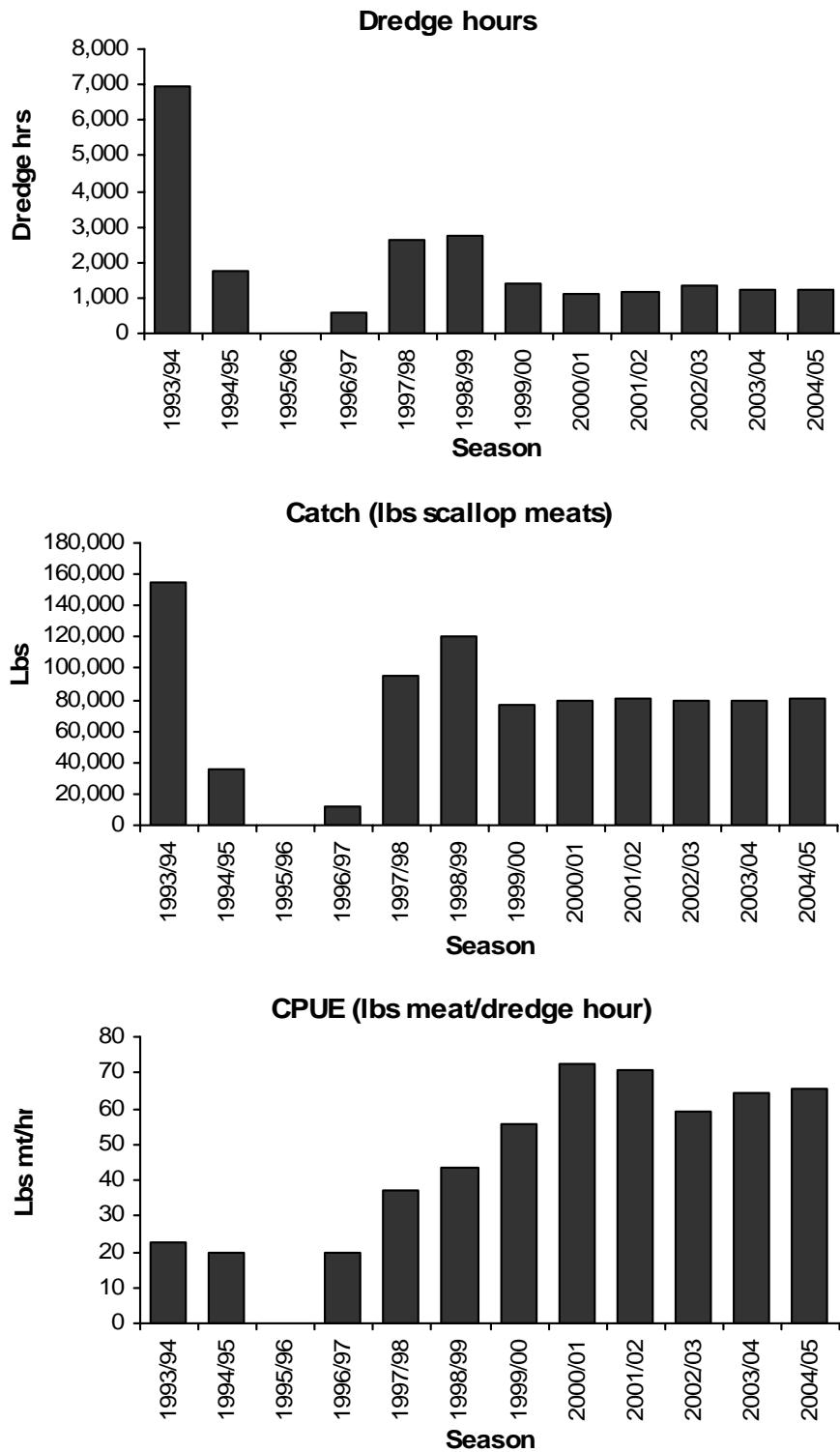


Figure 11. Barplots of Kodiak Northeast District scallop fishery statistics.

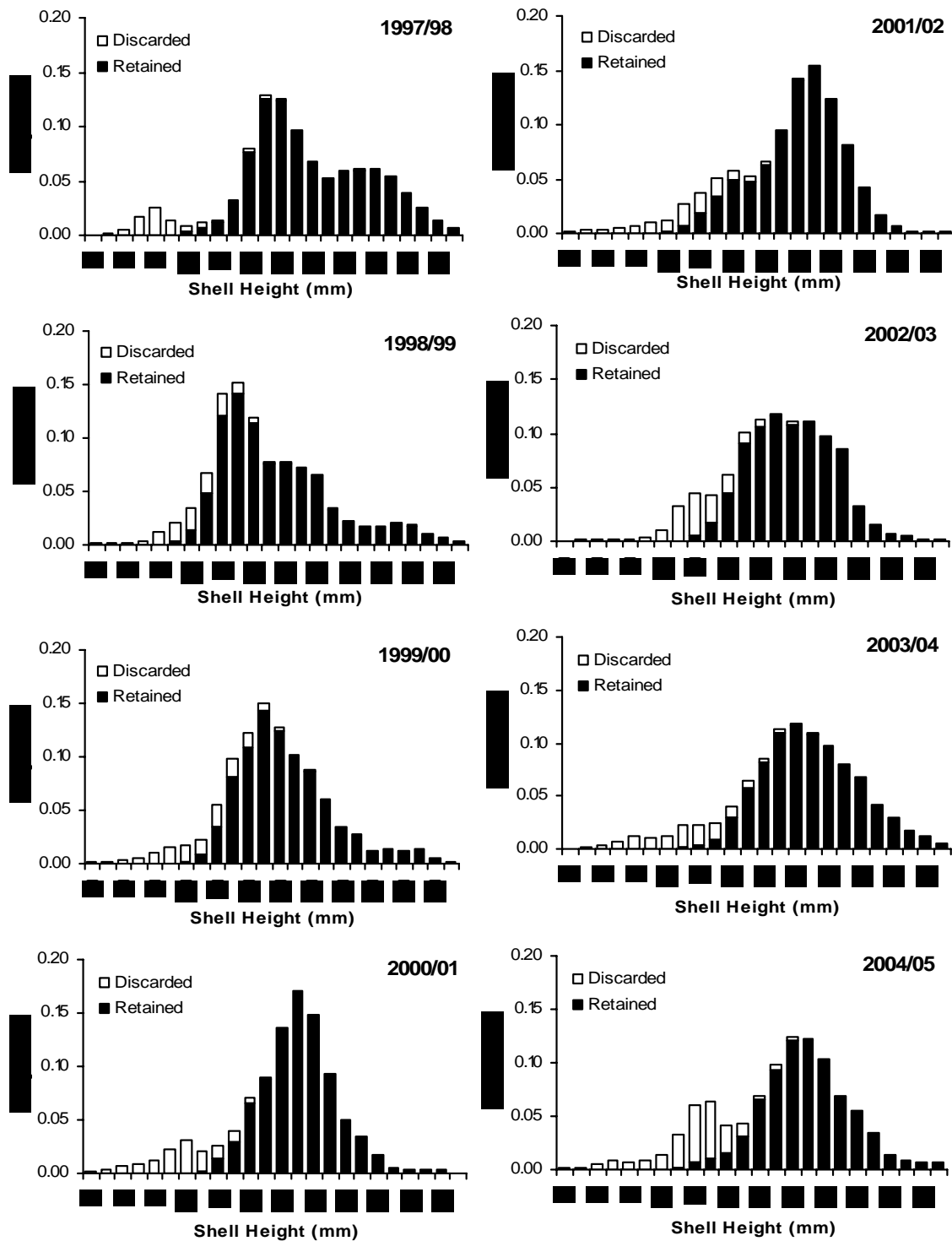


Figure 12. Shell height histograms from resampling Kodiak Northeast District scallop observer data, 1997/98–2004/05.

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 ranged 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. To protect depressed red king crab and Tanner crab populations, in 1990 the Board of Fisheries closed scallop fishing in Kodiak’s Westside bays which had been previously closed to non-pelagic trawling. Closures in this district are known to contain populations of weathervane scallops (Figure 3).

Experimental video research was conducted in the Shelikof District in 2004. Video stock assessment methodology is currently being developed. A video stock assessment in the Shelikof District may be conducted as early as 2007.

Table 9. Kodiak Shelikof District scallop fishery summary statistics.

Season	Number vessels	GHR ceiling (lbs meat)	Dredge hours ^a	Catch ^a (lbs meat)	CPUE (lbs meat 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 ^b	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
2004/05	2	180,000	3,467	174,622	50

^aConfidential data released by vessel operators.

^bOne additional vessel fished but data were not available.

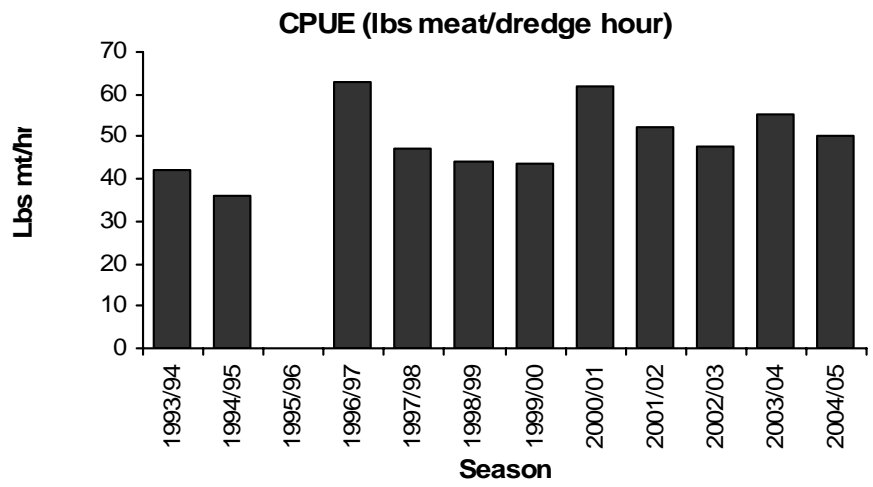
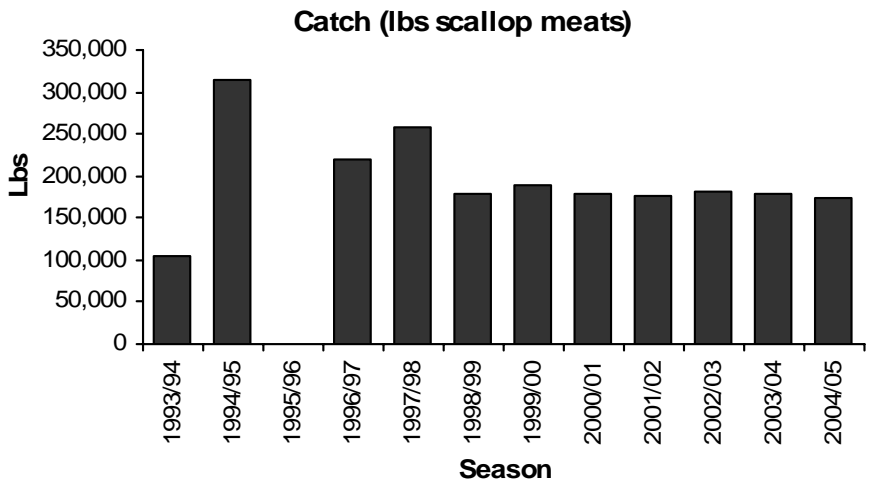
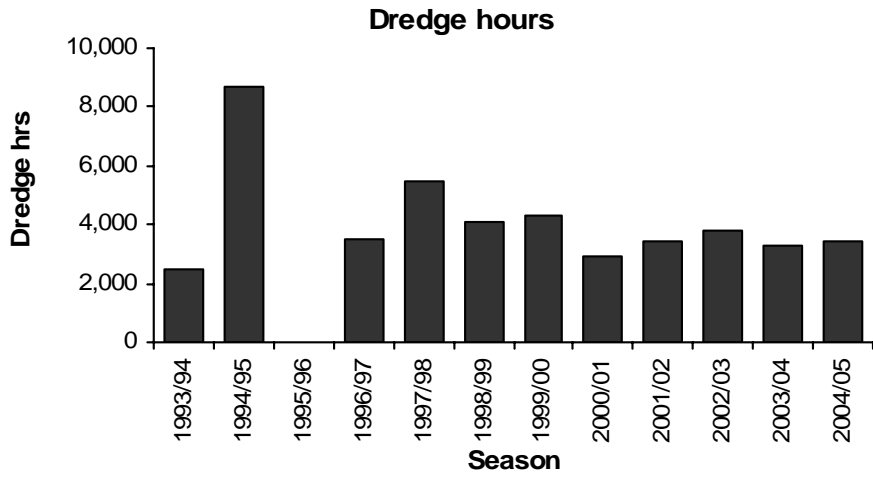


Figure 13. Barplots of Kodiak Shelikof District scallop fishery statistics.

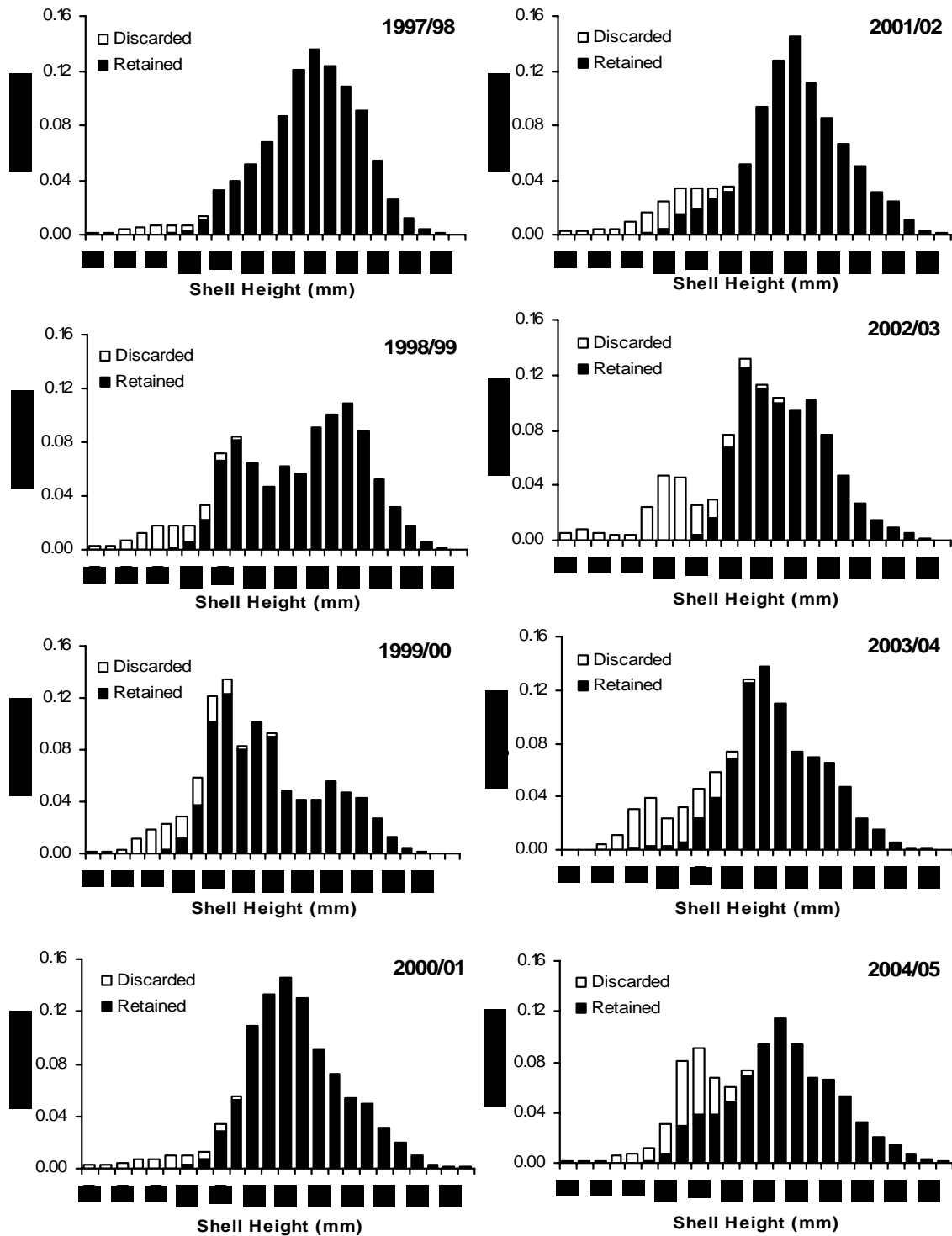


Figure 14. Shell height histograms from resampling Kodiak Shelikof District scallop observer data, 1996/97–2003/04.

3.6 Kodiak Registration Area, Semidi District

Traditional scallop fishing areas of the Semidi District are located in state waters that were closed to scallop dredging by the BOF in 2000 (Figure 3). The federal water portion of the district remains open to fishing, but no effort has occurred since the 1999/00 season (Table 10).

Table 10. Kodiak Semidi District scallop fishery summary statistics.

Season	Number vessels	GHR ceiling (lbs meat)	Dredge hours ^a	Catch ^a (lbs meat)	CPUE (lbs meat per dredge hr)
1993/94	6 ^b	NA	1,819	55,487	32
1994/95	2	NA	272	confidential	
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		
2004/05		NA	0		

^aConfidential data released by vessel operators.

^bTwo additional vessel fished but data are not available.

3.7 Alaska Peninsula Registration Area

Scallop fishing in the Alaska Peninsula Registration Area (Area M) is concentrated in the three small beds near the Shumagin Islands between 160° and 161° W. longitude. Area M was closed for the 2000/2001 and 2002/03 seasons due to concerns about potential localized depletion. For the 2003/04 and 2004/05 seasons, the area between 160° and 161° W. longitude remained closed for stock conservation, while the remainder of the area was opened with a 10,000 pound GHR ceiling; however, no effort occurred either year. Fishery managers plan to reopen the entire area in 2005/06 with a small GHR and use observer SH data to determine if recruitment to the harvestable population has occurred.

Alaska Peninsula SH histograms (Figure 16) suggest that most large 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 as a conservation measure to protect crab habitat and populations.

Table 11. Alaska Peninsula Area scallop fishery summary statistics.

Season	Number vessels	GHR ceiling (lbs meat)	Dredge hours ^a	Catch ^a (lbs meat)	CPUE (lbs meat 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			
2004/05		10,000			

^aConfidential data released by vessel operators.

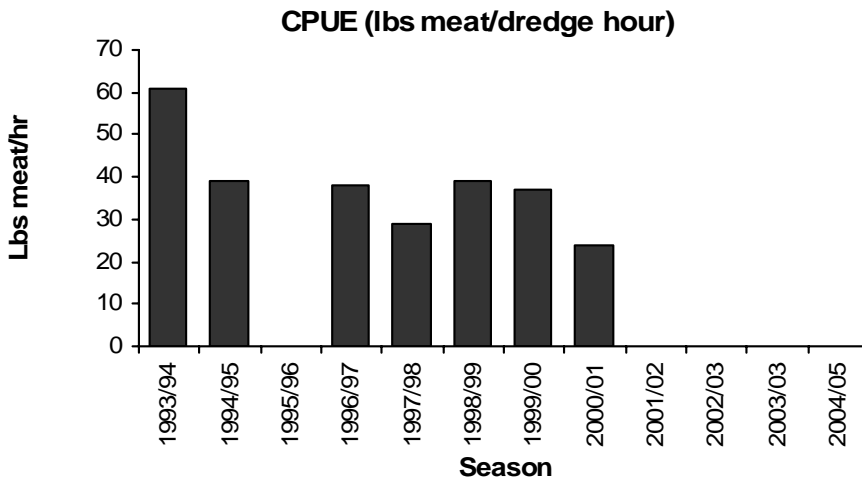
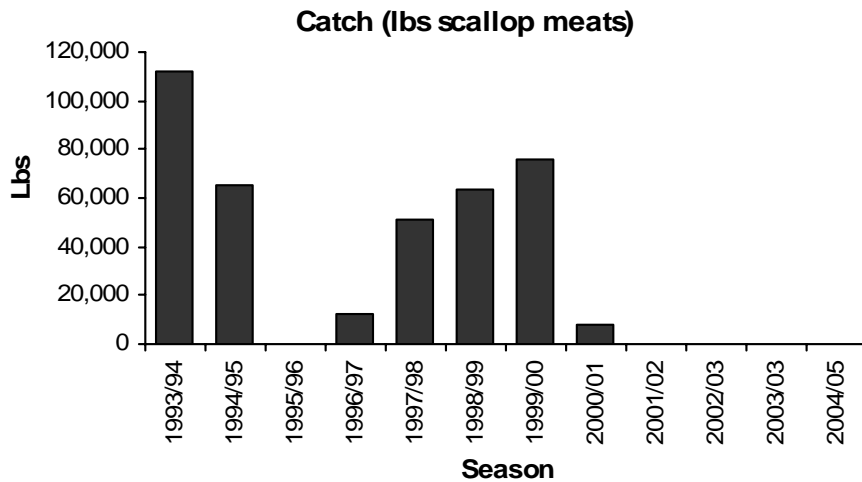
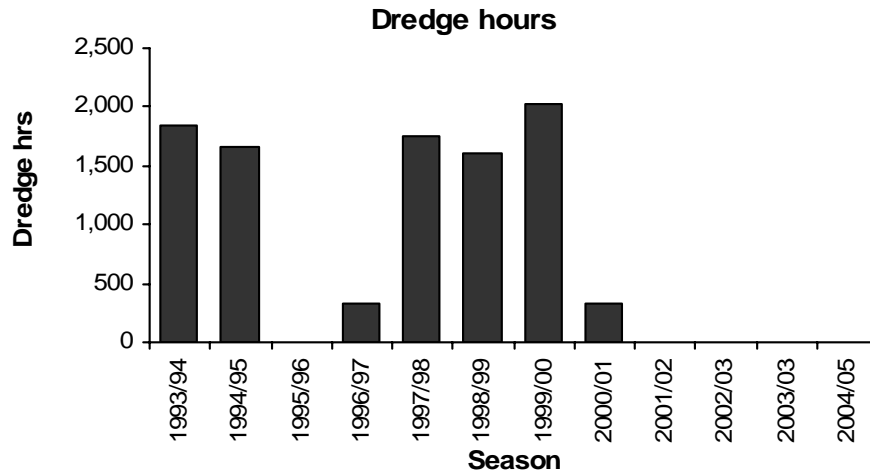


Figure 15. Barplots of Alaska Peninsula scallop fishery statistics.

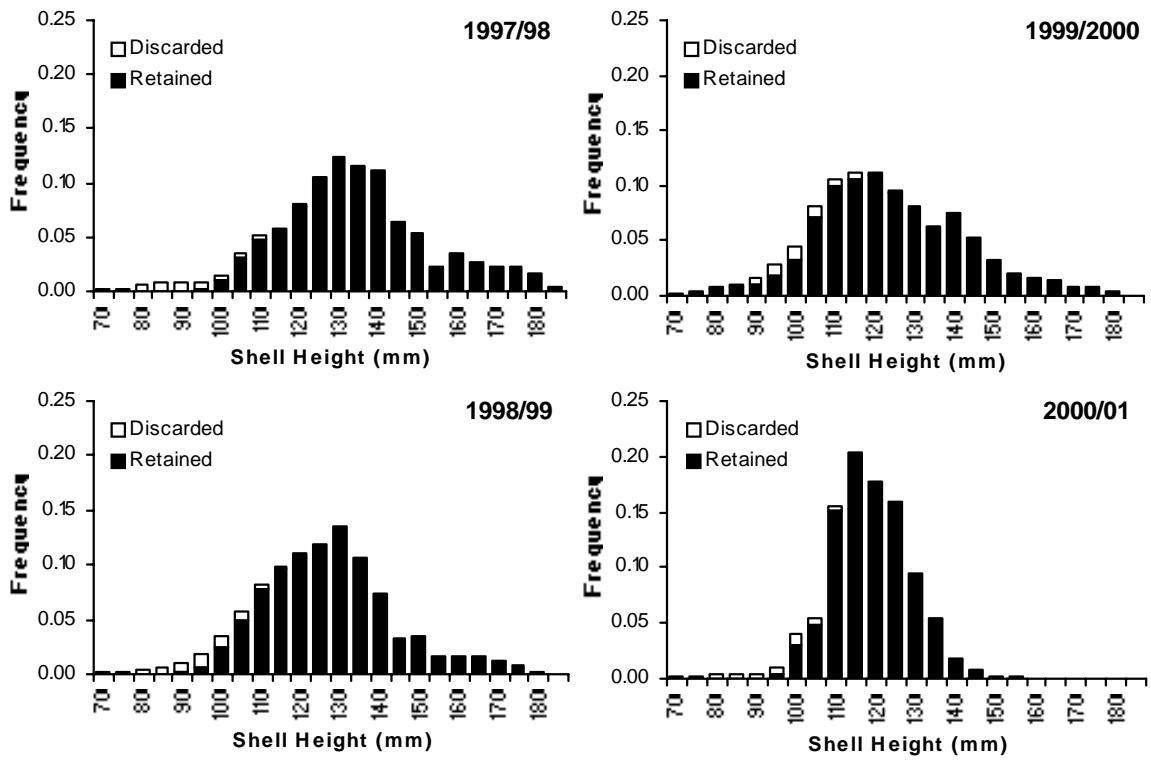


Figure 16. Shell height histograms from resampling Area M scallop observer data, 1997/98–2000/01.

3.8 Bering Sea Registration Area

Scallop fishing in the Bering Sea Registration Area (Area Q) occurs north of Unimak Island (Figures 1 and 2), where the stock occurs over a wide area at low densities. One vessel participated in the 2004/05 fishery and harvested 10,050 lbs of shucked scallop meats (Table 12; Figure 17). Large catches taken during the early 1990s during the “fishing-up” period 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 will continue to monitor observer SH data for signs of recruitment to the population.

Large portions of the eastern Bering Sea shelf and the Pribilof Islands Habitat Conservation Area are closed to scallop fishing to protect red and blue king crab, juvenile habitat and to provide for habitat conservation (Figure 3).

Experimental scallop video research was conducted in the Bering Sea Registration Area in 2003. Scallop video stock assessment methodologies are currently being developed. The video research did show that weathervane scallops in the Bering Sea occur at low densities over a large area.

Table 12. Bering Sea Area scallop fishery summary statistics.

Season	Number vessels	GHR ceiling (lbs meat)	Dredge hours ^a	Catch ^a (lbs meat)	CPUE (lbs meat 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
2004/05	1	105,000	275	10,050	37

^aConfidential data released by vessel operators.

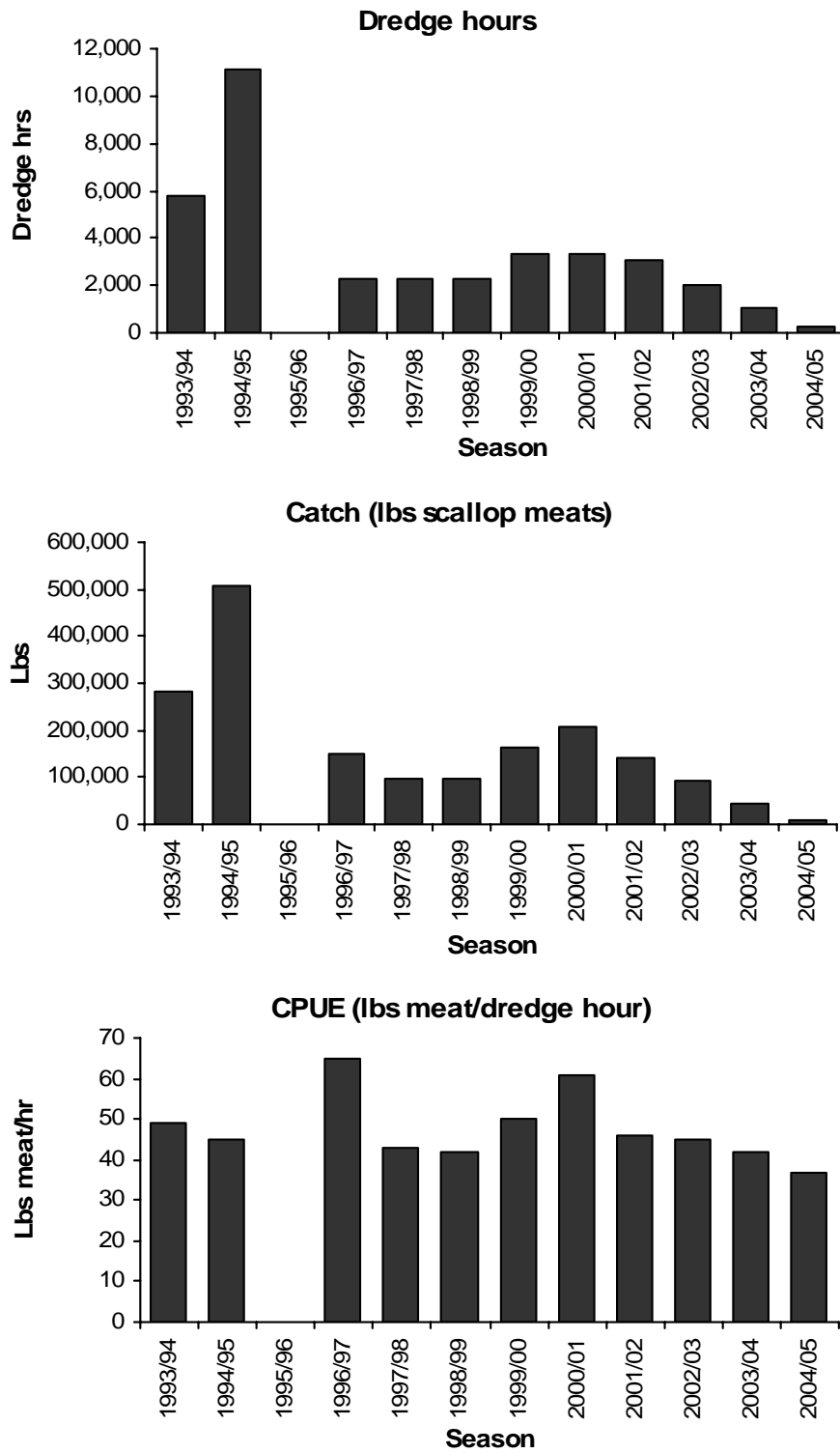


Figure 17. Barplots of Bering Sea scallop fishery statistics.

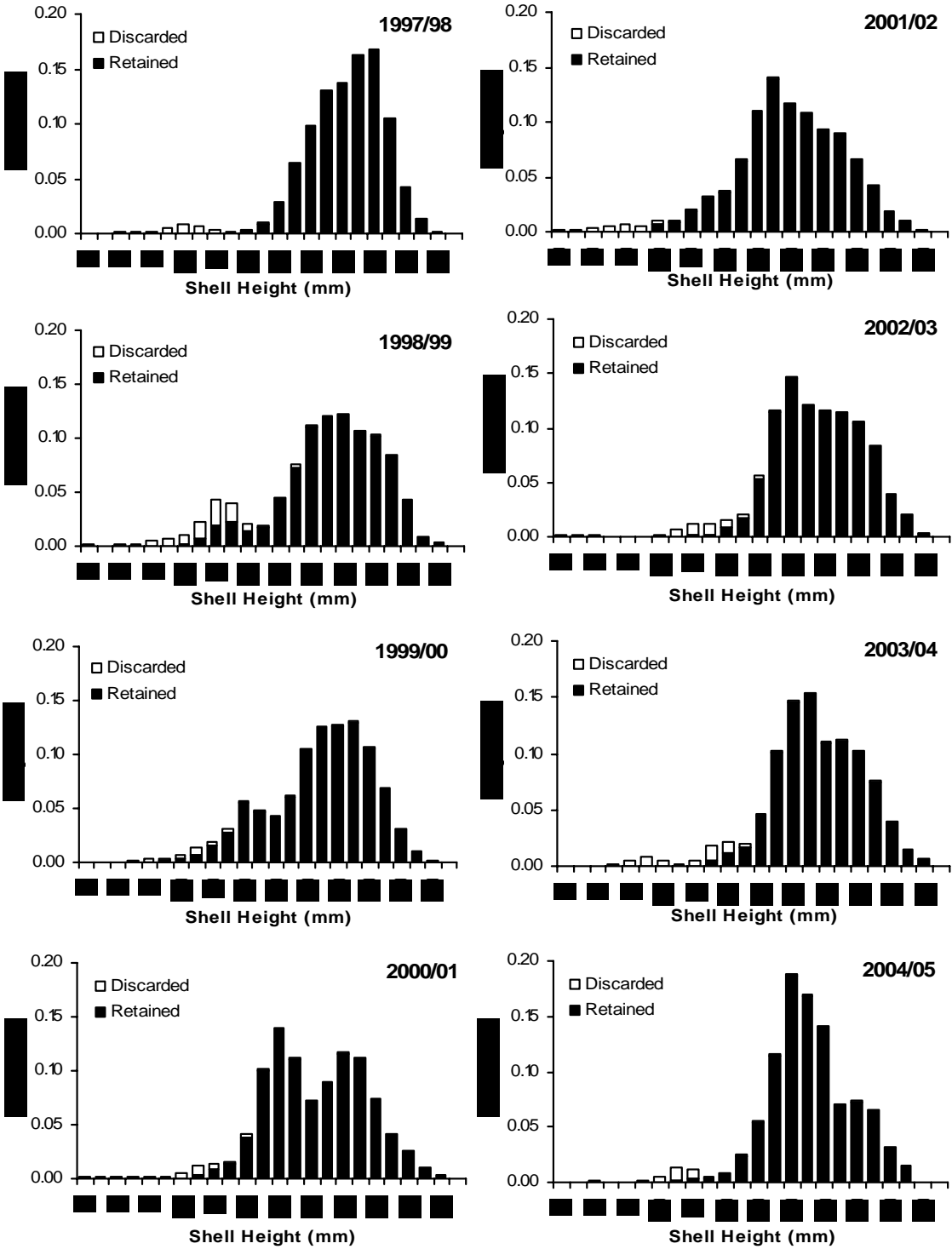


Figure 18. Shell height histograms from resampling Bering Sea scallop observer data, 1996/97–2004/05.

3.9 Dutch Harbor Registration Area

During the last five regulatory seasons (2000.01 – 2004/05) the Dutch Harbor Registration Area (Area O) was open one season, 2002/03. One vessel fished briefly and harvested about 6,000 lbs of scallop meats, with CPUE that was low but comparable to CPUE from earlier seasons (Table 13; Figure 19). Managers decided in 2003 to close the area for at least 3 additional years to allow for stock rebuilding. Productive scallop grounds that contributed significantly to the overall harvest were closed to scallop fishing by 1986, primarily as a protective measure for crab nursery areas (Figure 3).

The weathervane scallop population in the Dutch Harbor Registration Area is not surveyed and no estimate of abundance has been made. There are currently no plans to survey this population.

Table 13. Dutch Harbor Area scallop fishery summary statistics.

Season	Number vessels	GHR ceiling (lbs meat)	Dredge hours ^a	Catch ^a (lbs meat)	CPUE (lbs meat per dredge hr)
1993/94	2	170,000	838	confidential	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			
2004/05		closed			

^aConfidential data released by vessel operators.

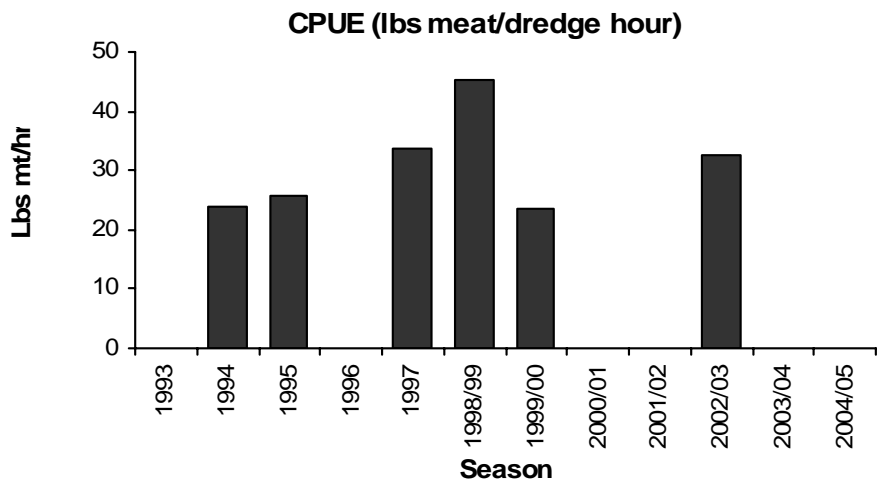
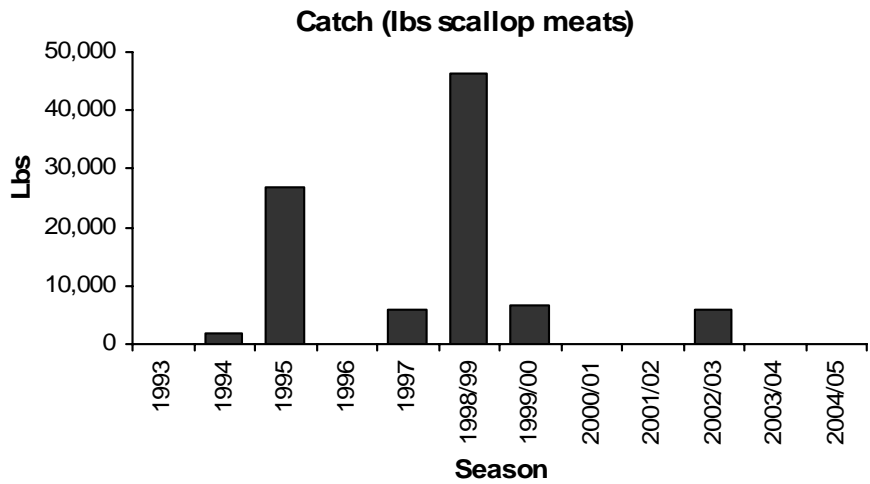
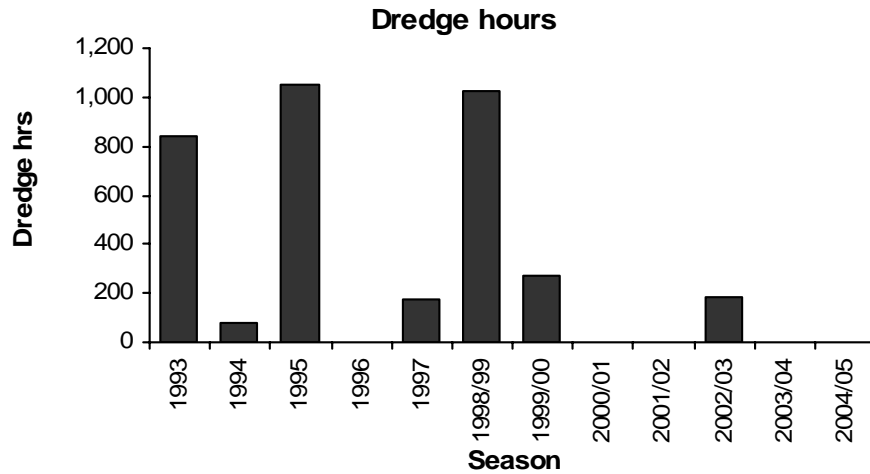


Figure 19. Barplots of Dutch Harbor Area scallop fishery statistics.

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.

ADF&G records indicate that scallops were first harvested from the Adak Registration Area in 1979, and then again in 1992 and 1995. During those years few fishermen participated in any given year, so catch and effort data are confidential. Little is known about scallop populations in this area. The Petrel Bank, between 51°30' N. lat. and 54°30' N. lat., west of 179° W. long. and east of 179° E. long. was closed in 1991 due to concerns about king crab bycatch during the *Chlamys* (pink scallop) fishery.

The 2004/05 fishery opened July 1, 2004 and closed by regulation on February 15, 2005. The GHR ceiling was 75,000 pounds. No vessels participated in the 2004/05 season.

The weathervane scallop population in the Adak Registration Area is not surveyed and no estimate of abundance has been made. There are currently no plans to survey this population. The continental shelf adjacent to the Aleutian Islands is narrow, providing limited weathervane scallop habitat.

4.0 Trawl Survey Information on Scallop Stocks

Trawl surveys for fisheries stock assessment are conducted annually in the Gulf of Alaska and the Bering Sea by NMFS and ADF&G. Although these surveys target crab and groundfish and the gear is not designed to efficiently capture scallops, weathervane scallops are caught in some areas and survey data provide information on the range of the species.

In the eastern GOA (Figure 20), weathervane scallops have been captured during trawl surveys offshore from traditional scallop fishing grounds and in closed waters adjacent to Prince William Sound. Around Kodiak, trawl surveys have captured scallops in closed waters south of the island and in many bays and inlets (Figure 21). Along the south side of the Alaska Peninsula, trawl survey data indicate that most scallop habitat lies in coastal waters that are closed to scallop fishing, while scallops have been captured during trawl surveys over a large swath of the eastern Bering Sea shelf (Figure 22).

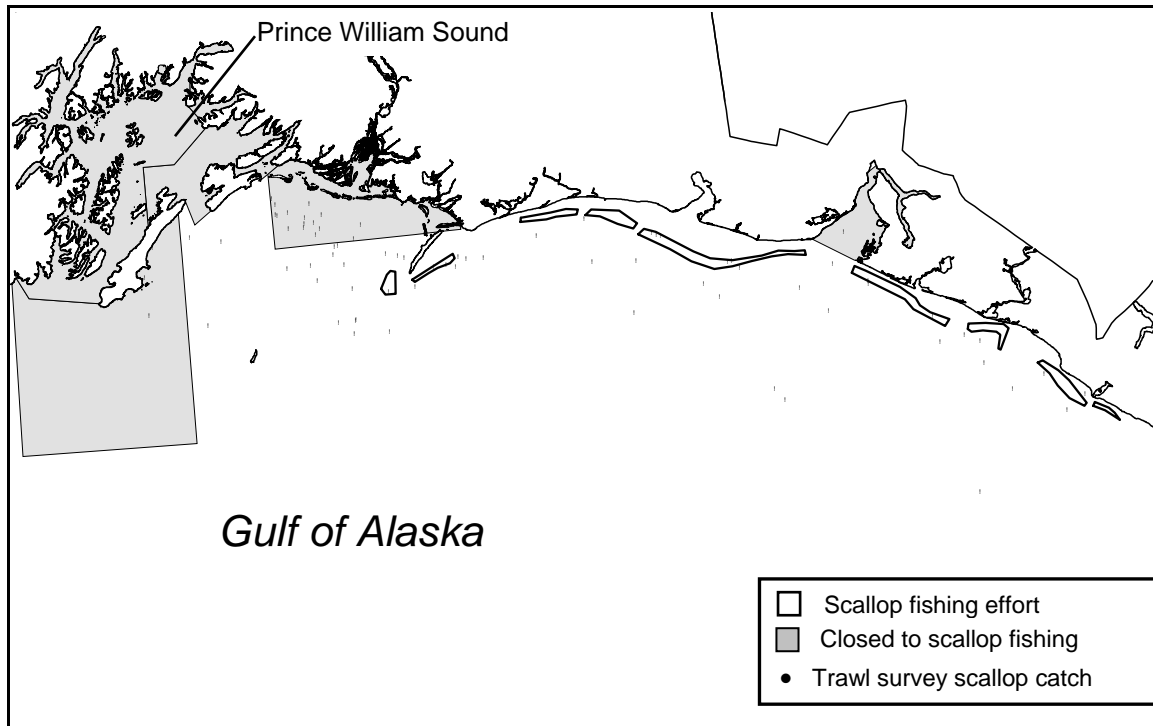


Figure 20. Map showing scallop fishing areas, areas closed to scallop fishing by regulation, and locations where weathervane scallops were captured during NMFS trawl surveys in the eastern Gulf of Alaska.

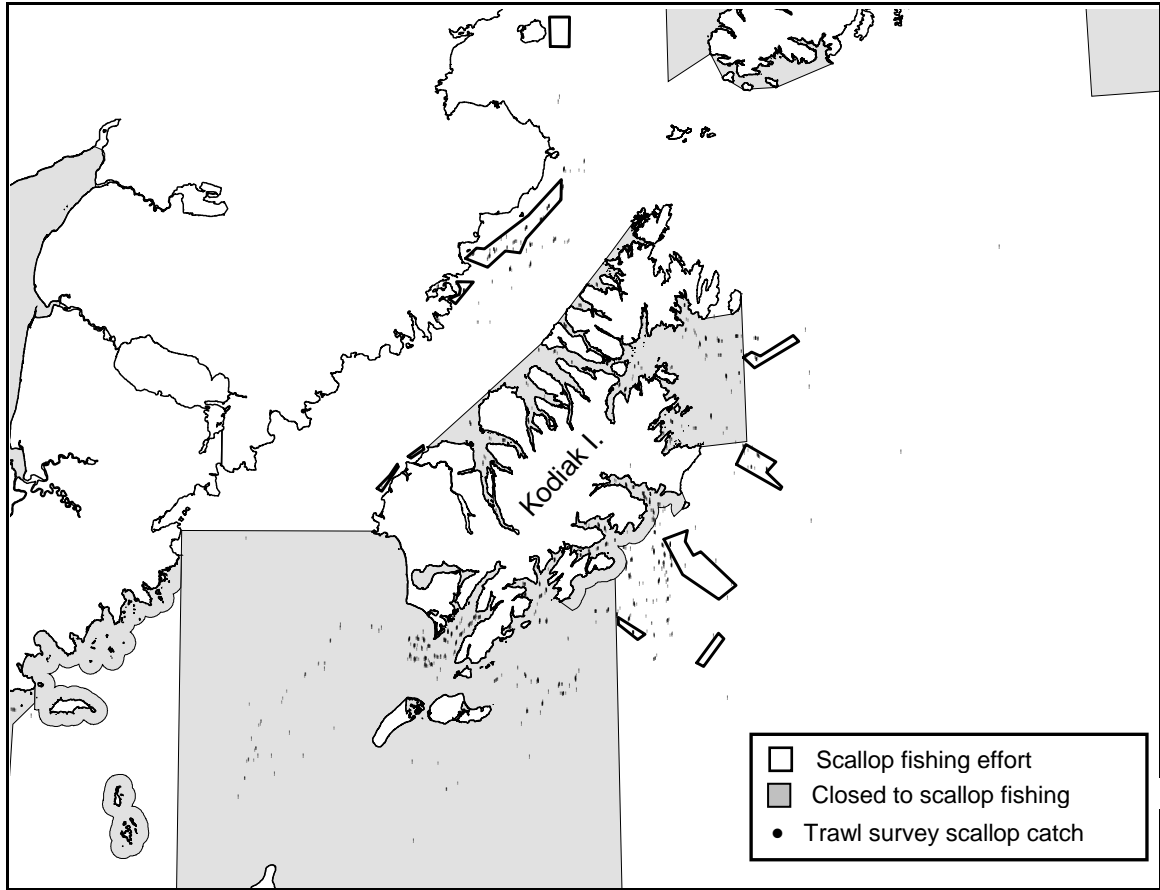


Figure 21. Map showing scallop fishing areas, areas closed to scallop fishing by regulation, and locations where weathervane scallops were captured during NMFS and ADF&G trawl surveys in the Kodiak area.

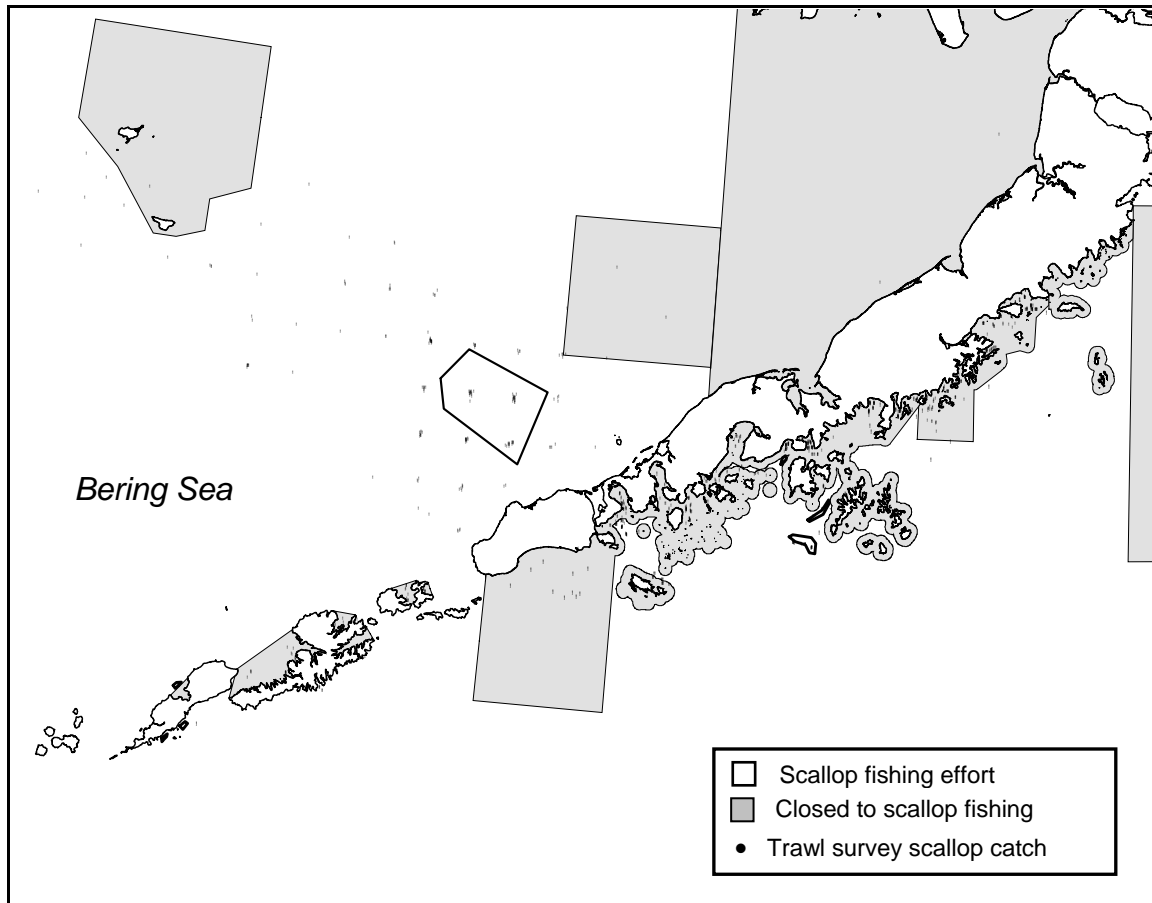


Figure 22. Map showing scallop fishing areas, areas closed to scallop fishing by regulation, and locations where weathervane scallops were captured during NMFS and ADF&G trawl surveys in western Alaska.

5.0 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).

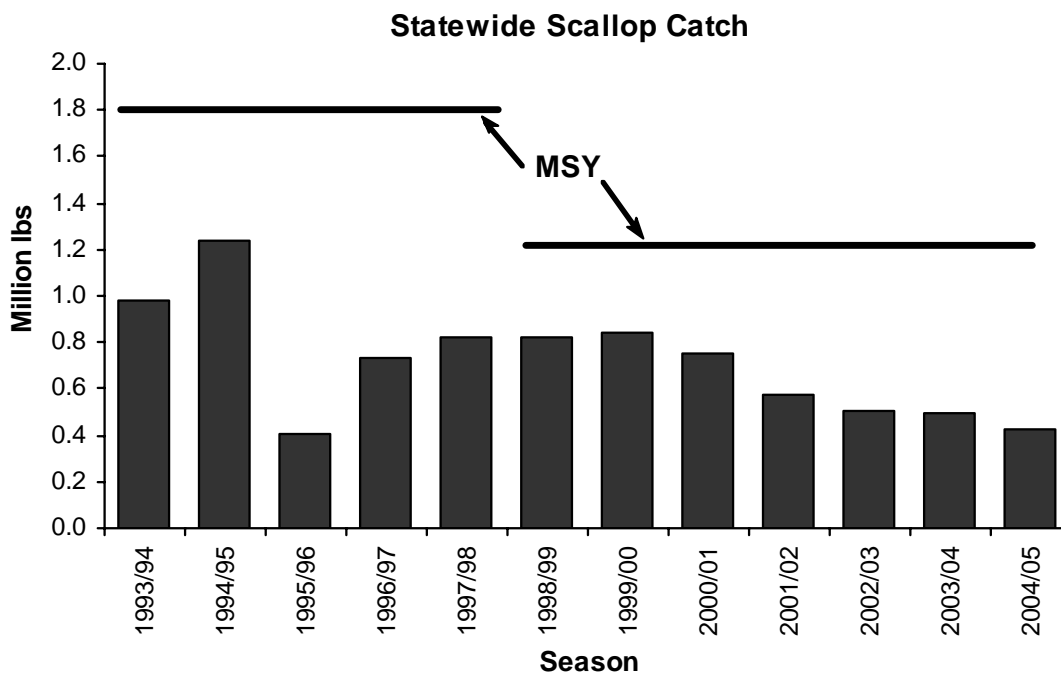


Figure 23. Statewide scallop harvest (pounds shucked scallop meats) and MSY levels from the FMP.

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.

6.0 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>

7.0 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).

8.0 Recent Regulatory Actions

8.1 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 modified this gear restriction in Amendment 10 to increase the dredge size to 2 dredges with a combined maximum dredge width of 20 feet. The Secretary approved Amendment 10 on June 22, 2005. NMFS published final regulations on July 11, 2005, which were effective August 10, 2005 (70 FR 39964). NMFS implemented Amendment 10 by reissuing the two LLP licenses with the larger gear restriction.

8.2 Update on State Vessel Based Limited Entry Program

During the 2002 legislative session, passage of CSHB206(RLS) am S resulted in changes to the limited entry statutes authorizing use of a permanent vessel-based limited entry program in the weathervane scallop fishery. In 2004, eight vessel owners received permits to fish for weathervane scallops in state waters. Vessel entry permits issued for the statewide weathervane scallop fishery will expire on December 31, 2008 unless statutory authority is extended. If statutory authority is not extended, the state water fishery will revert to an open access fishery.

9.0 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. (2005). 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 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 current 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 packed 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 ^a	Catch (lbs meats) ^b	Average Price/lb.	Inflation Factor	Adjusted Price	1st Wholesale Value
1967	2	6	778 ^c	\$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		No Effort					
1979	1	4	24,826	NA	NA	NA	NA
1980	8	56	616,717 ^c	\$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 ^d	\$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 ^e	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 ^d	\$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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Appendices

Appendix A: Economic Factors in the Scallop Fishery Off Alaska

Appendix B: Selected scallop research and management papers

- B-1: Annual Management Report for the Commercial Weathervane Scallop Fisheries in Alaska's Westward Region, 2003/04
- B-2: Annual Management Report for the Commercial Weathervane Scallop Fisheries in Alaska's Westward Region, 2002/03
- B-3: Annual Management Report for the Commercial and Subsistence Shellfish Fisheries of the Aleutian Islands, Bering Sea and the Westward Region's Shellfish Observer Program, 2004 (selected sections)
- B-4: Management of the Data-Limited Weathervane Scallop Fishery in Alaska
- B-5: Characterization of 12 single nucleotide polymorphisms in weathervane scallop
- B-6: Characterization of 16 polymorphic microsatellite loci in weathervane scallop *Patinopecten caurinus*
- B-7: Video scallop survey in the eastern Gulf of Alaska, USA

Appendix A

Economic Factors in the Scallop Fishery off Alaska

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Introduction

This paper discusses available economic information in an attempt to identify factors that have contributed to major changes in the Alaska scallop fishery over time. An attempt has been made to conduct more advanced analyses than presented here; however, considerable additional effort would be required to conduct surveys and/or combine existing electronic data with paper records to make such analyses feasible. While that may be warranted for future efforts, this paper is a discussion of existing analyses and data.

The Early Years

The Atlantic sea scallop fishery is the predominant source of U.S. domestic sea scallop supply. A cyclical decrease in stocks, possibly due to overfishing, began to occur on the Atlantic's Georges Bank in the late 1960's. In response to these stock conditions, management measures, focused on protecting stocks, were adopted. The result was a steady decline in sea scallop landings from the Georges Bank area. As a direct result of these changes, interest in developing a weathervane scallop fishery off Alaska materialized in the late 1960's. Weathervane scallop stocks off Alaska had been evaluated for commercial potential in the 1950's (Kaiser, 1986 as cited in Barnhart 2003) but the first effort recorded in the fishery occurred in 1967. In that year, two vessels made six landings of scallops totaling less than 1,000 pounds of shucked meats (Barnhart 2003).

As shown in Table 1, an additional 17 vessels entered the fishery in 1968 and the 19 vessels that participated made 125 landings totaling 1,677,268 pounds of shucked meats. In 1969, 19 vessels continued harvesting scallops and made 157 landings totaling 1,849,947 pounds of shucked meats. The 1969 fishery had the largest number of landings and the largest pound total in the history of the fishery. The inflation adjusted first wholesale value of the 1969 catch was just over \$6.6 million, or an average of nearly \$350,000 per vessel, and was the fourth highest annual value on record. However, this level of harvest and effort was not to be sustained.

Data from 1970 suggest that there may have been relatively few vessels landing most of the scallops during 1968 and 1969. This appears so because only 7 vessels remained in the fishery in 1970 despite a 17 percent increase in the average price. These 7 vessels made 137 landings totaling 1,440,338 pounds of shucked meats, which was 78 percent of the harvest taken by 19 vessels the previous year. The inflation adjusted first wholesale value of the 1970 catch was about \$5.8 million, or an average of more than \$826,000 per vessel. While this revenue picture appears rosy, there is no data available on operating costs or effort levels in the early days of this fishery, and the trend during the rest of the 1970's suggests that the fishery was not as lucrative as the 1970 revenue numbers suggest.

Table 1: Historic Statewide Commercial Weathervane Scallop Statistics, 1967-2002/03 (from NPFMC 2005b)

Year	Vessels	Landings ^a	Catch (lbs meats) ^b	Average Price/Lb.	Inflation Factor	Adjusted Price	Wholesale Value
1967	2	6	778 ^c	\$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	No Fishery						
1979	1	4	24,826	NA	NA	NA	NA
1980	8	56	616,717 ^c	\$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 ^d	\$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 ^e	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 ^d	\$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

^a Prior to and including 1994/95, reported number of landings(deliveries) equals number of fish tickets. After 1995/96, the reported number of landings equals number of fish tickets (off-loads). An off-load typically includes multiple fish tickets, normally one per week.

^b Pounds of shucked scallop meats.

^c Deliveries of unshucked scallops were converted to shucked meats using a 10% conversion factor.

^d Includes illegal harvest.

^e January 1 through June 30

In 1971, effort fell to 5 vessels and remained at 5 vessels for several years before falling to 3 vessels in 1974. During those years, landings fell from 137 in 1970 to 29 in 1974. However, shucked meat totals stayed near or above 1 million pounds through 1973 before falling by more than 50 percent to approximately a half million pounds in 1974. Prices continued to rise over this time frame; however, the declining catch forced revenue to decline to just under \$1.2 million in 1976 when 264,788 pounds, just 14 percent of the 1969 peak harvest, of shucked meats were caught. In 1977 and 1978, no effort was expended in the weathervane scallop fishery off Alaska.

The period of 1967 to 1976 demonstrates what can happen in an emerging fishery with passive management. There were no effort controls, limits, or guideline harvest levels in place. The fishery expanded rapidly as scallop beds were located and exploited, experienced substantial effort consolidation as marginal vessels departed, and eventually overexploited the known beds to the point that the fishery was not economically viable by 1977 and 1978. This could have been the end of the weathervane scallop fishery off Alaska, except for the fact that scallops are somewhat resilient and discoveries of new beds had yet to be made.

In 1979, following two years with no harvest, a single vessel made 4 landings totaling less than 25,000 pounds of shucked meats. Three years of zero or minimal effort had likely allowed the scallop resource to regenerate somewhat. That likelihood, combined with a price increase to \$3.80 per pound contributed to 8 vessels making 56 landings totaling about 617,000 pounds in 1980. It is interesting to note that the inflation adjusted 1980 price of \$7.44 per pound is the third highest inflation adjusted price in history.

Given fishing success in 1980 and price increases, it is not surprising to see that 1981 participation increased to 18 vessels that made 101 landings totaling 924,441 pounds of shucked meats. The 1980 first wholesale value was just under \$7 million. However, data for the next several years show a similar cycle as occurred between 1969 and 1974. By 1983, five vessels made 30 landings totaling less than 200,000 pounds of shucked meats. However, 1983 was the year of record high prices of \$8.56 per pound, so first wholesale value exceeded \$1.6 million.

Over the next several years, participation increased slightly as did landings and catch but repeated the cyclical pattern by trending back downwards before another cyclic increase in landings and catch began in 1989. Beginning in 1990, an influx of East Coast scallop vessels began to occur; once again this was because of unfavorable economic conditions in East Coast scallop fisheries (Barnhart 2006). The upward trend continued into 1992, when the second highest historic catch of 1,785,673 pounds was taken by 8 vessels making 136 landings. The first wholesale value of over \$8.6 million recorded in 1992 stands as the historic high inflation adjusted catch value in the history of this fishery.

This period of this fishery has been characterized as a “goldrush atmosphere” (Barnhart, 2006). It is also important to note that by this time, scallop beds had been located in several areas around Kodiak Island, in Shelikof Strait, near Yakutat, in the Northern Gulf of Alaska near Kayak Island, in Cook Inlet, as well as in the Aleutians and Bering Sea.

As scallop fishery effort increased in the early 1990s, the Alaska Department of Fish and Game

and the scallop industry expressed concerns about the scallop resource conservation as well as crab bycatch in this fishery. The State declared this fishery a high impact emerging fishery in May of 1993. This action required fishery closure and implementation of an interim management plan. Table 1 shows that, prior to closure in May of 1993, the fishery had participation by 7 vessels with 51 landings totaling 568,077 pounds. Following implementation of the interim management plan, the fishery reopened on June 17, 1993. The interim management plan required 100 percent observer coverage, and set crab bycatch limits and provided for other conservation measures. From this point on, data is presented by regulatory season. Thus, the remainder of 1993 catch is listed for the 1993-94 season. The seasons established in the management plan extend into the first six weeks of the following year.

Catch statistics for the 1993-94 season indicate participation by 15 vessels making 111 landings for a total of 984,583 pounds of shucked meats. Total first wholesale value was just over \$6.2 million in 1993-94. Fifteen vessels participated in the 1994/95 season making 104 landings totaling 1,240,775 pounds. Total first wholesale value in 1994-95 exceeded \$8.6 million, the second highest value in history.

In 1995, a the captain of a single vessel turned in his scallop interim use permit card to the Commercial Fisheries Entry Commission (CFEC) in Juneau and proceeded to harvest scallops in the EEZ with disregard to observer coverage, harvest limits and all other regulatory and management measures (Barnhart 2006). In response, Federal regulators closed the EEZ to scallop harvest by emergency rule on February 23rd of 1995 and then enacted a Fisheries Management Plan for the scallop fisheries off Alaska (FMP) and an amendment to that plan that closed the fishery in the EEZ until August of 1996, nearly 18 months later. (NPFMC, 2005) The actions of this one individual, and the resulting closures likely had a devastating economic impact on remaining participants. Nonetheless, the period from 1994/95 to 2000, with the exception of the 1995/96 season, had fairly constant participation and landed pounds trended upwards.

In 1997, the North Pacific Fisheries Management Council (Council) sought to restrict effort in the scallop fishery off Alaska by adopting a vessel moratorium, under which 18 vessels qualified to fish in Federal waters. Following that action, the Council undertook analysis of further capacity reductions and adopted a License Limitation Program, including 9 vessels, which took effect in 2000.(NPFMC, 2005) These changes ushered in a new era in the scallop fishery off Alaska. The successes of the early exploratory years had now necessitated stock and effort management measures and capacity reduction.

Markets:

In the domestic U.S. market, Alaska weathervane scallops are similar to Atlantic sea scallops. Table 2 compares total landings and value of Alaska weathervane scallops with Atlantic sea scallops from 1990 through 2004. These data show that Atlantic sea scallop harvest is consistently orders of magnitude larger than weathervane scallop harvests off Alaska.

Table 2: US Scallop Landings and Value versus Scallop Imports and Value, 1990-2003

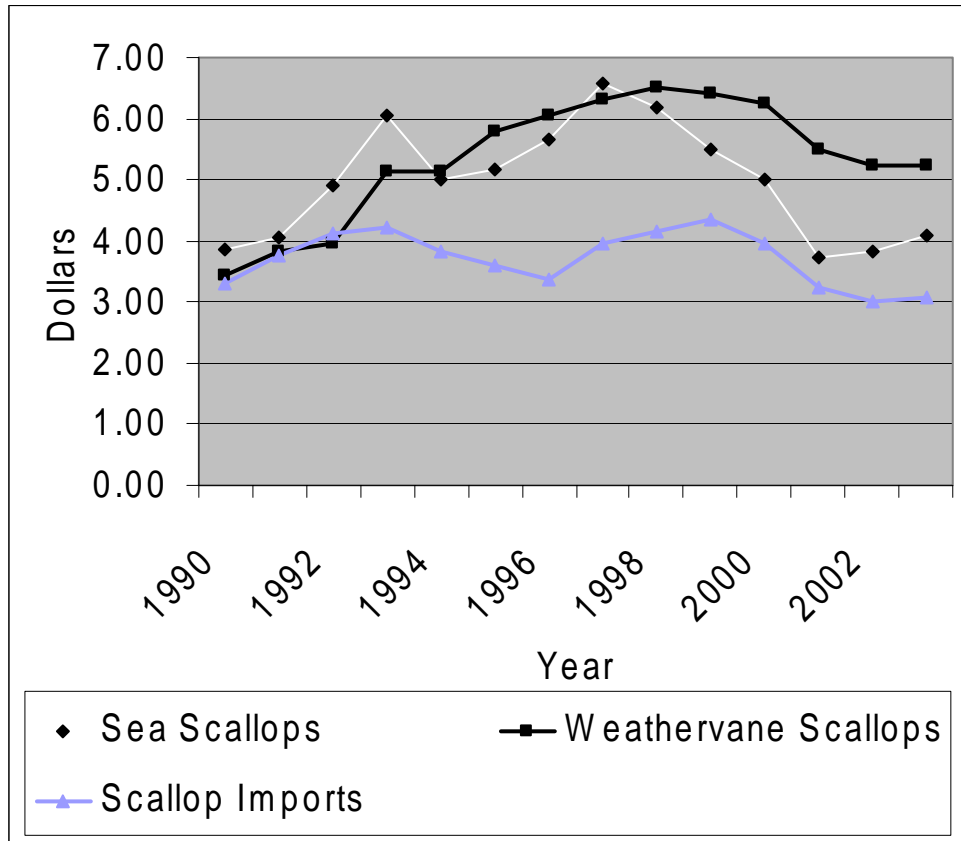
Year	Sea Scallops			Alaska Weathervane Scallops*			Scallop Imports, All Species Combined		
	Pounds	\$ Value	Av. \$/lb.	Pounds	\$ Value	Av. \$/lb.	Pounds	\$ Value	Av. \$/lb.
1990	38,122,499	147,652,629	3.87	1,481,136	5,080,296	\$3.43	40,019,022	131,561,184	3.29
1991	37,722,537	152,962,080	4.05	1,136,649	4,341,999	\$3.82	29,657,673	111,367,873	3.76
1992	31,142,424	152,613,014	4.90	1,785,673	7,071,265	\$3.96	38,835,772	160,209,462	4.13
1993	16,023,939	96,864,382	6.04	568,077	2,925,597	\$5.15	52,064,185	219,181,426	4.21
1994	16,693,648	83,668,338	5.01	984,583	5,070,602	\$5.15	56,803,716	216,872,816	3.82
1995	17,387,151	89,677,480	5.16	1,240,775	7,184,087	\$5.79	48,441,298	174,791,787	3.61
1996	17,456,928	98,511,157	5.64	410,743	2,482,941	\$6.05	58,848,419	198,798,644	3.38
1997	13,614,715	89,368,536	6.56	732,424	4,614,271	\$6.30	60,331,156	238,121,731	3.95
1998	12,110,282	75,034,905	6.20	818,913	5,322,935	\$6.50	53,200,242	221,115,522	4.16
1999	22,009,495	120,935,432	5.49	822,096	5,261,414	\$6.40	44,601,478	194,740,607	4.37
2000	32,132,910	160,756,579	5.00	837,971	5,237,319	\$6.25	54,080,178	214,764,421	3.97
2001	46,632,002	173,551,125	3.72	750,617	4,128,394	\$5.50	40,044,408	130,033,430	3.25
2002	52,576,168	201,794,044	3.84	572,838	3,007,400	\$5.25	48,958,906	146,690,423	3.00
2003	55,944,483	229,003,703	4.09	509,455	2,674,639	\$5.25	52,861,692	161,893,889	3.06

Sources: NMFS Data at <http://www.st.nmfs.gov> and ADF&G Fish Ticket data.

* Seasonal data is displayed as annual data for comparison with annual sea scallop landings

Though this analysis has not found a published formal market study of price determination of weathervane scallops, there are some intuitive conclusions that can be made from the data presented in Table 2 and from the price trends displayed in Figure 1. First, domestic markets are dominated by Atlantic sea scallop production. Second, prices of weathervane scallops track closely to those of Atlantic sea scallops. Thus, it is highly likely that domestic market price is dominated by the relationship between quantity supplied in the Atlantic sea scallop fishery and domestic market demand.

Figure 1: Scallop Price Comparisons, 1990-2003



Another important factor in scallop market is imports of scallop products. Unfortunately, available import data commingles imports of several small scallop species (e.g. pink, calico, bay etc.) with larger scallop varieties such as sea scallops and weathervane scallops. However, as these products are substitutes for one another, although not perfectly, the imports of these other species may have an effect on domestic market prices. In any event, the imported value of scallops has been similar to, or exceeded, total domestic production in recent years. Thus, it is likely that domestic market prices are heavily influenced by imports.

The obvious conclusion that can be drawn from the data presented in Table 1 is that the wholesale price of weathervane scallops is determined largely by other domestic supply and import supply. This suggests that North Pacific harvesters have little, if any, market power to negotiate prices and are essentially price takers in the wholesale market. There is likely an exception to this condition.

The scallop fishery inside the Cook Inlet registration area is located close enough to the port of Homer that vessels participating in that area can make short trips and delivery fresh product to shoreside processors or distributors. Homer is linked to Anchorage by road and scallops landed there can enter the Anchorage white tablecloth market and/or be sold locally to tourists who

flock to the region each summer. Thus, a somewhat separate market may exist for vessels that fish inside the Cook Inlet registration area. At present, so few vessels fish inside the Cook Inlet Registration Area that the data is confidential.

Scallop Fishery Transition and Fleet Consolidation

A review of fish ticket data suggest that, in the early days of this fishery, vessels delivered fresh scallop meats to shoreside processors. The shoreside processors then processed the meats (e.g. trim, freezing, and packaging) and moved the product to market, whether in fresh or frozen form. That method continued into the mid 1990's as CVs converted to catch-processors (CPs) freezing product at sea.

Under these conditions, vessel operators are constrained by external market forces dictating the value of their catch. Thus, operators would look to reduce inefficiencies, reduce operating costs, and attempt to capture processing value added that was being captured by the shoreside processing sector. Operators might even attempt to improve value by increasing quality. It can be argued that fresh frozen (at sea) product may be superior to product that is iced for a period of time before being consumed and/or frozen. The result of these forces appears to be converting CVs to CPs with freezing capacity in the scallop fishery. That this began to happen should be no surprise. It was around this time that the CP fleet began to expand in several of the Bering Sea fisheries for many of the same reasons.

This practice expanded over the next several seasons. By the time the vessel moratorium was imposed in 1997 there were 18 vessels included under the moratorium. Further consolidation of the fleet was deemed necessary by the North Pacific Fisheries Management Council.

In 1999 the Council adopted Amendment 4 to the Scallop FMP, which established the Federal License Limitation Program (LLP). The LLP recognized 9 participants and granted them statewide access with maximum vessel length overall (MLOA) limits (equal to the length of the vessel they were using during the qualifying period) and with gear restrictions for two vessels that primarily fished inside the Cook Inlet Registration Area. All of the remaining 7 participants in the statewide fishery outside the Cook Inlet Registration Area were using vessels categorized at CPs. Thus, at the time of the LLP, virtually all effort in the statewide fishery outside the Cook Inlet Registration Area was from CPs. Thus, the transition away from the capture of shoreside processing value added by offshore processing, and any potential improvement in quality brought about by at-sea freezing appeared to be complete by the time of LLP implementation in 2000. However, further fleet consolidation was predictable, and had already begun.

The Regulatory Impact Review (RIR) analysis supporting the action to create the LLP (NPFMC 1999) develops a breakeven analysis for the scallop fishery in the statewide fishery outside the Cook Inlet registration area. This analysis estimates the number of vessels that could breakeven in the fishery under a series of price and landings scenarios. The analysis is based on operating cost and revenue data provided voluntarily by fishery participants. Table 3 presents the analysis.

Table 3: Number of Vessels that Could Breakeven Under Various Price and Landings Scenarios (recreated from Regulatory Impact Review for Amendment 4 to the North Pacific Scallop FMP)

Price	Landing (pounds)			
	600,000	800,000	1,000,000	1,200,000
\$5.00	3.6	4.9	6.1	7.3
\$5.50	4.0	5.3	6.7	8.0
\$6.00	4.4	5.8	7.3	8.7
\$6.50	4.7	6.3	7.9	9.5
\$7.00	5.1	6.8	8.5	10.2
\$7.50	5.5	7.3	9.1	10.9
\$8.00	5.8	7.8	9.7	11.6

In the 1999/00 season 10 vessels, including two inside the Cook Inlet registration area, landed 837,971 pounds of scallops with an average price of \$6.25. The analysis recreated in Table 3 indicates that approximately 6 vessels could breakeven fishing in the statewide fishery outside the Cook Inlet Registration Area under this price and landings scenario. Thus, participation in the statewide fishery outside the Cook Inlet Registration Area exceeded the breakeven number of vessel by two.

In 2000/01 8 vessels, including two operating inside the Cook Inlet registration area, landed 750,617 pounds of scallops with an average price of \$5.50 per pound. The breakeven analysis suggests that this price and landings combination could probably support 5 vessels in the statewide fishery outside the Cook Inlet Registration Area; however, 6 were fishing in that season.

In 2001/02 6 vessels, likely four in the statewide fishery outside the Cook Inlet Registration Area, landed 572,838 pounds of scallops with an average price of \$5.25 per pound. The breakeven analysis suggests that this landings and price scenario could support fewer than four vessels at breakeven levels and this appears to be the case in 2002/03 as well.

In 2000 a group of six of the LLP holders, who traditionally have fished in the statewide fishery outside the Cook Inlet Registration Area, formed a voluntary marketing cooperative (NPFMC 2005). The cooperative members agreed to reduce harvesting capacity and entered into revenue sharing agreements with members who agreed to not use their vessel(s). That the cooperative chose to do this is not surprising given the effect of declining landings and price on breakeven numbers in this fishery between 2000/01 and 2002/03.

In 2001, the cooperative reduced vessel participation by 50 percent; however, one vessel continued to operate independently in the statewide fishery outside the Cook Inlet Registration Area. Two vessels continued to fish independent of the cooperative inside the Cook Inlet Registration Area. Thus, capacity reduction efforts made by the cooperative had reduced overall capacity but not to the level suggested by the breakeven analysis presented above.

A point worth considering is that several of the LLP holders who had joined the cooperative had, at one time, been involved in the East Coast Atlantic sea scallop fishery. This was true of the

LLP associated with the vessels Carolina Girl and Carolina Boy and the vessel Pursuit. The Pursuit was operating out of Kodiak when the LLP was implemented and the Carolina Boy and Carolina Girl were operating out of Seward (Barnhart, 2006). Each of these operations however, was East Coast based and likely had to bear costs of travel to and from the east coast, vessel caretaking costs during the off-season, and idle vessel time. These factors likely contributed to these three vessels not fishing under the cooperative.

Instead of fishing, the owners of the LLP that originally used these vessels received some form of revenue and/or ownership sharing while the other cooperative members continued to fish. Evidence of this was presented in Appendix A to the Environmental Assessment conducted for Amendment 10 to the FMP (NPFMC 2005b). Provider Inc. and Ocean Fisheries LLC provided operating cost data for their scallop fishing enterprise in 2003. This data shows that these two operators paid \$244,516 in “scallop leases” in 2003.

The lease fees paid by Ocean Hunter and Provider Inc. could only be afforded if the operations gained considerably more revenue and/or if they are able to decrease operating costs under the cooperative. The revenue earned by these two vessels is confidential. However, the breakeven analysis presented in the RIR for Amendment 4 (LLP) to the FMP determined that the average fixed and variable non-labor costs of the fleet at the time (pre LLP, pre coop) was approximately 59 percent.

The data provided by Provider Inc and Ocean Hunter/ Ocean Fisheries LLC in 2003 indicate a non-labor cost ratios of 59 percent and 57 percent for Provider and Ocean Hunter respectively. However, these non-labor cost ratios include lease fees of \$157,493 paid by Provider Inc and \$87,097 in lease fees paid by Ocean Hunter. Thus, these two cooperative vessels were able to maintain the same, or slightly lower, cost ratio inclusive of leases paid to other cooperative members totaling \$244,516. While revenue cannot be discussed directly, it is likely that overall revenue for these vessels increased with fewer vessels fishing. It is likely that payments to labor, including owner shares, increased with greater overall revenue and similar non-labor cost ratios.

While the cooperative initially limited effort by using revenue sharing to compensate owners of unused vessels, a more permanent effort reduction began to take place in 2002. It is important to understand that Federal Alaska Scallop LLP permits are not directly associated with a specific vessel. The only vessel requirement on the LLP permit is that it cannot be used on any vessel larger than the MLOA assigned to the LLP. Further restrictions are that no more than two LLPs may be held by one “individual” and that LLPs may not be leased.

In contrast, the Alaska Commercial Fisheries Entry Commission (CFEC) Limited Entry Scallop permit is specifically attached to a vessel. Thus, to fish in both Federal and State waters, one must have a Federal LLP and would need to use the actual vessel assigned the CFEC Limited Entry permit. However, if one wanted to fish only in Federal waters, without harvest restriction, they could use any vessel so long as it was under the MLOA of that LLP and was not an American Fisheries Act (AFA) vessel. Alternatively, if an individual or entity were to purchase a Federal LLP, they would not be required to actually fish the LLP, nor would they then have need of a CFEC Limited Entry licensed vessel.

In 2002, Alaska Scallop LLC was formed by Teresa Kandianis and Tom Mineo. Alaska Scallop LLC purchased the Scallop LLP formerly owned by Carolina Girl. In 2003, another cooperative member, Ocean Fisheries LLC, purchased the LLP originally awarded to Carolina Boy. Thus, Ocean Fisheries LLC now holds two Scallop LLPs, which it fishes on the vessel Ocean Hunter.

Provider Inc., another original LLP holder and cooperative member is owned by Mark Kandianis and John Doody (ADOR, 2006). Further, John Doody is part owner of Pursuit Inc, another original LLP holder and cooperative member. Pursuit has been sold and is now on the east coast and is no longer a scallop vessel (J. Barnhart, pers. comm.).

There was one additional original cooperative member; Forum Star Inc. The vessel Forum Star is an AFA eligible vessel. Under Amendment 8 to the FMP authority was delegated to the State of Alaska to set an AFA sideboard in the scallop fishery. The State set a limit of approximately 35,000 pounds (Barnhart, 2006) at present stock levels, on that vessel. The Forum Star has not fished scallops in recent years but is a cooperative member.

In 2005, Forum Star Inc. and its Scallop LLP were purchased by American Seafoods LLC, also an AFA entity. If the LLP held by American Seafoods LLC remains in the control of an AFA entity, it will continue to be restricted by the AFA sideboard. It is, however, important to note that the LLP itself is not AFA endorsed. This means that it could presumably be sold to a non-AFA entity. As long as a vessel no longer than 97' (the MLOA allowed under Federal Scallop LLP #002) with no AFA endorsement is used with LLP #002, the AFA sideboard restriction would not apply. Thus, an existing scallop operation could buy this LLP and use it on a 97 foot non-AFA vessel. Alternatively, an existing entity would not have to use it at all as just holding the second permit means more scallop harvest for the remaining vessels.

Table 4 provides a summary of LLP holdings and changes in those holding over time. It appears that there are effectively two vessels fishing in the statewide fishery outside the Cook Inlet Registration Area for the cooperative; Ocean Hunter, and Provider. Whether the LLP now held by American Seafoods will continue in the cooperative, be fished independently, or be sold, is not known at present.

Effects of Fleet Consolidation

The story of fleet consolidation presented above is not unlike that of any other fishery that has had overexploitation under open access, inefficiency caused by the race for fish, and marginally profitable operations due to overcapacity. A major result of fleet consolidation is reduced non-labor costs. Such reductions in cost are likely due to reduced crowding on available grounds, and elimination of the inefficiencies of the race for fish that occurs in an overcapitalized fishery.

Fleet consolidation undoubtedly has a direct effect on the number of crew and operator positions in the fishery. At the time of the vessel moratorium, 18 vessels qualified and likely employed at least 216 crew members (12, including operator, cooks, mechanics, etc. per vessel). However,

crew earnings and data linking crew members to vessels do not exist. It is impossible to say, using presently available data, exactly how many crew were employed or the amount of their crew shares. Similarly, it is impossible to determine how many crew were locally (Alaska Residents) acquired. In any event, the Federal LLP effectively reduced the number of crew positions, including operators etc., to 108. The fleet consolidation that has occurred under the cooperative has likely further reduced crew positions to 60, including two operations that have traditionally fished inside the Cook Inlet Registration Area. It is possible; however, that the crew shares earned by these crew members are higher than what was earned in the past.

As has been discussed above, the cooperative entered into a revenue sharing system that resulted in “lease payments” to members who agreed to not use their vessels. These LLP holders received payments from the cooperative. Instead of paying crew, purchasing vessel supplies, and making all the associated expenditures for vessel operations in Alaska, they received a revenue share that did not enter the Alaska economy. In fact, three of the inactive vessels are no longer located in Alaska, and, one of the active vessels has relocated from Kodiak to Bellingham (Barnhart, 2006). The expenditures these vessels traditionally made in Alaska, although a result of inefficiency, have been eliminated and/or reduced under the cooperative. This could be considered a “leakage” from the Alaska economy. Reduced vessel expenditures undoubtedly have negative impacts on coastal communities; however, a full analytical treatment of the impacts would require a survey of vessel expenditure data, optimally for pre and post cooperative levels, and an input-output analysis of expenditure data.

Table 4: Federal Scallop LLP Holder History and Current Activity.

LLP	Original Holder	MLOA	Current Holder*	Restrictions	Corporate Ownership	Vessel Historically Used	Fished in 2004/05
Independent Operators							
003	Hogan, Thomas C.	75	Hogan, Thomas C.	2 dredges with 20' max. combined width	Not Incorporated	Kilkenny	yes
004	Hulse, Max G. et al.	79	Hulse, Max G. et al.	2 dredges with 20' max. combined width	La Brisa Inc: Max Hulse, Mary Hulse, Robert Hulse, Denise Hulse	La Brisa / Wayward Wind	yes
006	Oceanic Research Services	70	Thomas Gilmartin	none	Not Incorporated	Artic Storm	yes
Cooperative Members							
002	Forum Star Inc.	97	American Seafoods Co., LLC	State Imposed AFA Sideboard	American Seafoods Group, LLC	Forum Star	no
005	Ocean Fisheries LLC	100	Ocean Fisheries LLC	none	Mikkelsen Fisheries, Festus Fisheries, Inc., Stein Enterprises, Stone Maritime, Inc., Stuart Rickey (Agent)	Ocean Hunter	yes
007	Pursuit, Inc.	101	Pursuit, Inc.	none	Elenor Doody, Teresa Kandianis (Agent)	Pursuit	no
008	Provider, Inc.	124	Provider, Inc.	none	John Doody, Mark Kandianis, Corp. Service Co. (Agent)	Provider	yes
009	Carolina Boy, Inc.	95	Ocean Fisheries, LLC	none	Mikkelsen Fisheries, Festus Fisheries, Inc., Stein Enterprises, Stone Maritime, Inc., Stuart Rickey (Agent)	Ocean Hunter	yes
010	Carolina Girl, Inc.	96	Alaska Scallop, LLC	none	Teresa Kandianis, Tom Mineo	Formerly Carolina Girl	no

Source: Public records at <http://www.fakr.noaa.gov/ram>, and <https://myalaska.state.ak.us/business/sosbk>

* Bold indicates change in holder of the LLP

Table 5 Scallop Deliveries by Port, 1990-2003.

Port	Year														Total	
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Landings	Landed Pounds
Bel/Sea, WA												1	3	1	5	123,632
Cordova	1		6	1		1		1	1	1	8				20	210,792
Dutch Harbor	12	13	8	32	27	1		14	4	3	2	4	4	3	127	2,013,740
Homer	2			15	12	2	11	7	12	4	8	6	7	13	99	242,568
Kodiak	70	48	49	64	44	6	15	14	15	12	6	8	9	10	370	5,808,856
Ketchikan	1														1	Confidential
Petersburg	2														2	Confidential
Pelican				3											3	Confidential
Seldovia														1	1	Confidential
Seward	5		1	3	4	2	7	5	20	21	10	3			81	2,086,133
Sitka	8	24	15	6	2	2								1	58	364,179
Sand Point										1					1	Confidential
Yakutat	22	16	34	3	5	3	4	6	10	3	3	12	7	2	130	2,000,195
At Sea												1	1	4	6	168,360

Source: Jeff Barnhart, ADF&G Kodiak Alaska.

Fleet consolidation has also affected deliveries to several Alaska ports. Table 5 provides data on scallop deliveries to ports from 1990-2003. These data show that, since formation of the cooperative and associated fleet consolidation, Cordova and Seward no longer receive scallop deliveries. Also of note is that the number of landings to Kodiak has dropped considerably since pre-LLP levels. Some of the deliveries previously made to these ports appear to now be going to Bellingham/Seattle and to “at sea” transfers. Unfortunately, actual amounts of scallops landed in each delivery are largely confidential due to single purchasing points (processors/marketers) in each community. However, it is important to understand that while numbers of deliveries to outside of Alaska ports appear small, the length of trips and amount caught on each trip has increased under the cooperative. Thus, a small number of deliveries in 2003 could represent many more deliveries made to Alaska ports in, for example, 1999. Out of state deliveries also imply that greater expenditure for vessel servicing may be occurring outside of Alaska than in previous years.

A result of reduced port deliveries within Alaska may be reduced landings tax revenue. While all fishing related corporations in Alaska must pay a business tax, the landings tax is normally charged on fish landed in Alaska. Thus, landings to outside ports may result in reduced fish tax collections by the State. Further, the community of Yakutat charges a 1 percent raw fish tax. (ADOR 2005) Thus revenues collected in Yakutat may be reduced by “at sea” and outside of Alaska landings.

While all of the effects mentioned above have negative consequences for some fishery participants and fishing communities, it is likely that the overall effect of fleet reduction is improved profitability for the remaining participants, whether they belong to the cooperative or not. It has been shown, with the cost of production information that is available, that non-labor cost ratios appear to have decreased for the cooperative members that are actively fishing. It is also likely that their revenue has increased. Purchase of LLPs from other cooperative members has likely reduced “lease fee” obligations for active participants, albeit with the potential cost of debt finance for these transactions. Overall, it is likely that fleet consolidation has resulted in a more efficient fleet with lower operating costs, potentially greater average crew wages, and improved returns to owned capital.

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