

**Summary and Analysis of Onboard Observer-
Collected Data From the 2002/2003 Statewide
Commercial Weathervane Scallop Fishery**

by

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July 2006

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



Symbols and Abbreviations

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Weights and measures (metric)		General		Measures (fisheries)	
centimeter	cm	Alaska Administrative Code	AAC	fork length	FL
deciliter	dL			mid-eye-to-fork	MEF
gram	g	all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.	mid-eye-to-tail-fork	METF
hectare	ha			standard length	SL
kilogram	kg	all commonly accepted		total length	TL
kilometer	km				
liter	L	professional titles	e.g., Dr., Ph.D., R.N., etc.		
meter	m			Mathematics, statistics	
milliliter	mL	at	@	<i>all standard mathematical signs, symbols and abbreviations</i>	
millimeter	mm	compass directions:		alternate hypothesis	H _A
		east	E	base of natural logarithm	<i>e</i>
		north	N	catch per unit effort	CPUE
Weights and measures (English)		south	S	coefficient of variation	CV
cubic feet per second	ft ³ /s	west	W	common test statistics	(F, t, χ^2 , etc.)
foot	ft	copyright	©	confidence interval	CI
gallon	gal	corporate suffixes:		correlation coefficient (multiple)	R
inch	in	Company	Co.	correlation coefficient (simple)	r
mile	mi	Corporation	Corp.	covariance	cov
nautical mile	nmi	Incorporated	Inc.	degree (angular)	°
ounce	oz	Limited	Ltd.	degrees of freedom	df
pound	lb	District of Columbia	D.C.	expected value	<i>E</i>
quart	qt	et alii (and others)	et al.	greater than	>
yard	yd	et cetera (and so forth)	etc.	greater than or equal to	≥
		exempli gratia	e.g.	harvest per unit effort	HPUE
Time and temperature		(for example)		less than	<
day	d	Federal Information Code	FIC	less than or equal to	≤
degrees Celsius	°C	id est (that is)	i.e.	logarithm (natural)	ln
degrees Fahrenheit	°F	latitude or longitude	lat. or long.	logarithm (base 10)	log
degrees kelvin	K	monetary symbols		logarithm (specify base)	log ₂ , etc.
hour	h	(U.S.)	\$. ¢	minute (angular)	'
minute	min	months (tables and figures): first three letters	Jan,...,Dec	not significant	NS
second	s	registered trademark	®	null hypothesis	H ₀
		trademark	™	percent	%
Physics and chemistry		United States (adjective)	U.S.	probability	P
all atomic symbols		United States of America (noun)	USA	probability of a type I error (rejection of the null hypothesis when true)	α
alternating current	AC	U.S.C.	United States Code	probability of a type II error (acceptance of the null hypothesis when false)	β
ampere	A	U.S. state	use two-letter abbreviations (e.g., AK, WA)	second (angular)	"
calorie	cal			standard deviation	SD
direct current	DC			standard error	SE
hertz	Hz			variance	
horsepower	hp			population	Var
hydrogen ion activity (negative log of)	pH			sample	var
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

FISHERY MANAGEMENT REPORT NO. 06-39

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ABSTRACT

The Alaska Scallop Fishery Management Plan, 5 AAC 38.076 (g), gives the Alaska Department of Fish and Game (ADF&G) the ability to require observers on board scallop vessels. Observers on board fishing vessels greatly enhance management, primarily by facilitating information gathering and by improving regulatory compliance. ADF&G staff relies heavily on observer-collected data to manage the weathervane scallop fishery.

The Alaska commercial weathervane scallop *Patinopecten caurinus* fishery occurs in the Alaska Territorial Sea and the Exclusive Economic Zone (EEZ) from Cape Spencer (58° 12' 45" N lat., 136° 39' 45" W long.) in Southeast Alaska through the Gulf of Alaska to the U.S.-U.S.S.R. Maritime Boundary Agreement Line of 1990 in the Bering Sea.

This report presents onboard observer-collected data and commercial weathervane scallop fishery statistics by registration area and district. A summary of fishing effort, area fished, number of vessels, observer coverage, crab and halibut bycatch estimates, catch composition, crab mortality, and discarded and retained scallop catch is included.

Key words: Weathervane scallop fishery, *Patinopecten caurinus*, fishery observer, Kodiak, Alaska Peninsula, Bering Sea, Dutch Harbor, Aleutian Islands, Yakutat, Prince William Sound, bycatch

INTRODUCTION

Alaskan weathervane scallop *Patinopecten caurinus* populations were identified in 1953 (Haynes and Powell 1968). In 1967, two Kodiak-based vessels the F/V Cloverleaf and the F/V Virginia Santos, were converted to scallop dredging (Turk 2000). At this same time, scallop catches were declining in the U.S. and Canadian fisheries on Georges Bank. By 1968, a movement of scallop vessels from the east coast to Alaska had occurred. The fishery expanded to 19 vessels consisting of New Bedford type scallop vessels, converted Alaska crab boats, salmon seiners, halibut longliners, and shrimp trawlers (Kaiser 1986).

The fishery developed from 1967 through 1973 as virgin scallop beds were identified and harvested (Shirley and Kruse 1995). This was followed by a period of declining scallop harvests from 1974 to the end of the decade. A smaller, more stable fishery followed through the 1980s.

By 1993, the fishery was again expanding with an influx of scallop boats from the east coast of the United States. The influx of new vessels into the weathervane scallop fishery prompted concerns from both the scallop and crab industry and the Alaska Department of Fish and Game (ADF&G) about crab bycatch and overharvest of the scallop resource. As a result, the weathervane scallop fishery was designated a high impact emerging fishery on May 21, 1993 (Barnhart and Sagalkin 1998). The resulting state of Alaska fishery management plan (FMP), 5 AAC 38.0766 included 100% onboard observer coverage to monitor crab bycatch and to collect biological and fishery information. As a result of the state FMP, the weathervane scallop observer program began on July 1, 1993.

Information contained in this report is from the 2002/03 regulatory scallop fishing season excluding the Cook Inlet Registration Area (Area H), where onboard observer coverage has been waived by the ADF&G and the Southeastern Registration Area where there is no open season. Previous year's data is included in some tables for comparison purposes. The report also includes a summary of the statewide weathervane scallop commercial fishery harvest statistics and observer data since inception of the observer program in 1993.

There are nine scallop registration areas in Alaska (Figure 1). These include scallop Registration Areas A (Southeastern Alaska), Area D (Yakutat), Area E (Prince William Sound), Area H

(Cook Inlet), Area K (Kodiak), Area M (Alaska Peninsula), Area Q (Bering Sea), Area O (Dutch Harbor) and Area R (Adak). In all registration areas except Cook Inlet (Area H), the weathervane scallop regulatory season is July 1 through February 15. State waters to three miles offshore and federal waters, three to 200 miles offshore, were concurrently open to weathervane scallop fishing. In this report, for simplicity, registration areas will be listed as areas. For example, the Kodiak Registration Area will be referred to as the Kodiak Area. Districts are subsets of registration areas.

METHODS

OBSERVER TRAINING AND DATA COLLECTION PROCEDURES

Training

Observer training for the weathervane scallop fishery was conducted at the University of Alaska Anchorage, North Pacific Fisheries Observer Training Center between June 10 and June 21, 2002. The two-week scallop observer training class was held for all first-time candidates, observers with a current National Marine Fisheries (NMFS) groundfish certification, and trainee observers whose trainee permit (crab or scallop) had expired. A four-day short course was conducted during the second week of training for previously certified scallop observers with expired certificates due to 12 months of inactivity and observers holding current crab certification status or a valid scallop or crab trainee permit. Course material included (1) history of the scallop observer program, (2) Alaska scallop fishery, (3) scallop and crab biology and identification, (4) finfish and invertebrate identification, (5) sampling procedures, (6) sampling forms, (7) use of vernier calipers, (8) safety, (9) onboard observer conduct, (10) shellfish regulations, and (11) documentation of violations. Observers were trained in data collection following the sampling protocols described in the weathervane scallop observer manual (Barnhart 2001).

At-Sea Catch Sampling

Scallop observers collected a variety of biological data on a daily basis. Observers were instructed to sample tows randomly, with the decision to sample an individual dredge made prior to viewing its contents. For haul composition (species) sampling, the daily goal was to sample a single dredge from one tow. For crab and Pacific halibut bycatch and discarded/retained scallop catch monitoring, the daily goal was to sample a single dredge from five different tows.

Haul Composition Sampling. The purpose of the haul composition sampling was to document dredge contents by species weight from one dredge per day. Dredge contents were sorted into baskets by species and weighed. Small quantities were weighed entirely, large amounts were subsampled to estimate weight.

To estimate the weight of retained scallops in the haul composition, three baskets of scallops retained by the crew were weighed, and the average basket weight was determined. The total weight of retained scallops in the sampled dredge was then calculated by multiplying the average basket weight by the total number of baskets retained. All scallops not retained by the crew (discarded scallops) were weighed entirely. Discarded and retained scallop weights were added together to obtain the total weight of scallops captured in the sampled dredge.

The protocol for estimating large volumes of ‘other’ species encountered was similar to that for scallops, except the average weight of three baskets was multiplied by the observer’s visual estimation of volume on deck.

All Pacific halibut *Hippoglossus stenolepis* were measured to the nearest centimeter (cm) from the tip of the nose to the end of the central rays of the caudal fin. Halibut weights were then determined from a length/weight conversion table.

Wood, rocks, and man-made debris items were collected and weighed. Man-made debris was counted and classified as plastics, fishing gear (including line), cans, or other.

Crab and Pacific Halibut Bycatch and Discarded/Retained Scallop Sampling. From a single dredge sampled in five selected tows, observers identified, counted, and recorded the number and condition of crabs and Pacific halibut encountered, collected/examined the discarded scallop catch, and examined the retained commercial scallop catch.

In all sampled dredges, all halibut encountered were measured, examined for injuries, and returned to the sea as quickly as possible.

For each sampled dredge, after the crew selected and removed the commercial scallop catch from the deck, observers were instructed to begin at one end of the remaining pile of dredge contents and select the first 20 each of red king crabs *Paralithodes camtschaticus*, Dungeness crabs *Cancer magister* and *Chionoecetes* spp. (Tanner and snow/hybrid crabs combined) avoiding size bias. If the dredge contained more than 20 crabs of a single genus, *Chionoecetes* for example, observers were instructed to measure and identify by species, the first 20, then count and identify by species, the remainder. For the first 20 crabs of a genus, carapace measurements, shell age, sex, injuries, and mortality were recorded for each crab. Crabs that were crushed, dismembered, or exhibited no movement of body parts were considered dead. Moribund crabs which were nearly dead or severely injured and not likely to survive were also coded as dead. Carapace length (CL) was measured on all king and hair crabs *Erimacrus isenbeckii*, and carapace width (CW) was measured on all other crab species.

Observers examined the discarded scallop catch associated with each bycatch sampled tow. After the crew sorted and removed the retained scallop catch from the dredge contents on deck, observers collected all remaining scallops regardless of size. This discarded scallop catch consisted of small and/or broken scallops and larger sized scallops that were overlooked by the crew. One basket was further subdivided into intact scallops and broken/crushed scallops. If a broken/crushed scallop shell had 50% or more of the body tissue attached to it, it was counted as one scallop. Small pieces of crushed shell and soft body tissue were not counted. The broken/crushed sample was weighed to the nearest whole pound and the individuals were counted. The intact sample was also weighed to the nearest pound, all individuals were counted and shell heights (SH) were collected from 20 randomly selected scallops. The SH was measured to the nearest millimeter in a perpendicular line from the umbo to the most distant point on the outer shell margin using vernier calipers (Figure 2). Any additional baskets of unsorted discarded scallops were weighed to the nearest pound.

Observers also examined the retained scallop catch associated with each bycatch sampled tow. Twenty scallops from the retained catch in each of the sampled bycatch tows were randomly selected and measured. Observers collected the dorsal (left) valve of every tenth scallop examined, as indicated by the shell sampling protocol contained in the scallop manual (Barnhart

1998, 2001). Shells were cleaned of mud, flora, and fauna, then dried. The haul (tow) number and corresponding shell number from the scallop size frequency form, as well as the statistical area number, vessel ADF&G number and date were written with a permanent black marker on the inside of each shell. Dried shells were stored in muslin bags. In addition, observers were instructed to collect 10 to 15 dorsal valves from scallops <100 mm SH from each statistical area fished. These small shells typically have distinguishable first and second year annuli on the shell surface that are frequently worn away and less visible on older shells. These small shells help department staff confirm placement of the first and second annuli on older scallop shells. Typically, scallop fishermen do not retain scallops <100 mm SH, so these shells were collected from the discarded catch. Again, pertinent collection information similar to that associated with the retained scallop shell collection was recorded on the inside of each shell.

Vessel Operator Logbook

Vessel operators maintained a fishing logbook provided by ADF&G. For each tow, the operator recorded (a) combined width of dredges towed, (b) gear performance, (c) date, (d) haul number, (e) set position, (f) tow duration, (g) average depth, (h) average speed, (i) estimated retained round weight in lb of whole/live scallops, (j) estimated discarded scallop catch in lb, and (k) ADF&G statistical area.

Data Collection Forms

Sample data collection forms used for the 2002/03 season can be found in the 2001 scallop observer manual (Barnhart 2001).

SCALLOP FISHING LOCATION MAPPING

Fishing locations were determined from data reported by vessel operators in the fishing logbook. Major fishing areas were plotted by outlining the highest concentration of fishing activity within a registration area. Specific fishing locations where fewer than three vessels participated remain confidential and were not mapped.

ESTIMATION OF CRAB AND PACIFIC HALIBUT BYCATCH, AND DISCARDED SCALLOP CATCH

Incidental bycatch of Dungeness crabs, red king crabs, halibut, snow crabs *Chionoecetes opilio*, and Tanner crabs *Chionoecetes bairdi* was estimated from the observer data. The observer's daily goal was to randomly sample bycatch in a single dredge from each of five tows. Due to weather conditions, observer health, and the vessel's daily fishing schedule, the number of dredges sampled ranged from zero to five on each day when fishing occurred.

For each fishing area, total bycatch (\hat{B}) of each species was estimated by summing all daily bycatch estimates from each vessel, calculated as:

$$\hat{B} = \frac{c}{t} \cdot T \cdot D, \quad (1)$$

where:

c = number counted in sampled dredges,

t = sampled dredge·hours (dredge·hr = one dredge towed 60 minutes),

T = total dredge-hours, and

D = average number of dredges fished.

For days when no dredges were sampled, bycatch was estimated by multiplying the average catch rate (number/hour) for the same vessel in the same area by total dredge-hours and average number of dredges fished during the day for which no samples were taken. Ninety-five percent confidence intervals for the bycatch estimates were calculated by percentile-method bootstrapping (Barnhart et al. 1996).

Sampling effort for scallops discarded by the fleet also ranged from 0–5 dredges per day. Methods for estimating the number and weight of discarded scallops in each fishing area were similar to those used for crab and Pacific halibut bycatch. Number or weight (\hat{X}) of intact (or broken) scallops in the sampled dredges on each vessel each fishing day were estimated by:

$$\hat{X} = \frac{x}{W} (W + R), \quad (2)$$

where:

x = number (or weight) of intact (or broken) scallops in subsampled baskets,

W = weight of subsampled baskets, and

R = weight of remaining scallops in sampled dredges.

Estimates for each day were obtained by substituting \hat{X} for c in equation (1), and area estimates were obtained by summing over all vessels and days. Days with no sampling were handled as above, using average catch rates (number or weight per hour) by the same vessel in the same area. Again, confidence intervals were calculated by percentile-method bootstrapping.

SHELL HEIGHT FREQUENCY DISTRIBUTIONS OF THE SCALLOP CATCH

For areas with sufficiently large sample sizes (at least 200) of both retained and discarded scallop SHs, estimated SH distributions were obtained by resampling with replacement from the observer measurements. Resamples were drawn from either the retained or discarded SH measurements based on the estimated proportion of discards in the total catch for the area. After resampling 10,000 SH measurements, histograms based on 5 mm bins were created to depict the SH distribution.

RESULTS

During the 2002/03 season, eight different observers were deployed aboard four different vessels for a total of 459 vessel days (total days from briefing to debriefing for all observers). A total of 40 briefings and debriefings were conducted by department staff in three ADF&G Regions. One or more tows were sampled on 312 of the 336 vessel days (93%) that fishing occurred. Due to inclement weather, physical health, or the vessel schedule, observers were unable to conduct sampling on every day that fishing occurred. On the average, observers sampled 5 tows per day. Approximately 30% of the 5,368 tows recorded in vessel operator logbooks were sampled.

COMMERCIAL SCALLOP FISHERY

Catch and Effort

The scallop fleet fished 29 different statistical areas extending from Yakutat to the Bering Sea. Figure 3 shows where the majority of fishing effort occurred.

Scallop dredges were towed a total of 24,447 nautical miles (nmi) and swept a maximum of 118 square nautical miles (nmi²) of the bottom during the 2002/03 season. (Table 1). Dredges were towed 12,434 nmi in the Kodiak Area (61 nmi² swept), 6,177 nmi in the Yakutat Area (30 nmi² swept), 4,965 nmi in the Bering Sea Area (24 nmi² swept), 462 nmi in the Dutch Harbor Area (2 nmi² swept), and 409 nmi in the Prince William Sound Area (1 nmi² swept). The 2002/03 statewide total miles towed and area dredged was the lowest since 2000/01.

Average depth fished during the 2002/03 season was 45 fathoms (fm) and ranged from a minimum of 25 fm in the Shelikof District of the Kodiak Area to a maximum of 75 fm, again in the Shelikof District (Table 2). The statewide average depth fished each season since 2000/01 has been similar.

Effort in the scallop fishery is based on dredge-hr. A dredge-hr is defined as one dredge towed 60 minutes. Effort totaled 10,032 dredge-hr during the 2002/03 season (Table 3). Alaska scallop vessels typically tow two dredges simultaneously but may tow a single dredge when fishing unfamiliar areas, repairing a dredge or when a winch is inoperable. The highest effort occurred in the Kodiak Area with 5,149 dredge-hrs followed by the Yakutat Area with 2,539 dredge-hrs and the Bering Sea Area with 2,038 dredge-hrs. Effort in the Dutch Harbor Area was 184 dredge-hrs, followed by the Prince William Sound Area with 122 dredge-hrs (Figure 4).

Total round weight of retained scallops for the season, as recorded in vessel operators logbook was 5,575,393 lb (Table 3). The Kodiak Area accounted for the largest catch with 2,729,384 lb, followed by the Yakutat Area with 1,602,795 lb, Bering Sea Area with 952,958 lb, Prince William Sound Area with 231,140 lb, and the Dutch Harbor Area with 59,116 lb (Figure 4).

Scallop catch-per-unit-effort (CPUE) is expressed in two ways, round weight and shucked meat weight, standardized to a dredge-hr. Round weight represents the weight in lb of live or whole scallops retained by the crew. The round weight of retained scallops is estimated by the vessel operator for each tow by counting the number of retained scallop bushels and multiplying by an estimated weight per bushel. Shucked meat weight represents the weight in lb of shucked scallop meats weighed at the time of processing.

Scallop CPUE expressed in round weight of retained scallops per dredge-hr (lb/drg-hr), was highest in the Prince William Sound Area at 1,895 lb/drg-hr, followed by the Northeast District of the Kodiak Area with 646 lb/drg-hr, Yakutat Area D with 632 lb/drg-hr, Yakutat District 16 with 609 lb/drg-hr, the Shelikof District of the Kodiak Area at 489 lb/drg-hr, the Bering Sea Area with 468 lb/drg-hr, and the Dutch Harbor Area with 321 lb/drg-hr (Table 3; Figure 4). Statewide, CPUE was 556 lb/drg-hr.

Retained scallop meats as reported on fish tickets totaled 500,864 lb. The Kodiak Area harvest of 260,580 lb was the highest in the state followed by the Yakutat Area harvest of 126,403 lb, Bering Sea Area harvest of 92,240 lb, Prince William Sound Area harvest of 15,641 lb, and the Dutch Harbor Area with 6,000 lb (Table 3).

Scallop CPUE expressed in lb of shucked scallop meats per dredge-hr (meat lb/drg-hr) was highest in the Prince William Sound at 128 meat lb/drg-hr, followed by 59 meat lb/drg-hr in the Northeast District of the Kodiak Area, 50 meat lb/drg-hr in Yakutat Area D, 48 meat lb/drg-hr in the Shelikof District of the Kodiak Area, 45 meat lb/drg-hr in the Bering Sea Area, 37 meat lb/drg-hr in Yakutat District 16, and 33 meat lb/drg-hr in the Dutch Harbor Area. Statewide, CPUE was 50 meat lb/drg-hr.

Discarded Scallop Catch

From the discarded portion of the 2002/03 catch, observers counted and weighed a total of 188,639 scallops consisting of 128,925 intact discarded scallops and 59,714 broken discarded scallops (Table 4). This is an increase from the 164,034 discarded scallops sampled in 2001/02, but a decrease from the 228,924 sampled in the 200/01 season. Estimates based on the 2002/03 season data indicate that a total of 3.9 million combined intact and broken shell scallops weighing 1.1 million lb were discarded (Table 5). The intact discards numbered 2.8 million with a weight of 731,465 lb and the broken discards numbered 1.1 million with a weight of 367,630 lb. Approximately 16% of the total statewide scallop catch by round weight was discarded. Approximately 67% of the discarded scallops by weight were intact.

Further examination of estimated weights of discarded scallops indicates that 60% of the total discards by weight were from the Kodiak Area and 34% from the Yakutat Area. Estimated weight of discarded scallops from all other areas combined was 6% of the statewide total discards.

Average weight of individual discarded scallops (intact and broken scallops combined) for the 2002/03 season ranged from 0.26 lb in Yakutat District 16 to 0.41 lb in the Bering Sea Area (Table 4). Statewide average weight for combined broken and intact shell discards was 0.30 lb.

Of the 23,474 measured intact discarded scallops, average SHs ranged from 102 mm in Yakutat Area D, Prince William Sound Area and the Shelikof District of the Kodiak Area to 112 mm in the Bering Sea Area. Scallops larger than 100-110 mm SH are typically retained in the commercial fishery.

Retained Scallop Catch

Observers measured approximately 26,000 scallops from the retained catch (Table 6). Average statewide SH was 136 mm and ranged from 120 mm in Yakutat District 16 to 149 mm in the Bering Sea.

Combined Retained and Discarded Scallop Catch

Estimated shell height distributions for retained and discarded scallops caught in each management area/district where adequate data (at least 200 measurements) were available are depicted in Figures 4-10. Caution should be exercised when interpreting these plots. Alaska weathervane scallop vessels are required to use scallop dredges with rings having an inside diameter of four inches (102 mm) or larger. The top of the ring bag is constructed of six-inch twine mesh. So, scallops <102 mm SH are captured with lower efficiency than larger scallops. Typically, scallops <100 mm SH are discarded, but decisions to retain or discard scallops are made by the individual operators and their crews. Statewide from the commercial catch, observers measured approximately 26,000 retained scallops and over 23,000 discarded scallops.

Estimated SH distributions for Yakutat District 16 based on 2002/03 season data, show a high proportion of the catch was comprised of scallops 120 mm SH or smaller (Figure 5). This SH distribution is similar to both the 2000/01 and 2001/02 seasons. The average size scallop retained in the 2002/03 commercial catch was 120 mm SH (Table 6). During the 2002/03 season, there was modest recruitment to the harvested population as evidenced by scallops less than 110 mm SH. Catches in Yakutat Area D during the 2002/03 season, indicate continued recruitment to the harvested population as well (Figure 6). Proportionally, the harvest of scallops over 120 mm SH was greater in Area D than in Area D16 during the 2002/03 season. The average size scallop in the 2002/03 retained commercial catch in Area D was 123 mm SH.

Plots of Prince William Sound SH distributions show that few scallops were discarded in this fishery during the 2000/01 to 2002/03 seasons (Figure 7). The retained catch over the last three seasons is predominated by scallops 120 mm SH or larger. In 2002/03, the retained catch shifted to smaller-size animals than were retained during the 2001/02 season. The average SH of scallops retained by the commercial fleet in Prince William Sound was 131 mm in 2000/01, 136 mm in 2001/02, and 131 mm in 2002/03.

Estimated SH distributions in the Kodiak Area feature a wider range of scallop sizes than were found in the Yakutat and Prince William Sound Areas. During the 2002/03 season, scallops from 125 mm SH to 150 mm SH were represented in nearly equal proportion in the Northeast District catch as compared to 2000/01 and 2001/02 when defined sizes predominated catches (Figure 8). The average size scallop retained in the 2002/03 commercial catch from the Northeast District was 140 mm SH. There appears to be continued recruitment to the harvested population as evidenced by scallops <115 mm SH. Estimated SH distributions in the Shelikof District show the catch was predominated by scallops >120 mm SH in 2002/03 and 2000/01 (Figure 9). In the Shelikof District, the average shell height of the retained commercial catch was 134 mm in 2000/01, 140 mm in 2001/02, and 138 mm in 2002/03. There appears to be regular recruitment to the harvested population as evidenced by scallops <115 mm SH in the commercial catch.

The 2002/03 Bering Sea Area catch was similar to that of previous seasons; the catch is comprised of large scallops >130 mm SH with few discards (Figure 10). The average shell height of the retained catch was 142 mm in 2000/01, 141 mm in 2001/02, and 149 mm in 2002/03. A small cohort of scallops around 90 mm SH in 2001/02 and 110 mm SH in 2002/03 suggests some recruitment to the harvestable population.

The Dutch Harbor Area was closed for the 2000/01 and 2001/02 seasons. Estimated 2002/03 SH distributions indicate that some recruitment occurred in the interim when fishing was closed (Figure 11). The SH of the retained commercial catch in the Dutch Harbor Area averaged 128 mm in 1998/99, 135 mm in 1999/2000 and 133 mm 2002/03.

SCALLOP FISHERY BYCATCH

A detailed ranking of the top twenty species or items by percent weight of the total catch from sampled dredges for each registration area or district fished during the 2002/03 season is presented in Tables 7-13. Although a variety of marine vertebrates, invertebrates, and natural or man-made debris (e.g., plastics and derelict fishing gear) are caught incidentally in scallop dredges, weathervane scallops predominated catches. In the Prince William Sound Area, weathervane scallops comprised the largest percentage of the catch by weight (95%) of any registration area in Alaska. In contrast, weathervane scallops comprised 59% of the catch by weight in the Dutch Harbor Area. Sunflower sea stars, a predator of weathervane scallops,

ranked in the top three species or items caught in all areas, except the Bering Sea Area, during the 2002/03 season.

A summary of the 36 most frequently caught species, species groups or items, by percent weight of the total catch is presented in Table 14. In addition to weathervane scallops, other species or groups of species or items are categorized as (1) prohibited species bycatch, (2) other commercial important species, and (3) miscellaneous species or items. The Prince William Sound Area has the least species diversity, with seven species or species groups represented in the table. The largest diversity of species were found in the Kodiak Area.

Crab Bycatch Estimates

The highest bycatch of *Chionoecetes* crabs occurred in the Bering Sea Area. An estimated 70,795 snow and hybrid crabs were incidentally caught in addition to an estimated 48,053 Tanner crabs for a total of 118,848 *Chionoecetes* crabs (Table 15).

Estimated bycatch of Tanner crabs in other areas included the Kodiak Area with 73,986 crabs, Yakutat Area with 8,608 crabs, Dutch Harbor Area with 2,744 crabs and the Prince William Sound Area with 369 crabs.

Dungeness crabs were recorded in the bycatch from three areas: the Shelikof District of the Kodiak Area, Yakutat Area D and the Dutch Harbor Area. The Shelikof District of the Kodiak Area accounted for the largest estimated Dungeness crab bycatch, with 2,704 crabs followed by Yakutat Area D with 779 crabs, and the Dutch Harbor Area with an estimated 29 crabs.

Few red king crabs *Paralithodes camtschaticus* were taken as incidental bycatch by the scallop fleet. Two red king crabs were incidentally caught in the Bering Sea. No king crab bycatch was reported from the remainder of the state. As a condition of registering to fish scallops, the vessel operator must agree to show every king crab caught to the observer for sampling, so king crab bycatch data presented in this report are counts rather than estimates.

Chionoecetes Crab Bycatch Mortality. On-deck mortality of Tanner crabs recorded by observers during the 2002/03 season ranged from 21% in the Bering Sea to 97% in Prince William Sound (Table 16).

For the Kodiak and Yakutat Areas, the overall mortality rate observed during the 2000/01 through 2002/03 seasons, was identical or very similar. Conversely, differences can be significant. Over the same time period, the mortality rate ranged from 50% to 97% in Prince William Sound.

Size and shell condition of *Chionoecetes* crabs incidentally caught in scallop dredges were shown to affect mortality rates (Urban et al., 1994; Barnhart et al., 1996; Rosenkranz 2002) and lead to variation in mortality rates.

Size Distribution of Tanner and Snow/hybrid Crab Bycatch. Size frequency plots of Tanner crab bycatch from Yakutat Area D in the 2000/01 through 2002/03 seasons, and Prince William Sound during the 2000/01 and 2002/03 seasons indicate bycatch was comprised of small, immature animals with average carapace width (CW) <30 mm (Figures 12;13). Note that sample sizes were too small to plot Yakutat District 16 for 2002/03 (15 animals), and for Prince William Sound in 2001/02 (5 animals).

For the Kodiak Area, size frequency plots of Northeast District Tanner crab bycatch (Figure 14) show crabs of increasing sizes over two seasons, with a strong mode of females at about 80 mm

CW in both 2000/01 and 2001/02. Conversely, crab sizes decreased in the 2002/03 season exhibiting a strong mode for both female and male crabs at about 65 mm CW. Size frequency plots of Shelikof District Tanner crab bycatch (Figure 15) show the majority of the crab at a strong mode centered at 25 mm CW in 2000/01 and 40 mm CW in 2002/03. In 2001/02 there appears to be several modes. No fishing occurred in the Semidi District between 2000/01 and 2002/03.

The Alaska Peninsula Area was closed to scallop fishing during the 2002/03 seasons.

The plot of incidentally caught Tanner crabs during the 2002/03 Bering Sea fishery show that few crabs <50 mm CW were caught (Figure 16). This was not the case in 2000/01 and 2001/02 when strong modes of Tanner crabs <50 mm CW appear in the plots. Few females larger than 120 mm CW were caught in any year.

The most notable feature in size frequency plots of snow crabs for the Bering Sea Area (Figure 17) is the discrepancy between male and female sample sizes; males predominated the bycatch. Males exhibited a strong bimodal distribution each year while females did not. Few females >110 mm CW were recorded in the bycatch.

Sample sizes for size frequency plots of incidentally-caught Tanner crabs in the Dutch Harbor Area were small in 2002/03, but show that the bycatch was comprised mostly of immature animals <80 mm CW. The Dutch Harbor Area was closed during the 2000/01 and 2001/02 seasons.

Tanner and Snow Crab Bycatch Relative to the Scallop Harvest. The bycatch rate of *Chionoecetes* crabs per pound of retained scallops meats (crab/lb meat) is reported in Tables 17-22. The rate was highest in the Bering Sea Area with 1.3 crab/lb meat. Bycatch rates for Yakutat District 16, Yakutat Area D, Prince William Sound Area and the Shelikof District of the Kodiak Area were all <0.1 crab/lb meat. The crab bycatch rate in the Northeast District of the Kodiak Area was 0.3 crab/lb meat while the rate in the Dutch Harbor Area was 0.5 crab/lb meat.

Pacific Halibut Bycatch Estimates and Release Conditions

Estimated Pacific halibut bycatch in the 2002/03 season totaled 871 halibut and ranged from 0 in the Dutch Harbor Area to 476 in the Kodiak Area (Table 15). Of 114 halibut examined in sampled tows, 23 (20%) were released in excellent condition, 26 (23%) were released in good condition, 25 (22%) were released in fair condition, 12 (11%) were released in poor condition, 19 (17%) were released dead, and five (4%) were previously dead when caught (obviously not killed in the current haul) and four (3%) were not examined (Table 23). From bycatch sampled tows during the 2000/01 season, 21 halibut were examined and during the 2001/02 season 93 halibut were examined.

UPDATING OF SUMMARY TABLES

Statewide commercial fishery statistics and observer data from the 1993 through the 2002/03 seasons are summarized in Tables 17-22 for all scallop registration areas and districts. The tables include season dates, effort levels, crab bycatch limits, crab and halibut bycatch estimates, scallop harvest, percent meat (adductor muscle) recovery, estimated number and weight of the discarded scallop catch, and the average size of the retained scallop catch.

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TABLES AND FIGURES

Table 1.-Distance towed and bottom area dredged, 2000/01 through 2002/03 weathervane scallop fishing seasons.

Registration Area	2000/01		2001/02		2002/03	
	Tow Miles ^a	Area Dredged ^b	Tow Miles ^a	Area Dredged ^b	Tow Miles ^a	Area Dredged ^b
Yakutat						
District 16	1,187	6.0	1,006	5.0	244	1.0
Area D	10,382	50.0	5,843	29.0	5,933	29.0
Yakutat Area Total	11,569	56.0	6,849	34.0	6,177	30.0
Prince William Sound	759	2.0	654	3.0	409	1.0
Kodiak						
Northeast District	2,695	13.0	2,748	13.0	3,241	16.0
Shelikof District	7,125	35.0	8,323	41.0	9,193	45.0
Semidi District	No Fishing		No Fishing		No Fishing	
Kodiak Area Total	9,820	48.0	11,071	54.0	12,434	61.0
Alaska Peninsula	875	4.0	Season Closed		Season Closed	
Bering Sea	8,412	41.0	7,563	37.0	4,965	24.0
Dutch Harbor	No Fishing		Season Closed		462	2.0
Statewide Total	31,435	151.0	26,137	128.0	24,447	118.0

^a Nautical miles (nmi) towed regardless of the number of dredges.

^b Maximum square nautical miles (nmi²), area swept.

Table 2.-Minimum, maximum, and average depth fished, 2000/01 through 2002/03 weathervane scallop fishing seasons.

Registration Area	2000/01			2001/02			2002/03		
	Depth (fathoms)								
	Range		Average	Range		Average	Range		Average
	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average
Yakutat									
District 16	27	47	37	33	55	38	30	53	40
Area D	29	72	40	28	66	42	29	64	39
Yakutat Area Average	27	72	40	28	66	41	29	64	39
Prince William Sound	31	60	44	30	49	36	35	48	43
Kodiak									
Northeast District	30	80	45	40	65	45	40	58	43
Shelikof District	25	94	52	21	78	53	25	75	46
Semidi District	No Fishing			No Fishing			No Fishing		
Kodiak Area Average	25	94	50	21	78	51	25	75	45
Alaska Peninsula	48	83	56	Season Closed			Season Closed		
Bering Sea	32	63	52	48	62	52	39	60	53
Dutch Harbor	Season Closed			Season Closed			28	54	39
Statewide Total	25	94	47	21	78	48	25	75	45

Table 3.-Summary of commercial fishery statistics and scallop observer data from the 2002/03 weathervane scallop fishing season.

Registration Area	Season Dates	Number of Vessels ^a	Number of Days Fishing Observed ^b	Dredge Hours ^c	lb of Retained Scallops ^d (Round lb)	CPUE ^e	lb of Retained Scallop Meats	CPUE ^f	Estimated Bycatch		% Scallops (by weight) in Samples ^g	Number of Tanners per lb of Retained Scallop Meats
									Tanner	Halibut		
Yakutat												
District 16	July 1-Feb 15	2	4	100	60,928	609	3,685	37	185	9	79	0.05
Area D	July 1-Feb 15	2	77	2,439	1,541,867	632	122,718	50	8,423	291	80	0.07
Yakutat Area Total	July 1-Feb 15	2	79	2,539	1,602,795	631	126,403	50	8,608	300	80	0.07
Prince William Sound	July 1-Feb 15	2	16	122	231,140	1,895	15,641	128	369	10	93	0.02
Kodiak												
Northeast District	July 1-Feb 10	2	42	1,350	871,918	646	80,000	59	22,821	175	71	0.29
Shelikof District	July 1-Feb 9	3	110	3,799	1,857,466	489	180,580	48	51,165	301	76	0.08
Semidi District	July 1-Feb 15						No Fishing					
Kodiak Area Total	July 1-Feb 15	3	152	5,149	2,729,384	530	260,580	51	73,986	476	73	0.28
Alaska Peninsula	Season Closed											
Bering Sea	July 1-Feb 15	2	56	2,038	952,958	468	92,240	45	118,848 ^h	85	78	1.29
Dutch Harbor	July 1-Feb 15	1	7	184	59,116	321	6,000	33	2,744	0	60	0.46
Statewide Total (excluding Cook Inlet)	July 1-Feb 15	4	310	10,032	5,575,393	556	500,864	50	204,555	871	77	0.41

^a Vessel operators voluntarily released their confidential data.

^b An observed day is a day with at least one sampled tow. Fishing may occur in several areas or districts within a registration area on the same day.

^c Dredge hour = one dredge towed for 60 minutes.

^d Vessel operator estimates.

^e CPUE = lb (round weight) of retained scallops per dredge-hour.

^f CPUE = lb of retained (shucked) scallop meats per dredge-hour.

^g From direct haul composition samples only, not estimated.

^h Includes 48,053 Tanner and 70,795 snow/hybrid crabs.

Table 4.-Number and weight (lb) of discarded scallops sampled by observers, 2000/01 through 2002/03 weathervane scallop fishing seasons.

Registration Area	Season	Number Sampled		Weight Sampled (lb)		Average Weight		Overall Average
		Intact	Broken	Intact	Broken	Intact	Broken	
Yakutat								
District 16	2000/01	7,672	7,892	2,017	2,132	0.26	0.27	0.27
	2001/02	2,565	8,090	792	2,096	0.31	0.26	0.27
	2002/03	278	1,314	94	316	0.34	0.24	0.26
Area D	2000/01	62,095	30,556	16,397	9,432	0.26	0.31	0.28
	2001/02	31,759	29,551	7,789	8,369	0.25	0.28	0.26
	2002/03	35,189	22,996	8,704	7,133	0.25	0.31	0.27
<hr/>								
Yakutat Area Total	2000/01	69,767	38,448	18,414	11,564	0.26	0.30	0.28
	2001/02	34,324	37,641	8,581	10,465	0.25	0.28	0.26
	2002/03	35,467	24,310	8,798	7,449	0.25	0.31	0.27
<hr/>								
Prince William Sound	2000/01	1,444	3,724	380	1,270	0.26	0.34	0.32
	2001/02	1,813	1,967	637	789	0.35	0.40	0.38
	2002/03	274	4,199	116	1,332	0.42	0.32	0.32
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Kodiak								
Northeast District	2000/01	15,060	6,838	4,405	2,388	0.29	0.35	0.31
	2001/02	11,095	9,028	3,622	3,571	0.33	0.40	0.36
	2002/03	15,155	9,446	4,836	3,673	0.32	0.39	0.35
Shelikof District	2000/01	42,385	11,755	8,188	4,123	0.19	0.35	0.23
	2001/02	36,138	10,409	11,671	4,810	0.32	0.46	0.35
	2002/03	68,978	12,931	17,430	4,838	0.25	0.37	0.27
Semidi District	2000/01				No Fishing			
	2001/02				No Fishing			
	2002/03				No Fishing			
<hr/>								
Kodiak Area Total	2000/01	57,445	18,593	12,593	6,511	0.22	0.35	0.25
	2001/02	47,233	19,437	15,293	8,381	0.32	0.43	0.36
	2002/03	84,133	22,377	22,266	8,511	0.26	0.38	0.29
<hr/>								
Alaska Peninsula	2000/01	1,650	584	362	183	0.22	0.31	0.24
	2001/02				Season Closed			
	2002/03				Season Closed			

-continued-

Table 4.-Page 2 of 2.

Registration Area	Season	Number Sampled		Weight Sampled (lb)		Average Weight		Overall Average
		Intact	Broken	Intact	Broken	Intact	Broken	
Bering Sea	2000/01	26,811	10,458	7,568	4,666	0.28	0.45	0.33
	2001/02	9,763	11,856	3,487	5,637	0.36	0.48	0.42
	2002/03	8,541	7,403	2,877	3,681	0.34	0.50	0.41
Dutch Harbor	2000/01			Season Closed				
	2001/02			Season Closed				
	2002/03	510	1,425	139	518	0.27	0.36	0.34
Statewide Total	2000/01	157,117	71,807	39,317	24,194	0.25	0.34	0.28
	2001/02	93,133	70,901	27,998	25,272	0.30	0.36	0.32
	2002/03	128,925	59,714	34,196	21,491	0.27	0.36	0.30

Table 5.-Estimated number and weight of intact and discarded broken scallops during the 2002/03 weathervane scallop fishing season.

Registration Area	Intact Number		Intact Weight ^a		Broken Number		Broken Weight ^a		Total Number	Total Weight ^a
	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI		
Yakutat										
District 16	10,203	3,010 - 18,968	3,433	1,097 - 5,991	44,887	11,379 - 70,779	10,651	3,092 - 14,720	55,090	14,084
Area D	856,018	785,908 - 946,607	205,826	187,770 - 227,569	510,838	464,838 - 572,455	153,184	138,599 - 172,629	1,366,856	359,010
Yakutat Area Total	866,221	788,918 - 965,575	209,259	188,867 - 233,560	555,725	476,217 - 643,254	163,835	141,691 - 187,349	1,421,946	373,094
Prince William Sound	2,305	1,251 - 3,459	962	621 - 1,340	19,604	16,847 - 22,884	6,598	5,595 - 7,695	21,909	7,560
Kodiak										
Northeast District	312,775	275,144 - 362,881	98,307	86,764 - 112,124	173,859	156,017 - 196,257	67,669	61,175 - 75,750	486,634	165,976
Shelikof District	1,559,735	1,396,037 - 1,708,735	397,004	353,631 - 435,774	267,571	234,201 - 308,112	95,950	84,942 - 108,431	1,827,306	492,954
Kodiak Area Total	1,872,510	1,671,181 - 2,071,616	495,311	440,395 - 547,898	441,430	390,218 - 504,369	163,619	146,117 - 184,181	2,313,940	658,930
Bering Sea	74,722	65,723 - 87,748	25,126	22,125 - 29,072	60,554	56,238 - 67,578	30,039	27,795 - 33,732	135,276	55,165
Dutch Harbor	3,005	1,996 - 4,779	807	546 - 1,333	9,700	6,922 - 12,824	3,539	2,393 - 4,658	12,705	4,346
Statewide Total	2,818,763	2,529,069 - 3,133,177	731,465	652,554 - 813,203	1,087,013	946,442 - 1,250,909	367,630	323,591 - 417,615	3,905,776	1,099,095

^a Weight in pounds (lb) of unshucked scallops.

Table 6.-Mean shell height from observer-sampled retained and intact discarded scallop catch during the 2002/03 weathervane scallop fishing season.

Registration Area	Retained Sample		Discarded Sample	
	Number Measured	Mean Shell Height (mm)	Number Measured	Mean Shell Height (mm)
Yakutat				
District 16	202	120	189	108
Area D	6,679	123	6,486	102
Yakutat Area Total	6,881	123	6,675	102
Prince William Sound	1,080	131	183	102
Kodiak				
Northeast District	3,593	140	3,490	111
Shelikof District	9,195	138	9,068	102
Semidi District			No Fishing	
Kodiak Area Total	12,788	138	12,558	104
Alaska Peninsula			Season Closed	
Bering Sea	4,807	149	3,702	112
Dutch Harbor	537	133	356	106
Statewide	26,093	136	23,474	105

Table 7.-Twenty most frequently caught species by weight as recorded by scallop observers during the 2002/03 Yakutat, District 16 weathervane scallop fishing season.

Rank	Species	Scientific Name	% of Total Catch
1	weathervane scallop	<i>Patinopecten caurinus</i>	74.09%
2	debris	NA	7.55%
3	sunflower sea star	<i>Pycnopodia helianthoides</i>	4.75%
4	weathervane shells	<i>P. caurinus</i>	3.78%
5	sand star	<i>Luidia foliolata</i>	2.28%
6	longnose skate	<i>Raja rhina</i>	1.17%
7	big skate egg case	<i>R. binocularata</i>	1.17%
8	sea anemone, unidentified	Order Actinaria	0.85%
9	Dover sole	<i>Microstomus pacificus</i>	0.72%
10	English sole	<i>Parophrys vetulus</i>	0.65%
11	arrowtooth flounder	<i>Atheresthes stomias</i>	0.46%
12	Bathyrāja skate, unidentified	<i>Bathyrāja</i> sp.	0.39%
13	petrale sole	<i>Eopsetta jordani</i>	0.26%
14	scarlet sea star	<i>Pseudarchaster parelli</i>	0.20%
15	box crab, unidentified	<i>Lopholithodessp.</i>	0.13%
16	Pacific sanddab	<i>Citharichthys sordidus</i>	0.13%
17	rex sole	<i>Glyptocephalus zachirus</i>	0.13%
18	longnose skate egg case	<i>R. rhina</i>	0.13%
19	notched brittle star	<i>Ophiura sarsi</i>	0.13%
20	sea mouse, unidentified	<i>Aphrodita negligens</i>	0.07%

Table 8.-Twenty most frequently caught species by weight as recorded by scallop observers during the 2002/03 Yakutat, Area D weathervane scallop fishing season.

Rank	Species	Scientific Name	% of Total Catch
1	weathervane scallop	<i>Patinopecten caurinus</i>	80.41%
2	sunflower sea star	<i>Pycnopodia helianthoides</i>	4.56%
3	weathervane shells	<i>P. caurinus</i>	4.38%
4	big skate egg case	<i>R. binoculata</i>	1.96%
5	debris	NA	1.56%
6	starfish, unidentified	Class Stelleroidea	1.15%
7	big skate	<i>Raja binoculata</i>	0.79%
8	sand star	<i>Luidia foliolata</i>	0.66%
9	arrowtooth flounder	<i>Atheresthes stomias</i>	0.54%
10	sea anemone, unidentified	Order Actinaria	0.47%
11	longnose skate	<i>Raja rhina</i>	0.43%
12	English sole	<i>Parophrys vetulus</i>	0.38%
13	Dover sole	<i>Microstomus pacificus</i>	0.38%
14	notched brittle star	<i>Ophiura sarsi</i>	0.26%
15	lingcod	<i>Ophiodon elongatus</i>	0.22%
16	Pacific halibut	<i>Hippoglossus stenolepis</i>	0.20%
17	spiny dogfish	<i>Squalus acanthias</i>	0.14%
18	butter sole	<i>Isopsetta isolepis</i>	0.13%
19	Bathyrāja skate, unidentified	<i>Bathyrāja</i> sp.	0.13%
20	rex sole	<i>Glyptocephalus zachirus</i>	0.08%

Table 9.-Twenty most frequently caught species by weight as recorded by scallop observers during the 2002/03 Prince William Sound Registration Area weathervane scallop fishing season.

Rank	Species	Scientific Name	% of Total Catch
1	weathervane scallop	<i>Patinopecten caurinus</i>	95.06%
2	sunflower sea star	<i>Pycnopodia helianthoides</i>	2.70%
3	weathervane shells	<i>P. caurinus</i>	0.76%
4	debris	NA	0.22%
5	starfish, unidentified	Class Stelleroidea	0.21%
6	longnose skate	<i>Raja rhina</i>	0.16%
7	notched brittle star	<i>Ophiura sarsi</i>	0.11%
8	sea anemone, unidentified	Order Actinaria	0.09%
9	big skate egg case	<i>R. binoculata</i>	0.08%
10	Dover sole	<i>Microstomus pacificus</i>	0.08%
11	sea mouse, unidentified	<i>Aphrodita negligens</i>	0.08%
12	big skate	<i>Raja binoculata</i>	0.06%
13	Aleutian skate	<i>Bathyraja aleutica</i>	0.05%
14	English sole	<i>Parophrys vetulus</i>	0.04%
15	hermit crab, unidentified	Family Paguridae	0.04%
16	Alaska hermit crab	<i>Pagurus ochotensis</i>	0.04%
17	Tanner crab	<i>Chionoecetes bairdi</i>	0.04%
18	rex sole	<i>Glyptocephalus zachirus</i>	0.04%
19	skate egg case	<i>Bathyraja</i> sp.	0.04%
20	Pacific lyre crab	<i>Hyas lyratus</i>	0.03%

Table 10.-Twenty most frequently caught species by weight as recorded by scallop observers during the 2002/03 Kodiak Registration Area, Northeast District weathervane scallop fishing season.

Rank	Species	Scientific Name	% of Total Catch
1	weathervane scallop	<i>Patinopecten caurinus</i>	70.52%
2	sunflower sea star	<i>Pycnopodia helianthoides</i>	9.26%
3	debris	NA	6.71%
4	weathervane shells	<i>P. caurinus</i>	5.78%
5	sea anemone, unidentified	<i>Order Actinaria</i>	3.03%
6	rock sole, unidentified	<i>Lepidopsetta sp.</i>	0.60%
7	notched brittle star	<i>Ophiura sarsi</i>	0.44%
8	blackspined sea star	<i>Lethasterias nanimensis</i>	0.40%
9	Tanner crab	<i>Chionoecetes bairdi</i>	0.36%
10	southern rock sole	<i>Lepidopsetta bilineata</i>	0.31%
11	northern rock sole	<i>Lepidopsetta polyxystra</i>	0.26%
12	longnose skate	<i>Raja rhina</i>	0.18%
13	Bathyrāja skate, unidentified	<i>Bathyrāja sp.</i>	0.15%
14	octopus, unidentified	Family Octopodidae	0.14%
15	flathead sole	<i>Hippoglossoides elassodon</i>	0.12%
16	arrowtooth flounder	<i>Atheresthes stomias</i>	0.11%
17	Oregon triton	<i>Fusitriton oregonensis</i>	0.10%
18	Pacific cod	<i>Gadus macrocephalus</i>	0.09%
19	Alaska hermit crab	<i>Pagurus ochotensis</i>	0.07%
20	spiny red sea star	<i>Hippasteria spinosa</i>	0.06%

Table 11.-Twenty most frequently caught species by weight as recorded by scallop observers during the 2002/03 Kodiak Registration Area, Shelikof District weathervane scallop fishing season.

Rank	Species	Scientific Name	% of Total Catch
1	weathervane scallop	<i>Patinopecten caurinus</i>	76.24%
2	debris	NA	7.35%
3	sunflower sea star	<i>Pycnopodia helianthoides</i>	3.76%
4	weathervane shells	<i>P. caurinus</i>	2.95%
5	Bathyrāja skate, unidentified	<i>Bathyrāja</i> sp.	1.94%
6	big skate	<i>Raja binocolata</i>	1.09%
7	sea anemone, unidentified	Order Actinaria	0.97%
8	longnose skate	<i>Raja rhina</i>	0.65%
9	Oregon triton	<i>Fusitriton oregonensis</i>	0.60%
10	Pacific halibut	<i>Hippoglossus stenolepis</i>	0.29%
11	debris-fishing gear	NA	0.27%
12	Alaska plaice	<i>Pleuronectes quadrituberculatus</i>	0.26%
13	sea mouse, unidentified	<i>Aphrodita negligens</i>	0.23%
14	Tanner crab	<i>Chionoecetes bairdi</i>	0.23%
15	flathead sole	<i>Hippoglossoides elassodon</i>	0.20%
16	sun sea star	<i>Solaster stimpsoni</i>	0.18%
17	Aleutian hermit crab	<i>Pagurus aleuticus</i>	0.17%
18	Pacific lyre crab	<i>Hyas lyratus</i>	0.16%
19	giant octopus	<i>Octopus dofleini</i>	0.15%
20	Dungeness crab	<i>Cancer magister</i>	0.11%

Table 12.-Twenty most frequently caught species by weight as recorded by scallop observers during the 2002/03 Bering Sea Registration Area weathervane scallop fishing season.

Rank	Species	Scientific Name	% of Total Catch
1	weathervane scallop	<i>Patinopecten caurinus</i>	78.46%
2	snow crabs and hybrids	<i>Chionoecetes opilio</i>	4.09%
3	Tanner crab	<i>Chionoecetes bairdi</i>	2.42%
4	Bathyraja skate, unidentified	<i>Bathyraja</i> sp.	2.05%
5	weathervane shells	<i>P. caurinus</i>	2.03%
6	snail shells	Class Gastropoda	1.68%
7	arrowtooth flounder	<i>Atheresthes stomias</i>	1.16%
8	hermit crab, unidentified	Family Paguridae	0.94%
9	sea anemone, unidentified	Order Actinaria	0.83%
10	Oregon triton	<i>Fusitriton oregonensis</i>	0.80%
11	flathead sole	<i>Hippoglossoides elassodon</i>	0.66%
12	debris	NA	0.42%
13	rex sole	<i>Glyptocephalus zachirus</i>	0.37%
14	lyre whelk	<i>Neptunea lyrata</i>	0.34%
15	yellowfin sole	<i>Limanda aspera</i>	0.32%
16	Pribilof whelk	<i>Neptunea pribiloffensis</i>	0.29%
17	Alaska hermit crab	<i>Pagurus ochotensis</i>	0.23%
18	rougthead skate	<i>Bathyraja trachura</i>	0.22%
19	Aleutian hermit crab	<i>Pagurus aleuticus</i>	0.19%
20	Pacific halibut	<i>Hippoglossus stenolepis</i>	0.19%

Table 13.-Twenty most frequently caught species by weight as recorded by scallop observers during the 2002/03 Dutch Harbor Registration Area weathervane scallop fishing season.

Rank	Species	Scientific Name	% of Total Catch
1	weathervane scallop	<i>Patinopecten caurinus</i>	59.62%
2	sunflower sea star	<i>Pycnopodia helianthoides</i>	30.69%
3	weathervane shells	<i>P. caurinus</i>	3.56%
4	Bathyraja skate, unidentified	<i>Bathyraja</i> sp.	2.27%
5	rock sole	<i>Lepidopsetta bilineata</i>	1.39%
6	debris	NA	1.24%
7	Pacific lyre crab	<i>Hyas lyratus</i>	0.21%
8	sturgeon poacher	<i>Podothecus accipenserinus</i>	0.15%
9	Tanner crab	<i>Chionoecetes bairdi</i>	0.15%
10	notched brittle star	<i>Ophiura sarsi</i>	0.15%
11	Alaska plaice	<i>Pleuronectes quadrituberculatus</i>	0.10%
12	hermit crab, unidentified	Family Paguridae	0.10%
13	arrowtooth flounder	<i>Atheresthes stomias</i>	0.10%
14	sea anemone, unidentified	Order Actinaria	0.05%
15	flathead sole	<i>Hippoglossoides elassodon</i>	0.05%
16	mottled sea star	<i>Evasterias troschelii</i>	0.05%
17	basket star	<i>Gorgonocephalus eucnemis</i>	0.05%
18	sun sea star	<i>Solaster stimpsoni</i>	0.05%
19	sea urchin	<i>Strongylocentrotus</i> sp.	0.30%
20	sculpin	Family Cottidae	0.20%

Table 14.-Summary of the most frequently caught species, by percent weight in sampled dredges during the 2002/03 weathervane scallop fishing season.

Species Category	Registration Area / District								
	Yakutat Area		PWS	Kodiak Area			Alaska Peninsula	Bering Sea	Dutch Harbor
	District 16	Area D		Northeast	Shelikof	Semidi			
weathervane scallops	74.09	80.41	95.06	70.52	76.2		78.46	59.62	
PROHIBITED SPECIES BYCATCH									
Dungeness crab	0	<0.1	0	0	0.11	No Fishing	Season Closed	0	0
king crab	0	0	0	0	0			0	0
Snow crab ^a , <i>C. opilio</i>	0	0	0	0	0			4.09	0
Tanner crab, <i>C. bairdi</i>	<0.1	<0.1	<0.1	0.36	0.23			2.42	0.15
Pacific halibut	0	0.2	0	<0.1	0.29			0.19	0
OTHER COMMERCIAL SPECIES									
Alaska plaice	0	0	0	0	0.26			<0.11	0.10
arrowtooth flounder	0.46	0.54	0	0.11	<0.1			1.16	0.10
bay scallops	0	<0.1	0	<0.1	<0.1			<0.1	0
butter sole	0	0.13	0	<0.1	<0.1			0	0
Dover sole	0.72	0.38	<0.1	0	<0.1			0	0
English sole	0.65	0.38	<0.1	<0.1	<0.1			0	0
flathead sole	<0.1	<0.1	0	0.12	0.20			0.66	<0.1
Greenland turbot	0	0	0	0	0			<0.1	0
lingcod	0	0.22	0	0	0			0	0
octopus	0	<0.1	0	0.14	0.25			0.17	0
petrale sole	0.26	0	0	0	<0.1			0	0
Pacific cod	0	<0.1	0	<0.1	<0.1			0.13	0
rex sole	0.13	<0.1	0	<0.1	<0.1			0.37	0
rock sole	0	0	0	1.17	<0.1			<0.1	1.39
rock fish	0	0	0	0	0			0	0
sablefish	0	<0.1	0	0	<0.1			0	0
sea cucumber	0	0	0	0	0			0	0
sea urchins	0	0	0	<0.1	<0.1			<0.1	0
shrimp	0	<0.1	0	0	<0.1			0	0
skates	1.17	1.4	0.27	2.1	3.78			2.34	2.27
spiny dogfish	0	0.14	0	0	<0.1			0	0
starry flounder	0	0	0	0	<0.1			0	0
walleye pollock	0	<0.1	0	<0.1	<0.1			0.11	0
yellowfin sole	0	0	0	0	<0.1			0.32	0
MISCELLANEOUS									
brittle star	0.2	<0.1	0	0.44	<0.1			0	0.15
sunflower sea star	4.75	4.56	2.7	9.26	3.76			0	30.69
kelp, rocks, etc.	7.55	1.56	0.22	6.71	7.35			0.42	1.24
man-made debris	<0.1	<0.1	<0.1	<0.1	0.33			0.12	0
starfish, misc	2.48	1.51	0.32	0.76	0.42			0.25	0.15
weathervane shells	3.78	4.38	0.76	5.78	2.95			2.03	3.56

^a Includes all hybrid *Chionoecetes* crab.

Table 15.-Estimated bycatch and associated confidence intervals for snow and hybrid, Tanner, Dungeness, king crabs and Pacific halibut from the 2002/03 weathervane scallop fishing season.

Registration Area	n ^a	Snow and hybrid crab		Tanner crab		Dungeness crab		King crab	Halibut	
		Estimated Number	95% CI	Estimated Number	95% CI	Estimated Number	95% CI	Number ^b	Estimated Number	95% CI
Yakutat										
District 16	6	NA	NA	185	15 - 347	0	NA	0	9	1 - 29
Area D	83	NA	NA	8,423	5,679 - 11,378	779	518 - 1,065	0	291	161 - 454
Yakutat Area Total	84	NA	NA	8,608	5,694 - 11,725	779	518 - 1,065	0	300	162 - 483
Prince William Sound	17	NA	NA	369	284 - 483	0	NA	0	10	2 - 20
Kodiak										
Northeast District	46	NA	NA	22,821	16,741 - 31,619	0	NA	0	175	76 - 284
Shelikof District	115	NA	NA	51,165	34,324 - 69,891	2,704	1,422 - 4,125	0	301	153 - 483
Semidi District	0			No Fishing Effort						
Kodiak Area Total	161			73,986	51,065 - 101,510	2,704	1,422 - 4,125	0	476	229 - 767
Alaska Peninsula	0	NA	NA	Season Closed						
Bering Sea	61	70,795	66,813 - 77,058	48,053	44,107 - 53,268	0	NA	2	85	22 - 165
Dutch Harbor	8	NA	NA	2,744	677 - 5,369	29	8 - 166	0	0	NA

^a Number of days fishing occurred. Fishing may occur in several areas or districts within a registration area on the same day.

^b Actual number caught, not an estimate.

NA = Not Applicable

Table 16.-Tanner crab bycatch mortality, 2000/01 through 2002/03 weathervane scallop fishing seasons.

NUMBER OF TANNER ^a CRABS MEASURED AND EXAMINED									
<u>Registration Area</u>	2000/01			2001/02			2002/03		
	<u>Dead</u>	<u>Alive</u>	<u>Percent Dead</u>	<u>Dead</u>	<u>Alive</u>	<u>Percent Dead</u>	<u>Dead</u>	<u>Alive</u>	<u>Percent Dead</u>
Yakutat									
District 16	57	42	58	60	61	50	7	8	47
Area D	1,084	841	56	545	415	57	680	530	56
Yakutat Area Total	1,141	883	56	605	476	56	687	538	56
Prince William Sound	66	52	56	3	3	50	130	4	97
Kodiak									
Northeast District	325	1,020	24	480	1,503	24	525	1,411	27
Shelikof District	748	1,201	38	917	1,859	33	638	1,128	36
Semidi District	No Fishing			No Fishing			No Fishing		
Kodiak Area Total	1,073	2,221	33	1,397	3,362	29	1,163	2,539	31
Alaska Peninsula	74	189	28	Season Closed			Season Closed		
Bering Sea, snow and hybrid	2,070	3,963	34	2,322	1,812	56	1,330	1,484	47
Bering Sea, Tanner	733	2,501	23	1,446	2,497	37	533	2,014	21
Bering Sea, combined species	2,803	6,464	30	3,768	4,309	47	1,863	3,498	35
Dutch Harbor	Season Closed			Season Closed			50	113	31
Statewide Total	5,157	9,809	34	5,773	8,150	41	3,893	6,692	37

^a Tanner crab, except snow crab and *C. opilio*/hybrids are reported in the Bering Sea Area..

Table 17.-Summary of weathervane scallop commercial fishery statistics and observer data from Yakutat, District 16 and Yakutat, Area D, 1993 through 2002/03 weathervane scallop fishing seasons.

Registration Area	Season Dates		Number of Vessels	Number of Vessel Days ^a	Number of Days Fishing Occurred ^b	Number of Days Fishing Observed ^c	Crab Bycatch Limits		Bycatch Estimates				Tanner Crab Mortality %
	Beginning	Ending					Tanner	King	Tanner	King ^d	Dungeness	Halibut	
Yakutat, District 16													
1993	Fishing by Permit only		1 ^e	^a	^e	^e	NE	NE	^e	^e	^e	^e	^e
1994	20-Jan-94	20-Jan-94	7	^a	7	7	NE	NE	10	0	4	48	67
1994	01-Jul-94	31-Oct-94	2 ^f	^a	4	3	NE	NE	0	0	11	236	0
1995	10-Jan-95	13-Feb-95	6	^a	42	35	NE	NE	469	0	93	719	28
1996	10-Jan-96	20-Jan-96	1	^a	6	5	NE	NE	39	0	140	108	0
1996	01-Aug-96	29-Nov-96	2	^a	23	21	NE	NE	669	0	1	68	47
1997	10-Jan-97	23-Feb-97	4	^a	27	20	NE	NE	129	0	0	160	65
1998/99	01-Jul-98	06-Oct-98	6	^a	33	24	NE	NE	273	0	0	24	8
1999/2000	01-Jul-99	27-Sep-99	2	^a	23	16	NE	NE	48	0	0	111	20
2000/01	01-Jul-00	15-Feb-01	3	^a	29	23	NE	NE	627	0	22	86	58
2001/02	01-Jul-01	15-Feb-02	2	^a	21	17	NE	NE	833	0	32	86	50
2002/03	01-Jul-02	15-Feb-03	2	^a	6	4	NE	NE	185	0	0	9	47
Yakutat, Area D													
1993	01-Jul-93	11-Jul-93	7	96	77	75	NE	NE	1,700	40	351	99	54
1994	10-Jan-94	18-Jan-94	10	119	88	83	NE	NE	1,767	0	10	129	31
1994	01-Jul-94	12-Jul-94	5	82	60	60	NE	NE	603	0	169	522	56
1995	10-Jan-95	02-Feb-95 ^g	8	235	166	134	NE	NE	3,751	0	2,379	1,361	26
1996	10-Jan-96	25-Jan-96	3	54	47	43	NE	NE	2,591	0	2,320	237	27
1996	01-Aug-96	04-Sep-96	3	116	82	80	NE	NE	6,872	0	38	150	59
1997	10-Jan-97	18-Feb-97	4	172	144	129	NE	NE	5,884	0	277	353	32
1998/99	01-Jul-98	29-Jul-98	8	232	160	148	NE	NE	8,891	0	177	293	47
1999/2000	01-Jul-99	01-Sep-99	3	182	132	123	NE	NE	4,993	0	584	80	42
2000/01	01-Jul-00	15-Feb-01	3	249	170	134	NE	NE	17,395	0	313	65	56
2001/02	01-Jul-01	15-Feb-02	2	114	86	81	NE	NE	6,770	0	1,150	155	57
2002/03	01-Jul-02	15-Feb-03	2	117	83	77	NE	NE	8,423	0	779	291	56

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Table 17.-Page 2 of 3.

Registration Area	Pounds of Retained Scallops (round lb) ^h	Pounds of Retained Scallop Meats	% Retained Scallop Meat Recovery	Dredge Hours ⁱ	CPUE ^j	% of Scallops In Catch (by weight)	Est. Number Of Discarded Scallops	Est. lb Of Discarded Scallops	Retained Scallops		No. of Tanner Crab Per lb. of Retained Scallop Meats
									Avg. Shell Height(mm)	Sample Size	
Yakutat, District 16											
1993	e	e	NA	e	e	e	NA	NA	e	e	e
1994	150,962	13,301	NA	276	547	72	NA	NA	147	196	<0.1
1994	f	f	NA	f	f	55	NA	NA	151	218	0
1995	447,469	33,302	NA	1,095	409	65	NA	NA	132	2,347	<0.1
1996	85,086	8,090	NA	167	509	92	NA	NA	126	430	<0.1
1996	336,978	25,970	9.0	750	449	81	707,236	159,899	133	1,821	<0.1
1997	265,882	22,020	9.9	561	474	73	143,392	32,764	128	1,020	<0.1
1998/99	384,286	34,090	8.5	702	547	79	119,414	25,292	123	2,198	<0.1
1999/2000	292,625	34,624	10.1	674	434	83	216,600	57,718	125	1,276	<0.1
2000/01	310,370	30,904	9.0	476	652	86	203,946	51,221	118	1,735	<0.1
2001/02	245,319	20,398	NA ^k	417	588	79	164,073	48,879	119	1,171	<0.1
2002/03	60,928	3,685	NA ^k	100	609	79	55,090	14,084	120	202	<0.1
Yakutat, Area D											
1993	2,082,824	141,423	NA	1,999	1,042	78	NA	NA	118	5,651	<0.1
1994	2,085,942	158,660	NA	2,547	819	78	NA	NA	121	2,488	<0.1
1994	1,713,094	103,475	NA	1,715	999	81	NA	NA	122	4,903	<0.1
1995	3,214,968	242,491	NA	4,712	682	78	NA	NA	124	10,824	<0.1
1996	832,756	53,310	NA	1,142	721	82	NA	NA	121	4,310	<0.1
1996	2,362,498	185,426	9.0	2,840	832	85	1,166,422	295,933	122	8,253	<0.1
1997	3,282,860	243,810	9.0	3,956	830	81	1,575,369	299,843	119	7,790	<0.1
1998/99	3,475,996	242,929	7.8	4,192	829	79	1,175,158	271,506	123	14,846	<0.1
1999/2000	3,119,103	249,681	9.5	3,840	812	87	2,165,570	533,172	124	11,989	<0.1
2000/01	2,734,559	195,699	8.1	4,241	645	88	2,129,885	588,981	123	10,237	<0.1
2001/02	1,521,537	103,800	NA ^k	2,406	632	80	1,070,516	272,300	121	6,447	<0.1
2002/03	1,541,867	122,718	NA ^k	2,439	632	80	1,366,856	359,010	123	6,679	<0.1

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Table 17.-Page 3 of 3.

- ^a All days between observer briefing and debriefing; District 16 vessel days included with Yakutat, Area D vessel days.
 - ^b All days with at least one tow made by the vessel.
 - ^c All days with at least one sampled tow.
 - ^d Actual count, not an estimate, beginning with the 1995/96 season.
 - ^e Data not available because an observer waiver was granted.
 - ^f 2 vessels fished. One was granted an observer waiver (no data collected). Confidential data from the other vessel is combined with the Yakutat, Area D data.
 - ^g Reopened February 13 (12 Noon) to February 14 (12 Noon).
 - ^h Vessel operator estimates.
 - ⁱ Dredge-hour = one dredge towed for 60 minutes.
 - ^j CPUE = round weight of retained scallops per dredge-hour.
 - ^k Special project concluded.
- NA = Not Available, NE = Not Established.

Table 18.-Summary of weathervane scallop commercial fishery statistics and observer data from the Prince William Sound Registration Area, 1993 through 2002/03 weathervane scallop fishing seasons.

Registration Area	Season Dates		Number of Vessels	Number of Vessel Days ^a	Number of Days Fishing Occurred ^b	Number of Days Fishing Observed ^c	Crab Bycatch Limits		Bycatch Estimates				Tanner Crab Mortality %
	Beginning	Ending					Tanner	King	Tanner	King ^d	Dungeness	Halibut	
Prince William Sound													
1993	15-Jul-93	18-Jul-93	7	58	29	27	500	NE	200	0	0	27	58
1994	Season Closed												
1995	10-Jan-95	26-Jan-95	2	29	21	21	500	NE	271	0	0	153	0
1996	Season Closed												
1997	10-Jan-97	19-Jan-97	1	12	8	7	500	NE	0	0	0	8	0
1998/99	01-Jul-98	04-Jul-98	2	22	8	8	500	NE	20	0	0	0	0
1999/2000	01-Jul-99	04-Jul-99	2	14	8	6	500	NE	6	0	0	0	0
2000/01	01-Jul-00	02-Aug-00	3	43	30	28	500	NE	467	0	3	9	56
2001/02	01-Jul-01	11-Feb-02	1	29	21	18	11,400	NE	43	0	0	5	50
2002/03	01-Jul-02	15-Feb-03	2	26	17	16	11,400	NE	369	0	0	10	97

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Table 18.-Page 2 of 2.

Registration Area	Pounds of Retained Scallops (round lb) ^e	Pounds of Retained Scallop Meats	% Retained Scallop Meat Recovery	Dredge Hours ^f	CPUE ^g	% of Scallops In Catch (by weight)	Est. Number Of Discarded Scallops	Est. lb Of Discarded Scallops	Retained Scallops		No. of Tanner Crab Per lb. of Retained Scallop Meats
									Avg. Shell Height(mm)	Sample Size	
Prince William Sound											
1993	850,718	63,068	NA	638	1,333	90	NA	NA	124	1,628	<0.1
1994	Season Closed										
1995	Confidential	108,000 ^h	NA	Confidential		98	NA	NA	125	1,010	NA
1996	Season Closed										
1997	257,230	18,000	9.6	171	1,504	97	NA	NA	123	743	0
1998/99	334,152	19,650	7.9	179	1,867	91	15,457	12,789	132	540	0
1999/2000	211,140	20,410	9.4	149	1,417	93	46,502	18,500	132	360	<0.1
2000/01	361,032	30,266	9.0	221	1,634	93	42,931	13,826	131	1,429	<0.1
2001/02	511,761	30,090	NA ⁱ	263	1,946	94	68,454	23,824	136	699	<0.1
2002/03	231,140	15,641	NA ⁱ	122	1,895	93	21,909	7,560	131	1,080	<0.1

^a All days between observer briefing and debriefing.

^b All days with at least one tow made by the vessel.

^c All days with at least one sampled tow.

^d Actual count, not an estimate, beginning with the 1995/96 season.

^e Vessel operator estimates.

^f Dredge-hour = one dredge towed for 60 minutes.

^g CPUE = round weight of retained scallops per dredge-hour.

^h Includes estimated illegal harvest.

ⁱ Special project concluded.

NA = Not Available, NE = Not Established.

Table 19. Summary of weathervane scallop commercial fishery statistics and observer data, Northeast and Shelikof Districts of the Kodiak Registration Area, 1993/94 through 2002/03 weathervane scallop fishing seasons.

Registration Area	Season Dates		Number of Vessels	Number of Vessel Days ^a	Number of Days Fishing Occurred ^b	Number of Days Fishing Observed ^c	Crab Bycatch Limits		Bycatch Estimates				Tanner Crab Mortality %
	Beginning	Ending					Tanner	King	Tanner	King ^d	Dungeness	Halibut	
Kodiak													
Northeast District													
1993/94	01-Jul-93	24-Nov-93	10	°	272	237	°	°	33,511	9	5	1,513	23
1994/95	01-Jul-94	15-Feb-95	7	°	77	68	143,000	123	2,054	190	0	577	34
1995/96	Season Closed												
1996/97	01-Aug-96	15-Feb-97	3	°	29	19	130,000	66	27,722	0	0	704	16
1997/98	01-Jul-97	19-Nov-97	4	°	95	86	91,600	50	11,914	0	0	58	28
1998/99	01-Jul-98	02-Oct-98	4	°	90	80	46,500	21	13,887	1	0	309	44
1999/2000	01-Jul-99	09-Sep-99	3	°	40	38	66,500	150	13,886	0	0	158	41
2000/01	01-Jul-00	26-Sep-00	4	°	40	37	81,000	200	13,311	0	0	47	24
2001/02	01-Jul-01	18-Jan-02	3	°	45	39	425,000	15	20,362	0	100	94	24
2002/03	01-Jul-02	10-Feb-03	2	°	46	42	1,100,000	15	22,821	0	0	175	27
Shelikof District													
1993/94	01-Jul-93	05-Aug-93	5	°	83	79	°	°	51,560	0	122	226	13
1994/95	01-Jul-94	01-Oct-94	11	°	263	257	98,000	219	64,444	29	1,097	851	14
1995/96	Season Closed												
1996/97	01-Aug-96	18-Oct-96	4	°	104	99	16,100	22	11,285	0	515	440	37
1997/98	01-Jul-97	10-Aug-97	4	°	153	150	51,000	35	36,744	0	4,359	448	22
1998/99	01-Jul-98	21-Aug-98	8	°	121	112	33,500	196	22,707	0	33	502	40
1999/2000	01-Jul-99	06-Sep-99	6	°	117	111	42,500	250	38,893	0	100	493	45
2000/01	01-Jul-00	02-Oct-00	5	°	90	81	49,000	125	15,133	2	54	366	38
2001/02	01-Jul-01	08-Dec-01	4	°	103	97	59,000	50	29,114	1	451	247	33
2002/03	01-Jul-02	09-Feb-03	3	°	115	110	67,500	50	51,165	0	2,704	301	36

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Table 19.-Page 2 of 2.

Registration Area	Pounds of Retained Scallops (round lb) ^f	Pounds of Retained Scallop Meats	% Retained Scallop Meat Recovery	Dredge Hours ^g	CPUE ^h	% of Scallops In Catch (by weight)	Est. Number Of Discarded Scallops	Est. lb Of Discarded Scallops	Retained Scallops		No. of Tanner Crab Per lb. of Retained Scallop Meats
									Avg. Shell Height(mm)	Sample Size	
Kodiak											
Northeast District											
1993/94	2,214,427	155,122	NA	6,940	319	46	NA	NA	144	12,221	0.2
1994/95	389,202	35,207	NA	1,773	220	44	NA	NA	151	4,171	<0.1
1995/96	Season Closed										
1996/97	147,269	11,430	10.0	581	253	54	22,076	8,355	144	1,252	2.4
1997/98	1,143,926	95,858	10.1	2,603	439	58	193,776	41,615	140	7,300	0.1
1998/99	1,365,836	120,010	10.8	2,747	497	57	800,629	190,480	127	7,961	0.1
1999/2000	952,972	77,119	10.7	1,383	689	62	410,193	113,349	132	3,969	0.2
2000/01	681,192	79,965	11.2	1,101	619	80	351,100	113,422	136	3,302	0.2
2001/02	822,110	80,470	NA ⁱ	1,142	720	76	305,047	108,835	140	3,240	0.3
2002/03	871,918	80,000	NA ⁱ	1,350	646	71	486,634	165,976	140	3,593	0.3
Shelikof District											
1993/94	1,169,664	105,017	NA	2,504	467	71	NA	NA	128	6,599	0.5
1994/95	3,522,517	314,051	NA	8,720	404	64	NA	NA	131	20,426	0.2
1995/96	Season Closed										
1996/97	1,878,268	219,305	12.0	3,497	537	77	753,292	197,174	136	10,615	<0.1
1997/98	3,101,152	258,346	9.4	5,490	565	78	427,756	93,221	139	16,378	0.1
1998/99	2,129,025	179,870	9.3	4,081	522	78	1,054,711	216,354	137	11,967	0.1
1999/2000	1,903,345	187,963	11.1	4,304	442	64	1,144,593	289,867	130	12,353	0.2
2000/01	1,768,376	180,087	11.1	2,907	608	80	569,722	128,614	134	7,559	<0.1
2001/02	1,830,265	177,112	NA ⁱ	3,398	539	78	722,636	239,459	140	9,057	0.2
2002/03	1,857,466	180,580	NA ⁱ	3,799	489	76	1,827,306	492,954	138	9,195	<0.1

^a All days between observer briefing and debriefing.

^b All days with at least one tow made by the vessel.

^c All days with at least one sampled tow.

^d Actual count, not an estimate, beginning with the 1995/96 season.

^e Included in Kodiak Area combined, Table 20.

^f Vessel operator estimates.

^g Dredge-hour = one dredge towed for 60 minutes.

^h CPUE = round weight of retained scallops per dredge-hour.

ⁱ Special project concluded.

NA = Not Available.

Table 20.-Summary of weathervane scallop commercial fishery statistics and observer data from the Semidi District and Kodiak Registration Area combined, 1993/94 through 2002/03 weathervane scallop fishing seasons.

Registration Area	Season Dates		Number of Vessels	Number of Vessel Days ^a	Number of Days Fishing Occurred ^b	Number of Days Fishing Observed ^c	Crab Bycatch Limits		Bycatch Estimates				Tanner Crab Mortality %
	Beginning	Ending					Tanner	King	Tanner	King ^d	Dungeness	Halibut	
Kodiak													
Semidi District													
1993/94	01-Jul-93	11-Feb-94	7	e	75	70	NE	NE	62,726	29	12,905	136	21
1994/95	01-Jul-94	15-Feb-95	2	e	10	10	NE	NE	984	22	64	21	28
1995/96	Season Closed												
1996/97	01-Aug-96	15-Feb-97	3	e	37	32	NE	NE	8,902	9	0	79	37
1997/98	10-Jul-97	15-Feb-98	1	e	14	14	NE	NE	8,500	1	856	21	43
1998/99	01-Jul-98	02-Oct-98	2	e	5	5	NE	NE	780	0	37	17	23
1999/2000	01-Jul-99	15-Feb-00	1	e	4	1	NE	NE	66	0	0	0	29
2000/01	01-Jul-00	15-Feb-01	No Fishing				NE	NE					
2001/02	01-Jul-01	15-Feb-02	No Fishing				NE	NE					
2002/03	01-Jul-02	15-Feb-03	No Fishing				NE	NE					
Kodiak Area combined													
1993/94	01-Jul-93	11-Feb-94	10	597	430	386	199,500	283	147,797	38	13,032	1,875	18
1994/95	01-Jul-94	15-Feb-95	10	474	350	333	241,000	342	67,482	241	1,161	1,449	15
1995/96	Season Closed												
1996/97	01-Jul-96	15-Feb-97	5	237	170	150	146,100	88	47,909	9	515	721	28
1997/98	01-Jul-97	15-Feb-98	5	335	262	250	142,600	85	57,158	1	5,215	157	26
1998/99	01-Jul-98	02-Oct-98	8	316	216	197	80,000	217	37,374	1	70	828	40
1999/2000	1-Jul-99	15-Feb-00	6	203	159	150	109,000	400	52,845	0	100	651	44
2000/01	01-Jul-00	15-Feb-01	5	170	129	118	130,000	325	28,444	0	54	413	33
2001/02	01-Jul-00	15-Feb-02	4	191	148	136	484,000	65	49,476	0	451	341	29
2002/03	01-Jul-02	15-Feb-03	3	200	161	152	1,167,500	65	73,986	0	2,704	476	31

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Table 20.-Page 2 of 2.

Registration Area	Pounds of Retained Scallops (round lb) ^f	Pounds of Retained Scallop Meats	% Retained Scallop Meat Recovery	Dredge Hours ^g	CPUE ^h	% of Scallops In Catch (by weight)	Est. Number Of Discarded Scallops	Est. lb Of Discarded Scallops	Retained Scallops		No. of Tanner Crab Per lb. of Retained Scallop Meats
									Avg. Shell Height(mm)	Sample Size	
Kodiak											
Semidi District											
1993/94	579,836	55,487	NA	1,819	319	38	NA	NA	145	3,713	1.1
1994/95	i	i	i	i	i	49	NA	NA	153	767	i
1995/96	Season Closed										
1996/97	288,117	37,810	12.0	1,017	283	52	11,211	6,000	154	2,529	0.2
1997/98	61,320	6,315	11.4	349	176	21	5,831	2,716	147	1,066	1.3
1998/99	15,806	1,720	11.8	106	149	35	1,453	508	151	252	0.5
1999/2000	11,310	930	NA	45	251	38	929	375	152	120	<0.1
2000/01	No Fishing										
2001/02	No Fishing										
2002/03	No Fishing										
Kodiak Area combined											
1993/94	3,963,927	318,361	NA	11,236	353	50	NA	NA	143	22,533	0.5
1994/95	3,911,719	354,498	NA	10,765	363	60	NA	NA	135	25,364	0.2
1995/96	Season Closed										
1996/97	2,313,654	268,545	12.0	5,095	454	71	786,579	211,529	139	14,396	0.2
1997/98	4,306,399	360,519	9.4	8,442	510	73	1,727,874	308,719	139	24,744	0.2
1998/99	3,510,667	301,600	9.9	6,934	506	69	1,856,793	407,342	134	20,180	0.1
1999/2000	2,867,627	266,012	10.9	5,732	500	69	1,555,715	403,591	131	16,344	0.2
2000/01	2,449,574	260,052	11.1	4,008	611	80	920,722	242,036	135	10,858	0.1
2001/02	2,652,375	259,668	NA ^j	4,540	584	77	1,027,683	348,294	140	12,297	0.2
2002/03	2,729,384	260,580	NA ^j	5,149	530	73	2,313,940	658,930	139	12,788	0.3

^a All days between observer briefing and debriefing.
^b All days with at least one tow made by the vessel.
^c All days with at least one sampled tow.
^d Actual count, not an estimate, beginning with the 1995/96 season.
^e Included in Kodiak Area combined.
^f Vessel operator estimates.
^g Dredge hour = one dredge towed for 60 minutes.
^h CPUE = round weight of retained scallops per dredge-hour.
ⁱ Confidential, combined with Shelikof, Table 19.
^j Special project concluded.

NA = Not Available, NE = Not Established

Table 21.-Summary of weathervane scallop commercial fishery statistics and observer data from the Alaska Peninsula and Bering Sea Registration Areas, 1993/94 through 2002/03 weathervane scallop fishing seasons.

Registration Area	Season Dates		Number of Vessels	Number of Vessel Days ^a	Number of Days Fishing Occurred ^b	Number of Days Fishing Observed ^c	Crab Bycatch Limits			Bycatch Estimates					Tanner Crab Mortality %
	Beginning	Ending					Snow	Tanner	King	Snow ^d	Tanner	King ^e	Dungeness	Halibut	
Alaska Peninsula															
1993/94	01-Jul-93	21-Oct-93	8	136	75	69	NA	52,530	85	NA	180,319	25	0	329	35
1994/95	01-Jul-95	22-Sep-95	7	137	80	70	NA	44,000	119	NA	25,287	0	73	157	29
1995/96	Season Closed														
1996/97	01-Aug-96	31-Oct-96	2	34	13	12	NA	22,000	435	NA	19,045	0	4	25	32
1997/98	01-Jul-97	15-Feb-98	4	100	68	64	NA	45,300	79	NA	21,971	0	0	347	21
1998/99	01-Jul-98	19-Sep-98	4	65	48	46	NA	48,500	900	NA	47,780	0	140	226	20
1999/2000	01-Jul-99	29-Sep-99	5	108	73	65	NA	75,500	300	NA	28,160	1	2,349	178	32
2000/01	01-Jul-00	15-Feb-01	3	25	14	9	NA	42,000	100	NA	2,636	1	0	8	28
2001/02	Season Closed														
2002/03	Season Closed														
Bering Sea															
1993/94	01-Jul-93	05-Sep-93	9	275	174	168	NA	260,000	17,000	15,000	290,913	207	0	165	12
1994/95	01-Jul-94	07-Sep-94	8	382	312	309	NA	260,000	17,000	34,867	220,710	22	0	3,513	24
1995/96	Season Closed														
1996/97	01-Aug-96	15-Feb-97	1	79	63	54	275,000	257,000	500	106,935	16,642	0	0	124	16
1997/98	01-Jul-97	11-Aug-97	2	81	66	64	172,000	238,000	500	195,345	28,446	0	0	98	53
1998/99	01-Jul-98	04-Sep-98	4	106	73	64	130,000	215,000	500	232,911	39,363	146	12	98	44
1999/2000	01-Jul-99	30-Aug-99	2	120	94	81	300,000	65,000	500	159,656	62,268	2	0	106	22
2000/01	01-Jul-00	23-Aug-00	3	112	91	87	150,000	65,000	500	103,350	52,505	2	0	50	30
2001/02	01-Jul-01	31-Oct-01	3	106	84	82	300,000	65,000	500	68,458	48,718	2	0	76	41
2002/03	01-Jul-02	15-Feb-03	2	106	61	56	300,000	65,000	500	70,795	48,053	2	0	85	35

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Table 21.-Page 2 of 2.

Registration Area	Pounds of Retained Scallops (round lb) ^f	Pounds of Retained Scallop Meats	% Retained Scallop Meat Recovery	Dredge Hours ^g	CPUE ^h	% Scallops In Catch (by weight)	Est. Number Of Discarded Scallops	Est. lb Of Discarded Scallops	Retained Scallops		No. of Tanner Crab Per lb of Retained Scallop Meats
									Avg. Shell Height (mm)	Sample Size	
Alaska Peninsula											
1993/94	1,061,925	112,152	NA	1,847	575	75	NA	NA	119	5,183	1.3
1994/95	619,473	65,282	NA	1,664	372	73	NA	NA	127	4,069	0.4
1995/96	Season Closed										
1996/97	130,235	12,560	11.0	327	398	70	33,684	7,384	126	769	1.5
1997/98	654,960	51,616	8.7	1,752	374	56	56,654	38,219	135	5,604	0.4
1998/99	617,120	63,290	11.0	1,612	383	71	212,152	43,129	128	4,276	0.8
1999/2000	781,596	75,535	10.3	2,025	386	66	256,592	59,077	129	6,046	0.4
2000/01	95,510	7,660	9.4	320	298	73	18,633	4,538	119	699	0.3
2001/02	Season Closed										
2002/03	Season Closed										
Bering Sea											
1993/94	3,447,681	284,414	NA	5,763	598	NA	NA	NA	146	12,169	1.0
1994/95	5,942,912	505,439	NA	11,113	535	77	NA	NA	147	26,451	0.5
1995/96	Season Closed										
1996/97	1,432,160	150,295	10.0	2,313	619	88	34,412	16,188	147	4,039	0.8
1997/98	1,082,825	97,002	8.8	2,246	482	74	114,614	38,262	151	4,726	2.3
1998/99	1,193,071	96,795	8.7	2,319	514	70	403,121	127,607	147	5,479	2.8
1999/2000	1,851,620	164,929	9.1	3,294	562	69	157,289	68,406	145	8,751	1.4
2000/01	2,376,601	205,520	9.3	3,355	708	81	298,483	97,994	142	8,418	0.8
2001/02	1,700,578	140,871	NA ⁱ	3,072	554	80	180,075	76,261	141	7,316	0.8
2002/03	952,958	92,240	NA ⁱ	2,038	468	78	135,276	55,165	149	4,807	1.3

^a All days between observer briefing and debriefing.

^b All days with at least one tow made by the vessel.

^c All days with at least one sampled tow.

^d Snow and hybrid crabs combined.

^e Actual count, not an estimate, beginning with the 1995/96 season.

^f Vessel operator estimates.

^g Dredge-hour = one dredge towed for 60 minutes.

^h CPUE = round weight of retained scallops per dredge-hour.

ⁱ Special project concluded.

NA = Not Available.

Table 22. Summary of weathervane scallop commercial fishery statistics and observer data from the Dutch Harbor and Adak Registration Areas, 1993/94 through 2002/03 weathervane scallop fishing seasons.

Registration Area	Season Dates		Number of Vessels	Number of Vessel Days ^a	Number of Days Fishing Occurred ^b	Number of Days Fishing Observed ^c	Crab Bycatch Limits			Bycatch Estimates				Tanner Crab Mortality %	
	Beginning	Ending					Snow	Tanner	King	Snow ^d	Tanner	King ^e	Dungeness		Halibut
Dutch Harbor															
1993/94	01-Jul-93	18-Sep-93	3	46	36	24	NA	50,500	45	NA	69,354	35	0	270	50
1994/95	01-Jul-94	15-Feb-95	3	21	6	6	NA	87,000	47	NA	757	7	0	0	54
1995/96	01-Jul-95	15-Feb-96	1	62	38	35	NA	NA	NA	NA	5,980	0	0	37	22
1996/97	01-Aug-96	15-Feb-97	No Fishing												
1997/98	01-Jul-97	25-Aug-97	1	15	8	8	NA	10,700	10	NA	12,582	1	0	22	44
1998/99	01-Jul-98	15-Feb-99	4	84	37	34	NA	10,700	10	NA	6,479	0	23	35	8
1999/2000	01-Jul-99	1-Oct-99	1	16	13	10	NA	10,700	10	NA	4,274	0	0	39	47
2000/01	Season Closed														
2001/02	Season Closed														
2002/03	01-Jul-02	15-Feb-03	1	10	8	7	NA	10,700	50	NA	2,744	0	29	0	31
Adak															
1993/94	Not established as a separate area, included with Bering Sea Area.														
1994/95	01-Jul-94	15-Feb-95	No Fishing				NA	NA	NA						
1995/96	01-Jul-95	15-Feb-96	1	7	4	4	NA	NA	NA	Confidential					
1996/97	01-Aug-96	15-Feb-97	No Fishing				NA	10,000	50						
1997/98	01-Jul-97	15-Feb-98	No Fishing				NA	10,000	50						
1998/99	01-Jul-98	15-Feb-99	No Fishing				NA	10,000	50						
1999/2000	01-Jul-99	15-Feb-00	No Fishing				NA	10,000	50						
2000/01	01-Jul-00	15-Feb-01	No Fishing				NA	10,000	50						
2001/02	01-Jul-01	15-Feb-02	No Fishing				NA	10,000	50						
2002/03	01-Jul-02	15-Feb-03	No Fishing				NA	10,000	50						

-continued-

Table 22.-Page 2 of 2.

Registration Area	Pounds of Retained Scallops (round lb) ^f	Pounds of Retained Scallop Meats	% Retained Scallop Meat Recovery	Dredge Hours ^g	CPUE ^h	% Scallops In Catch (by weight)	Est. Number Of Discarded Scallops	Est. lb Of Discarded Scallops	Retained Scallops		No. of Tanner Crab Per lb of Retained Scallop Meats
									Avg. Shell Height (mm)	Sample Size	
Dutch Harbor											
1993/94	432,970	38,731	NA	838	517	NA	NA	NA	128	1,948	1.8
1994/95	23,590	1,931	NA	81	291	56	NA	NA	158	105	0.4
1995/96	289,398	26,950	NA	1,047	276	NA	NA	NA	134	3,026	0.2
1996/97	No Fishing										
1997/98	55,725	5,790	10.6	171	326	36	67,742	18,561	127	267	2.2
1998/99	427,422	46,432	10.5	1,025	417	71	92,270	29,348	128	2,850	0.1
1999/2000	68,070	6,465	11.8	273	249	54	11,459	4,284	135	1,008	0.7
2000/01	Season Closed										
2001/02	Season Closed										
2002/03	59,116	6,000	NA ⁱ	184	321	60	12,705	4,346	133	537	0.5
Adak											
1993/94	Not established as a separate area.										
1994/95	No Fishing										
1995/96	Confidential										
1996/97	No Fishing										
1997/98	No Fishing										
1998/99	No Fishing										
1999/2000	No Fishing										
2000/01	No Fishing										
2001/02	No Fishing										
2002/03	No Fishing										

^a All days between observer briefing and debriefing.

^b All days with at least one tow made by the vessel.

^c All days with at least one sampled tow.

^d Snow and hybrid crabs combined.

^e Actual count, not an estimate, beginning with the 1995/96 season.

^f Vessel operator estimates.

^g Dredge-hour = one dredge towed for 60 minutes.

^h CPUE = round weight of retained scallops per dredge-hour.

ⁱ Special project concluded.

NA = Not Applicable

Table 23.-Number and condition of Pacific halibut in bycatch samples, 2000/2001 through 2002/03 weathervane scallop fishing seasons.

Registration Area	Season	Number of Halibut ^a					Previously dead	Total
		Excellent	Good	Fair	Poor	Dead		
Yakutat								
District 16	2000/01	1	2	0	7	2	0	12
	2001/02	1	2	3	3	3	0	12
	2002/03	1	0	0	0	0	0	1
Area D	2000/01	2	2	0	1	4	0	9
	2001/02	2	6	6	2	4	2	22
	2002/03	9	8	7	6	8	4	42
Prince William Sound	2000/01	0	2	0	0	1	0	3
	2001/02	0	0	0	1	0	0	1
	2002/03	0	0	2	1	0	0	3
Kodiak								
Northeast District	2000/01	4	0	0	2	1	0	7
	2001/02	4	1	1	1	7	0	14
	2002/03	2	2	8	4	6	1	25 ^b
Shelikof District	2000/01	17	12	4	12	3	1	49
	2001/02	9	7	6	5	4	0	31
	2002/03	10	13	7	1	3	0	36 ^b
Semidi District	2000/01				No Fishing			
	2000/01				No Fishing			
	2002/03				No Fishing			
Alaska Peninsula	2000/01	1	0	0	0	0	0	1
	2001/02				Season Closed			
	2002/03				Season Closed			
Bering Sea	2000/01	5	0	1	0	0	0	6
	2001/02	3	4	2	2	0	0	11
	2002/03	1	3	1	0	2	0	7
Dutch Harbor	2001/02				Season Closed			
	2000/01				Season Closed			
	2002/03	0	0	0	0	0	0	0
Statewide Total	2000/01	3	4	0	8	6	0	21
	2001/02	19	22	18	13	19	2	93
	2002/03	23	26	25	12	19	5	114

^a Condition Codes:

Excellent: Vigorous body movement before and after release; could close operculum tightly; minor external injuries, if any.

Good: Feeble body movements; could close operculum tightly; minor external injuries, if any.

Fair: No body movement; could close operculum tightly; minor external injuries, if any.

Poor: No body movement; could move operculum but not tightly; severe injuries (eg. bleeding).

Dead: No body or opercular movement; probably killed in sampled haul.

Previously dead: Obviously not killed in the current haul (incidentally caught).

^b Includes 2 halibut that were not examined.

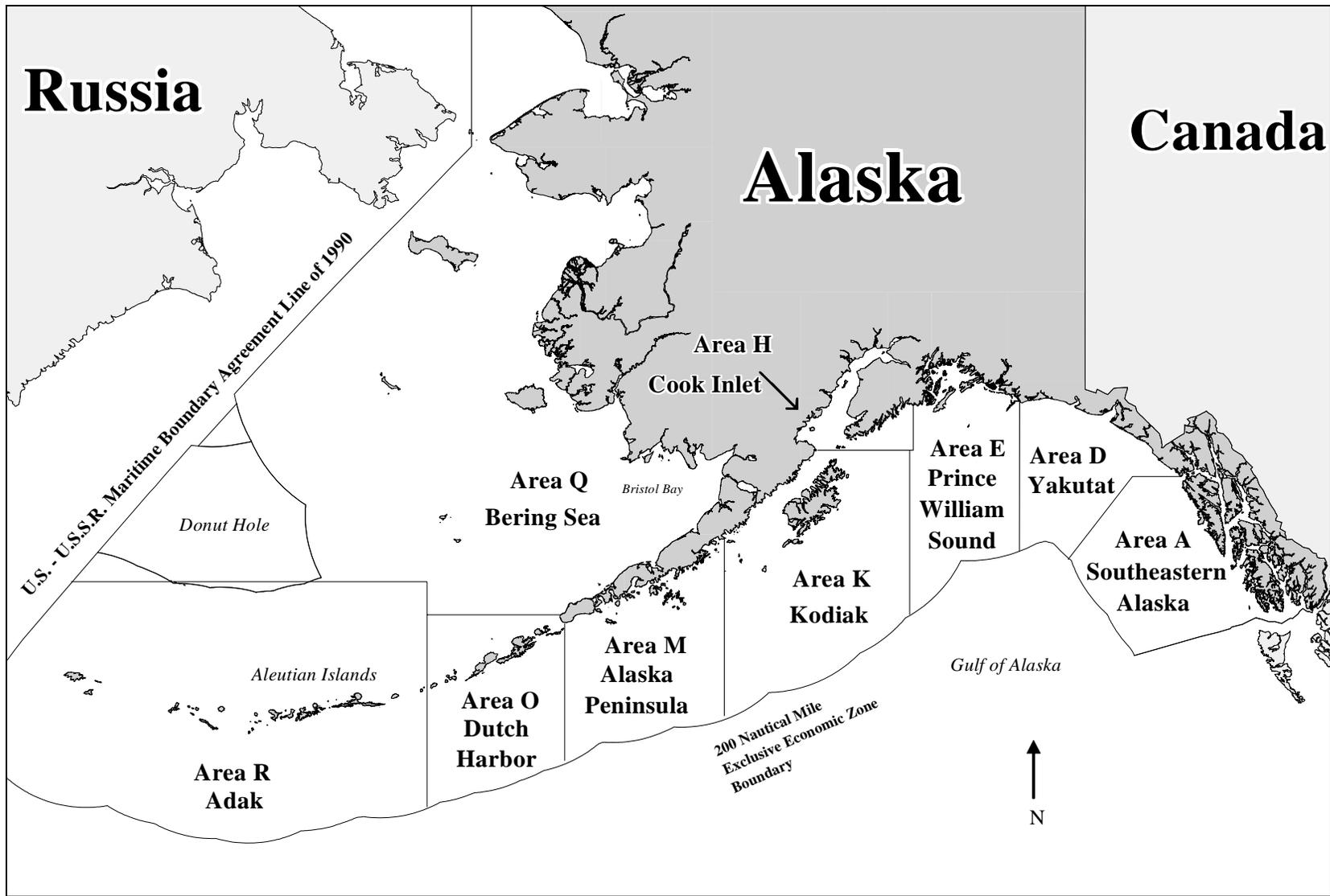


Figure 1.-State of Alaska weathervane scallop fishing registration areas.

LEFT VALVE (Top Valve)

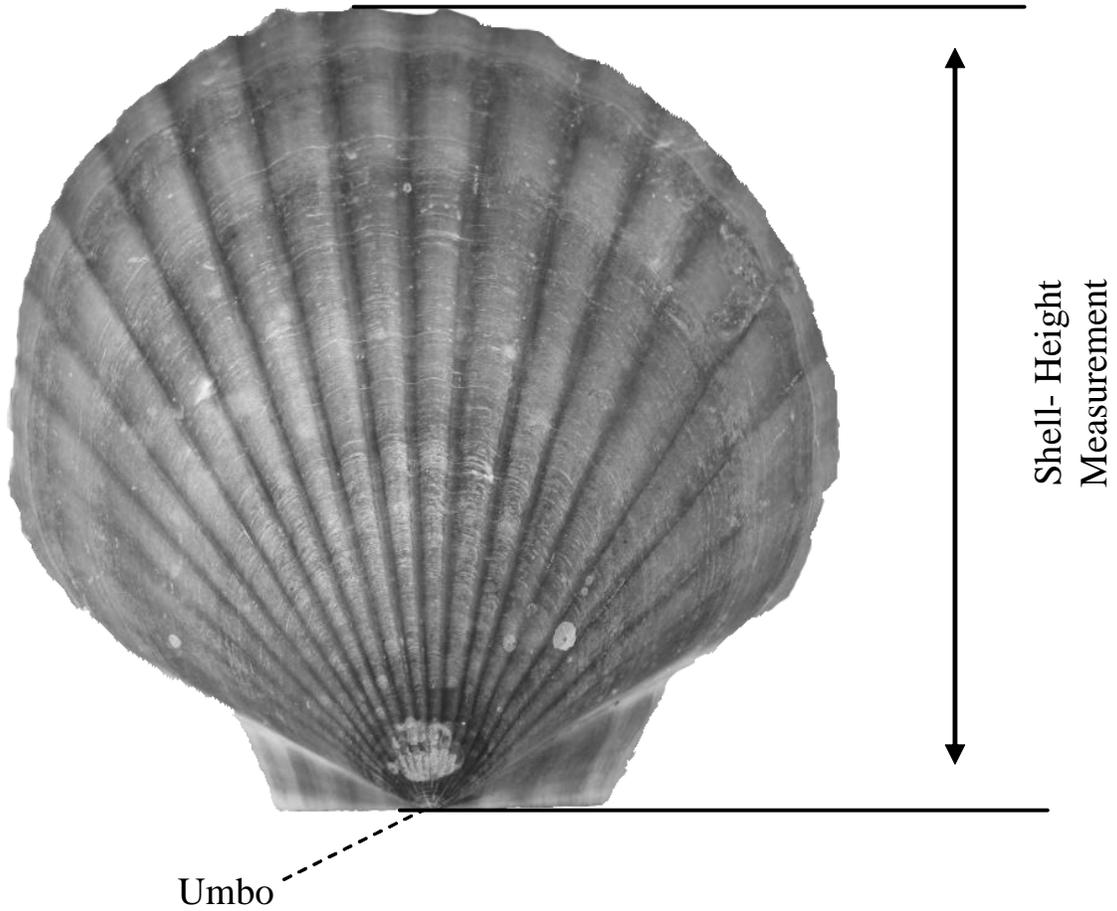


Figure 2.-Scallop shell-height measurement.

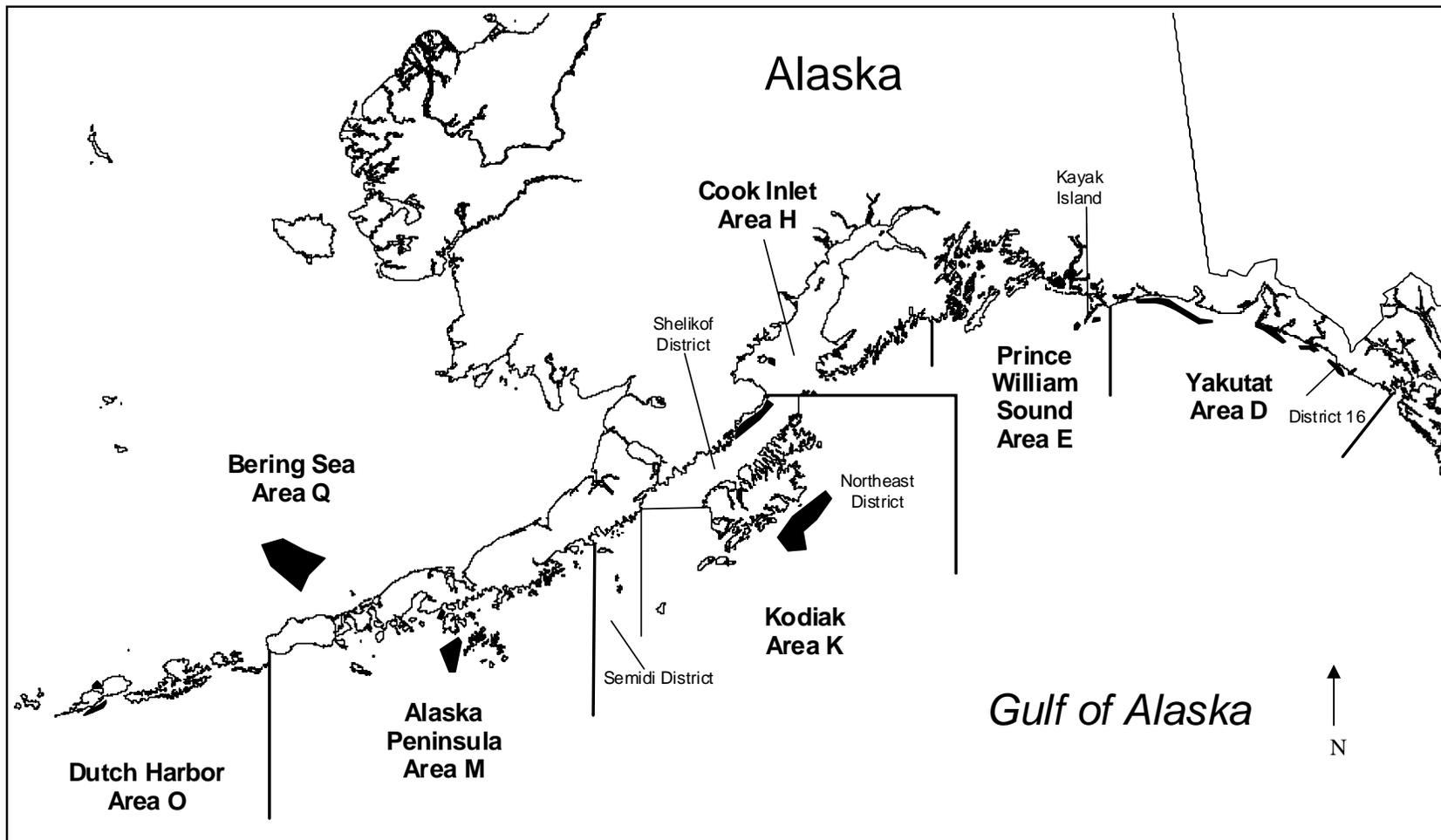


Figure 3.-General fishing locations (dark polygons) for weathervane scallops during the 2002/03 weathervane scallop fishing season.

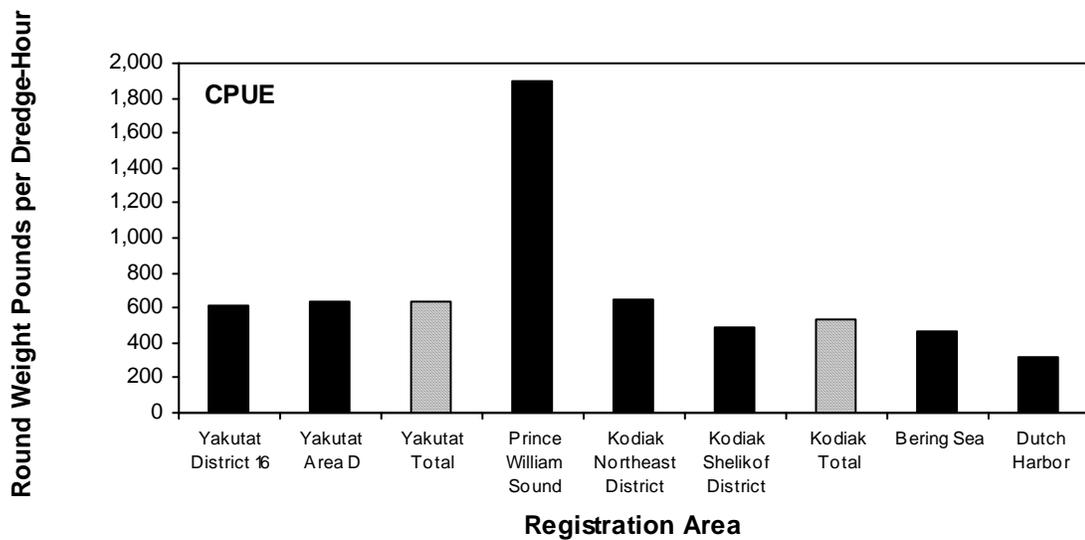
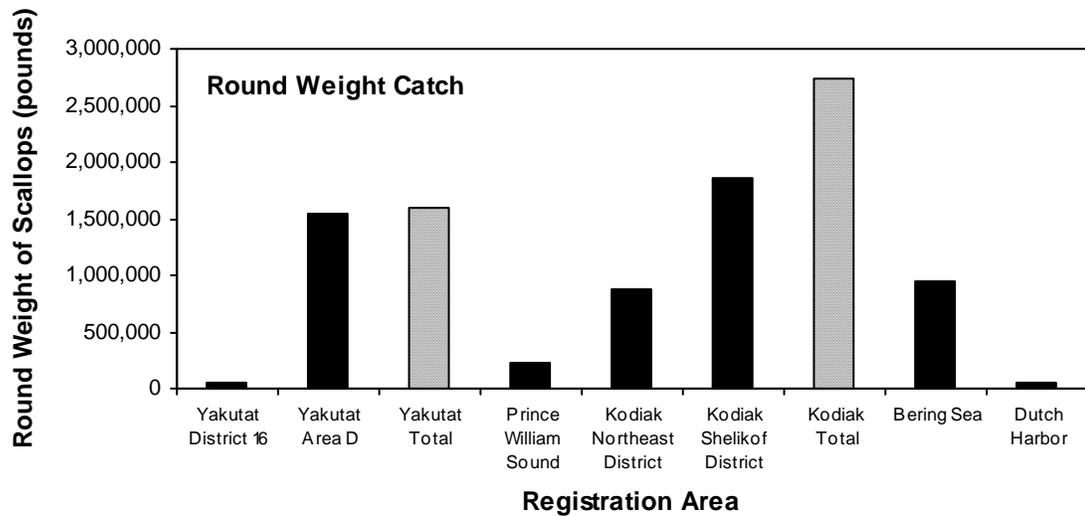
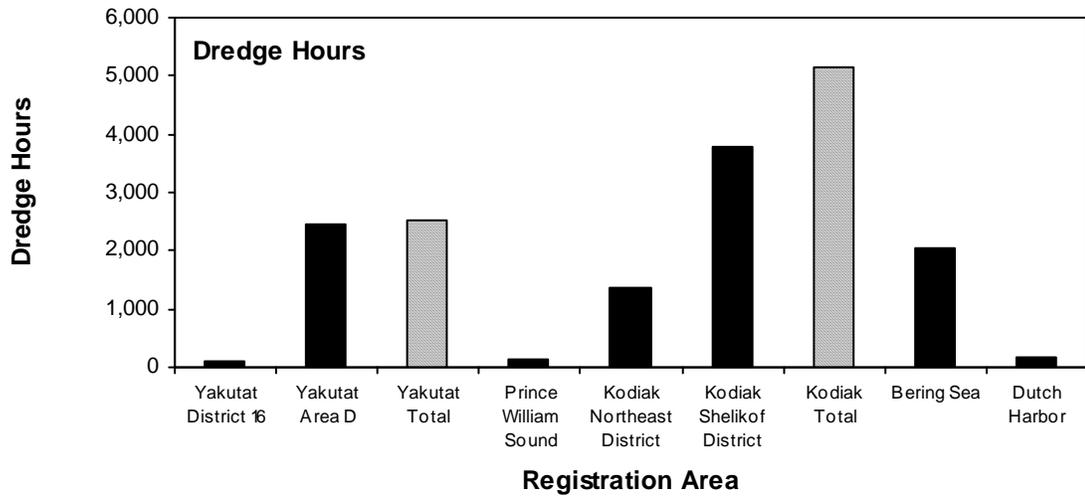


Figure 4.-Fishing effort, round weight catch and CPUE by registration area and district, 2002/03 weathervane scallop fishing season.

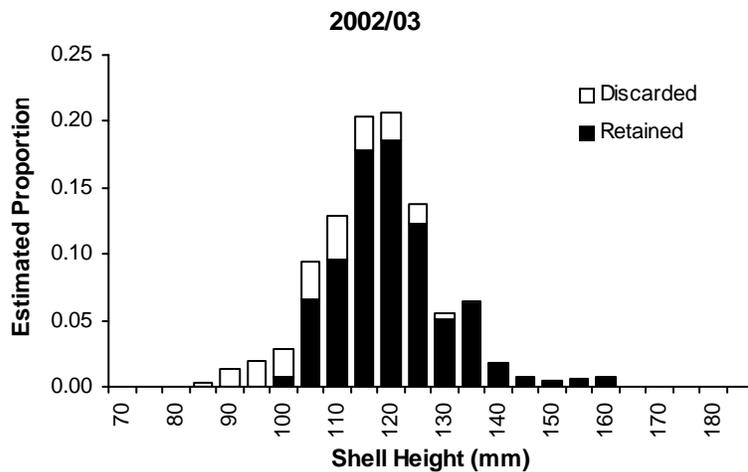
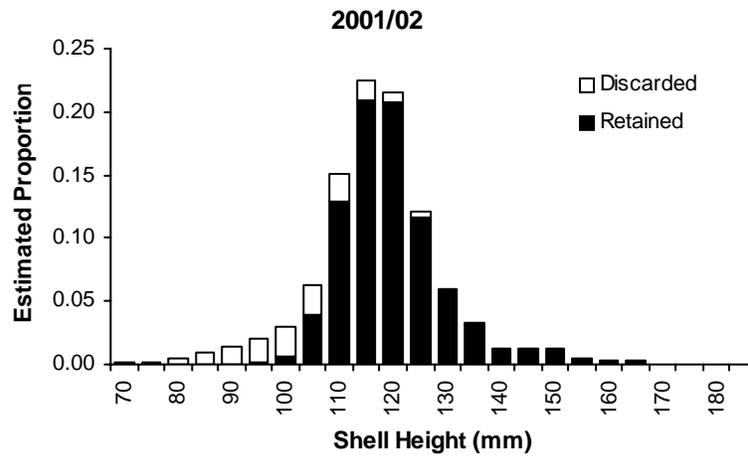
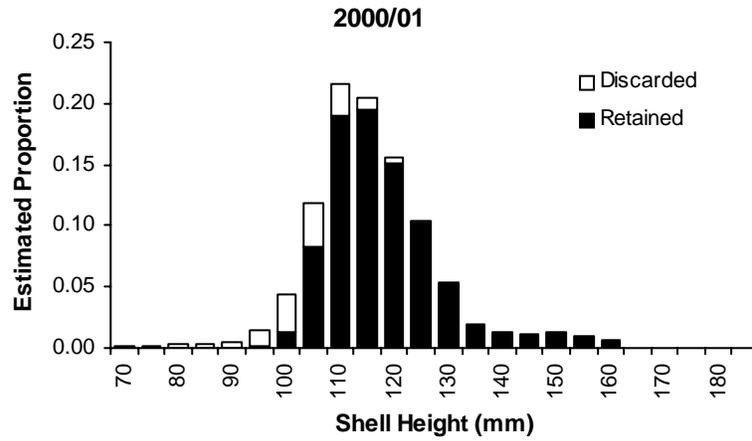


Figure 5.-Estimated shell height distribution from resampling observer-collected scallop measurements, Yakutat, District 16, 2000/01 through 2002/03 weathervane scallop fishing seasons.

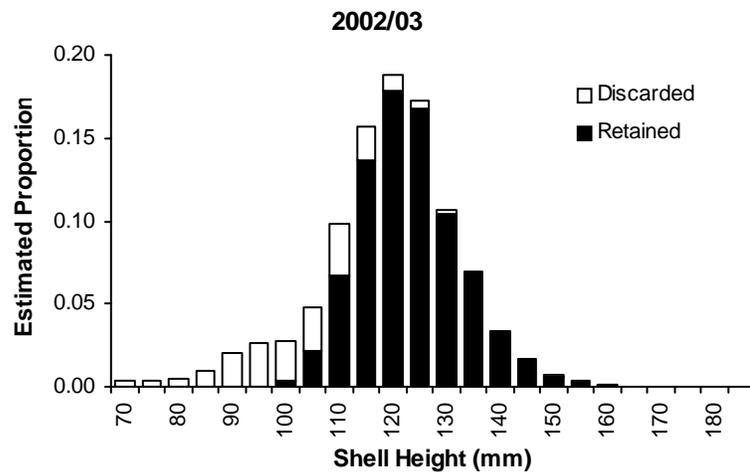
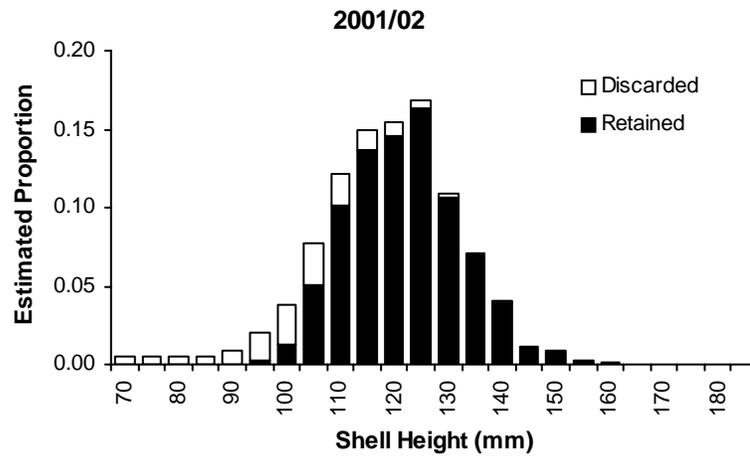
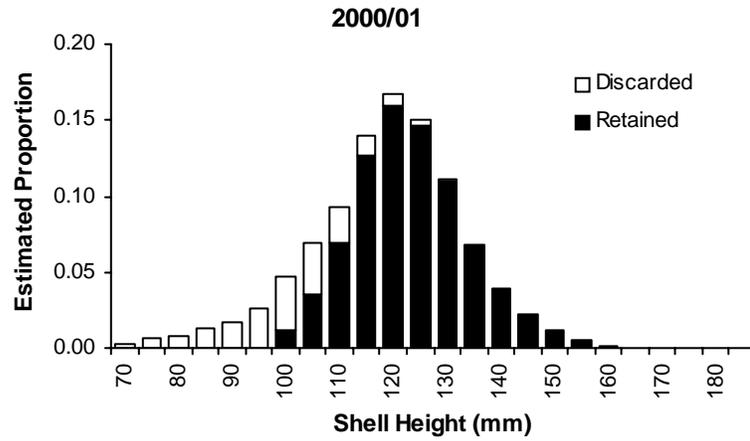


Figure 6.-Estimated shell height distribution from resampling observer-collected scallop measurements, Yakutat, Area D, 2000/01 through 2002/03 weathervane scallop fishing seasons.

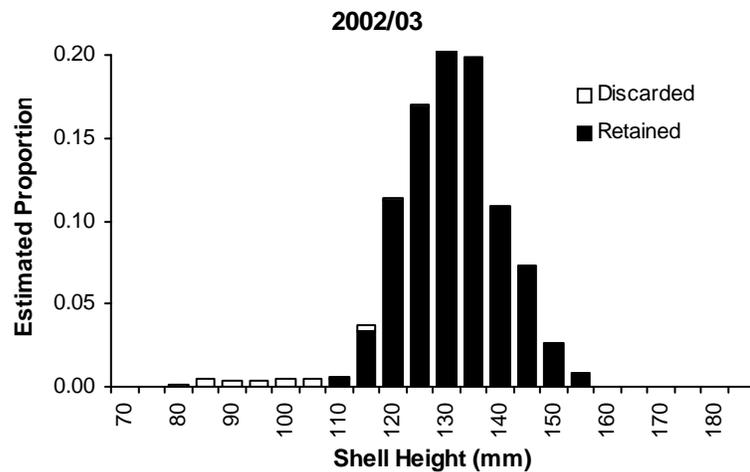
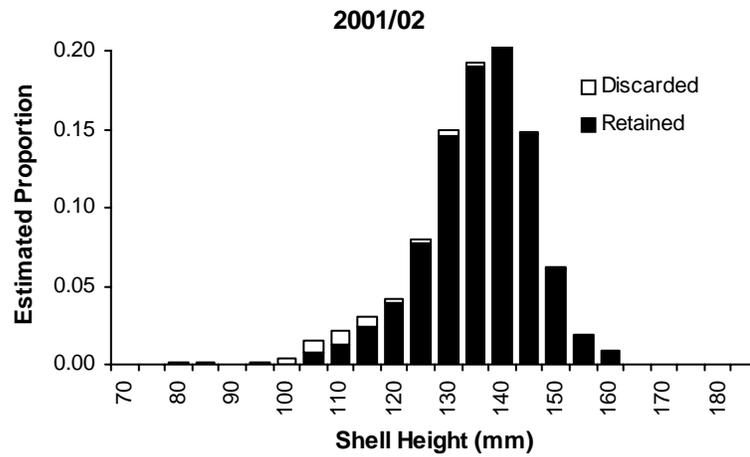
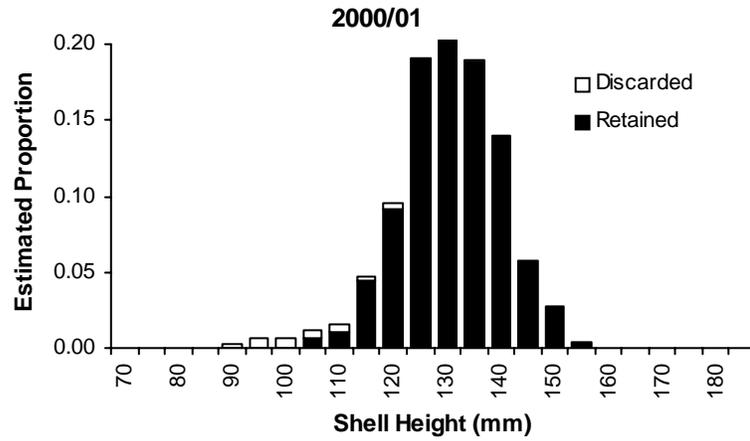


Figure 7.-Estimated shell height distribution from resampling observer-collected scallop measurements, Prince William Sound Registration Area, 2000/01 through 2002/03 weathervane scallop fishing seasons.

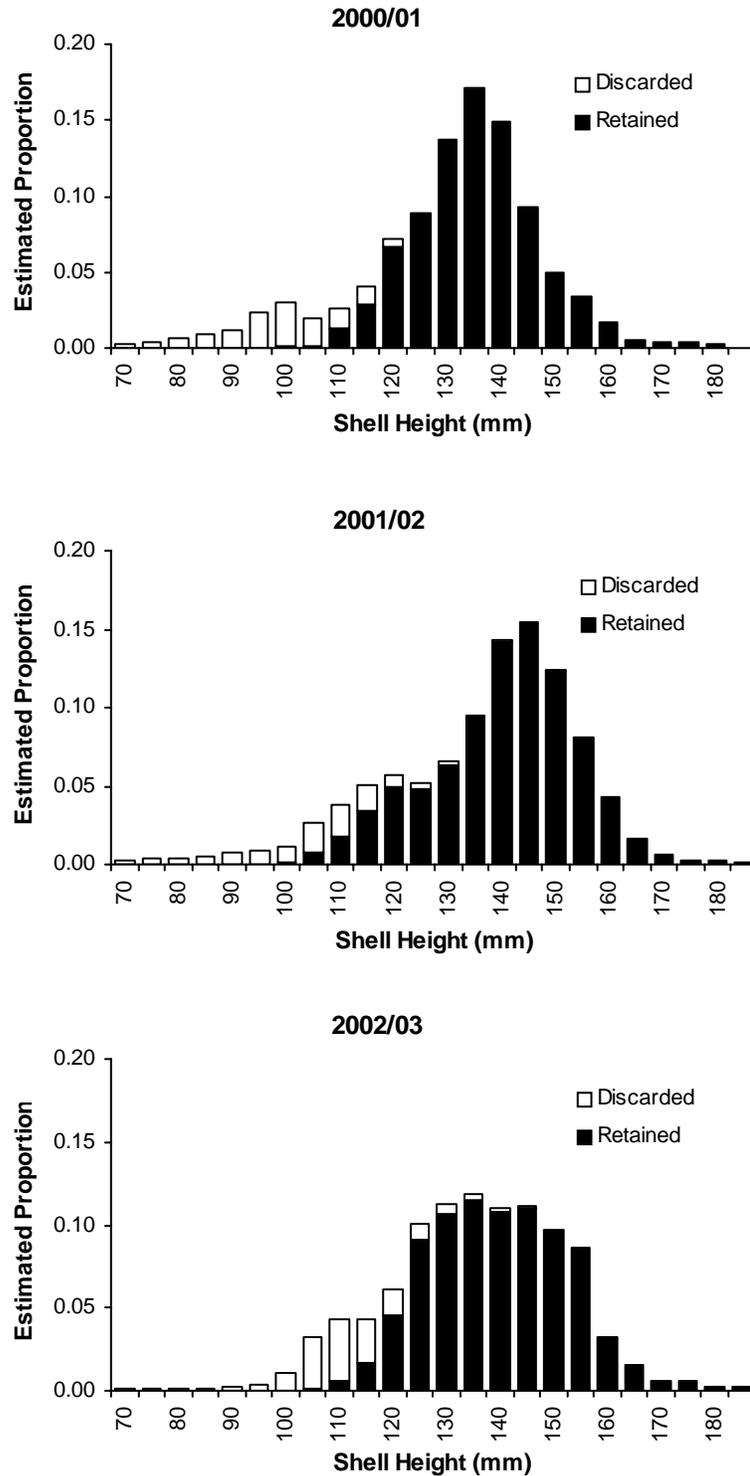


Figure 8.-Estimated shell height distribution from resampling observer-collected scallop measurements, Kodiak Registration Area, Northeast District, 2000/01 through 2002/03 weathervane scallop fishing seasons.

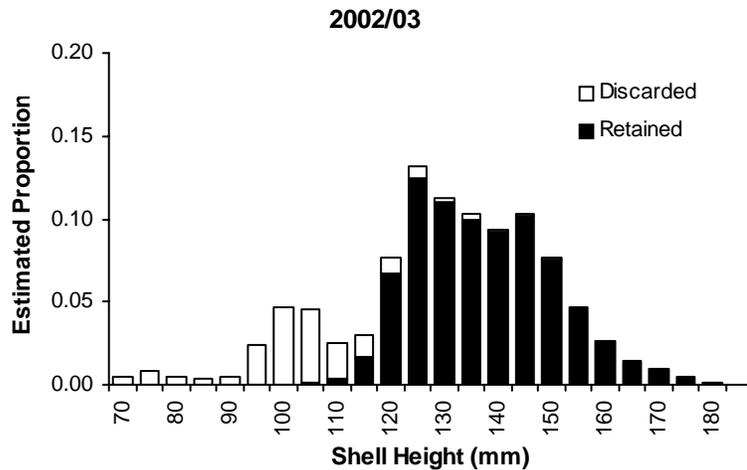
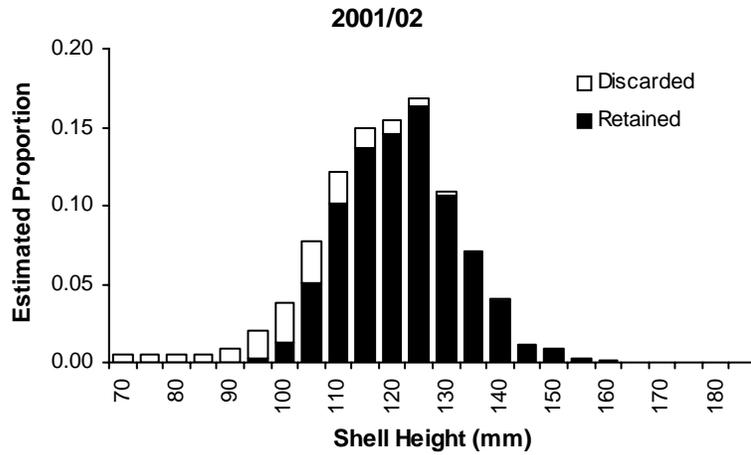
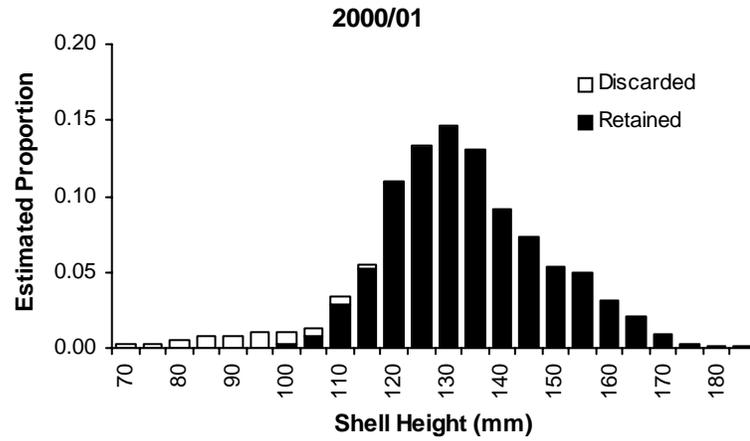


Figure 9.-Estimated shell height distribution from resampling observer-collected scallop measurements, Kodiak Registration Area, Shelikof District, 2000/01 through 2002/03 weathervane scallop fishing seasons.

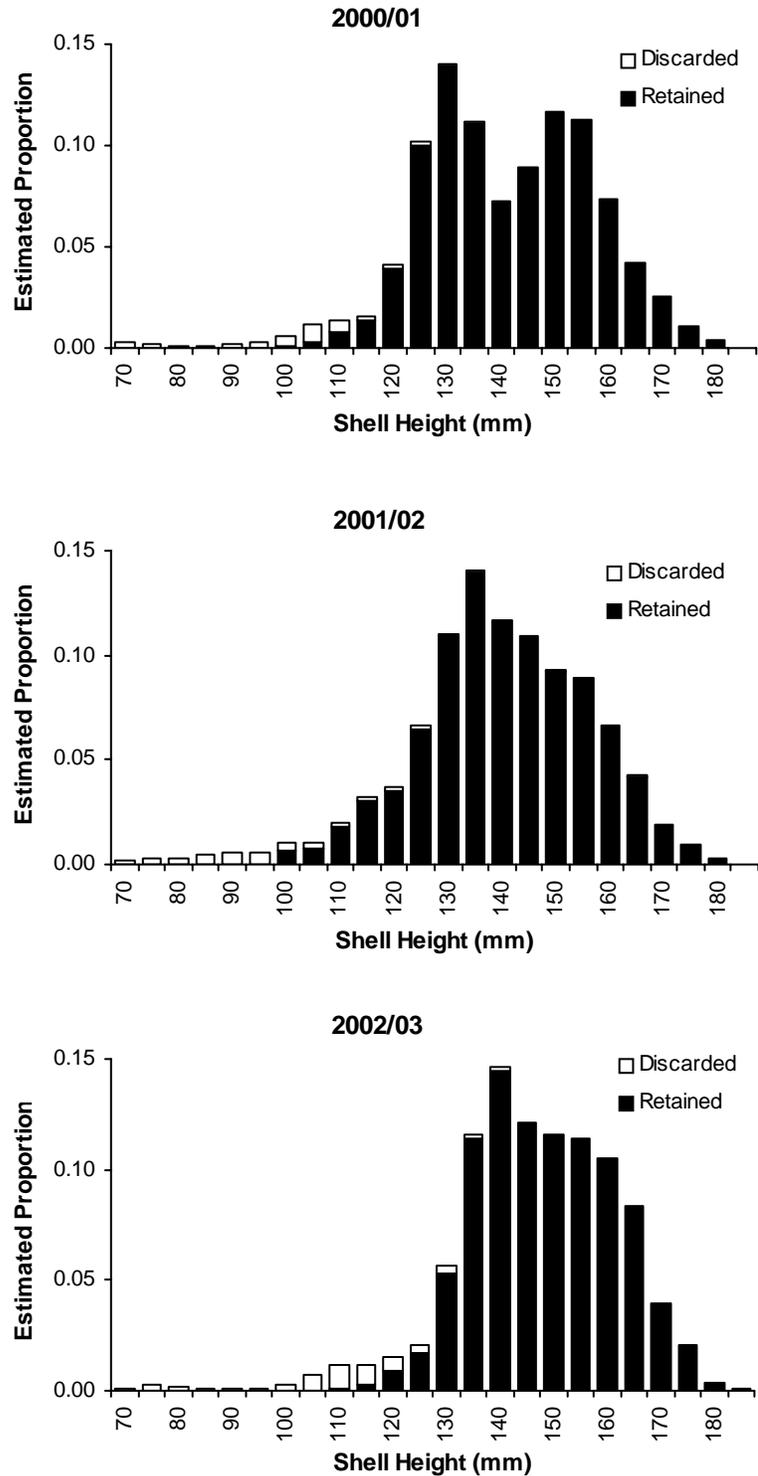


Figure 10.-Estimated shell height distribution from resampling observer-collected scallop measurements, Bering Sea Registration Area, 2000/01 through 2002/03 weathervane scallop fishing seasons.

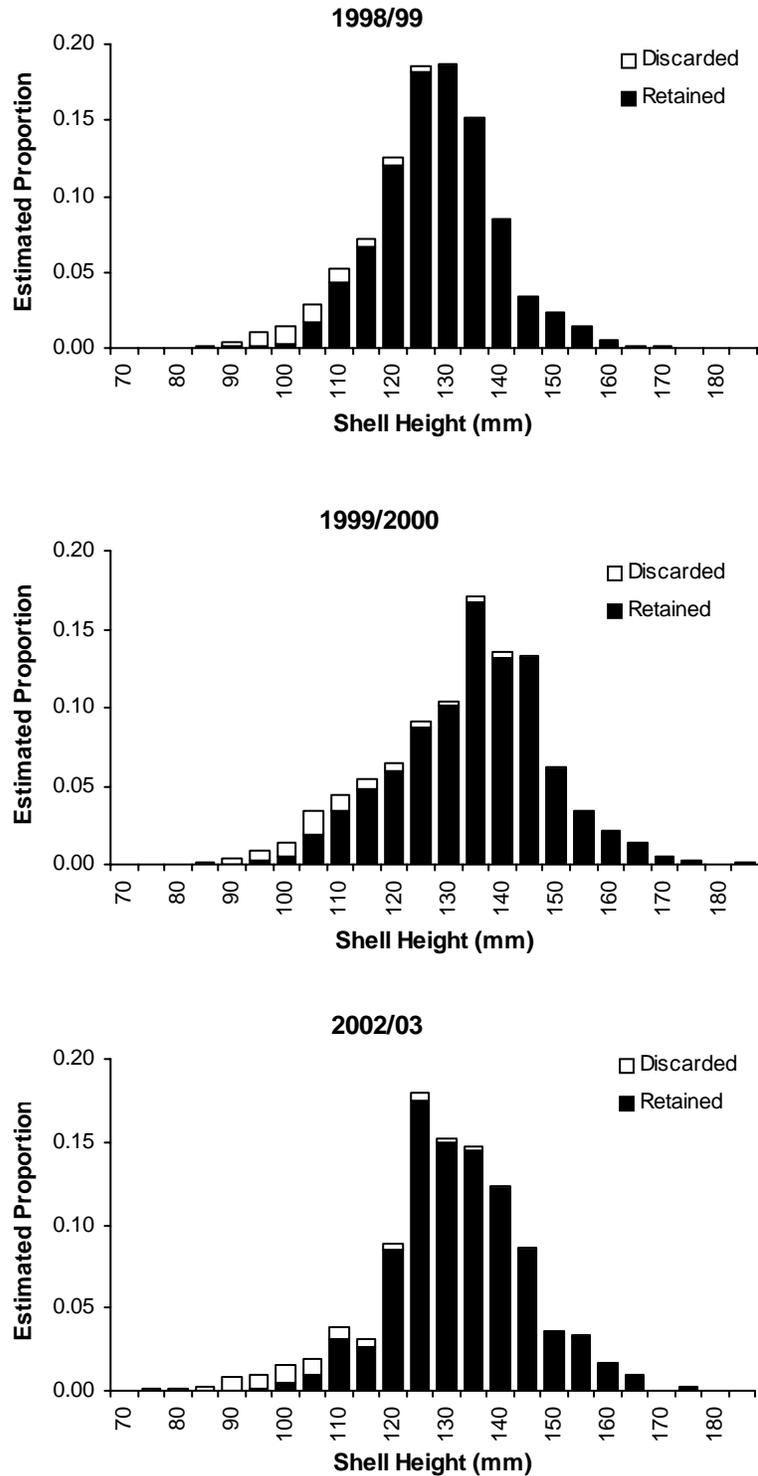


Figure 11. Estimated shell height distribution from resampling observer-collected scallop measurements, Dutch Harbor Registration Area, 1998/99, 1999/2000 and 2002/03 weathervane scallop fishing seasons.

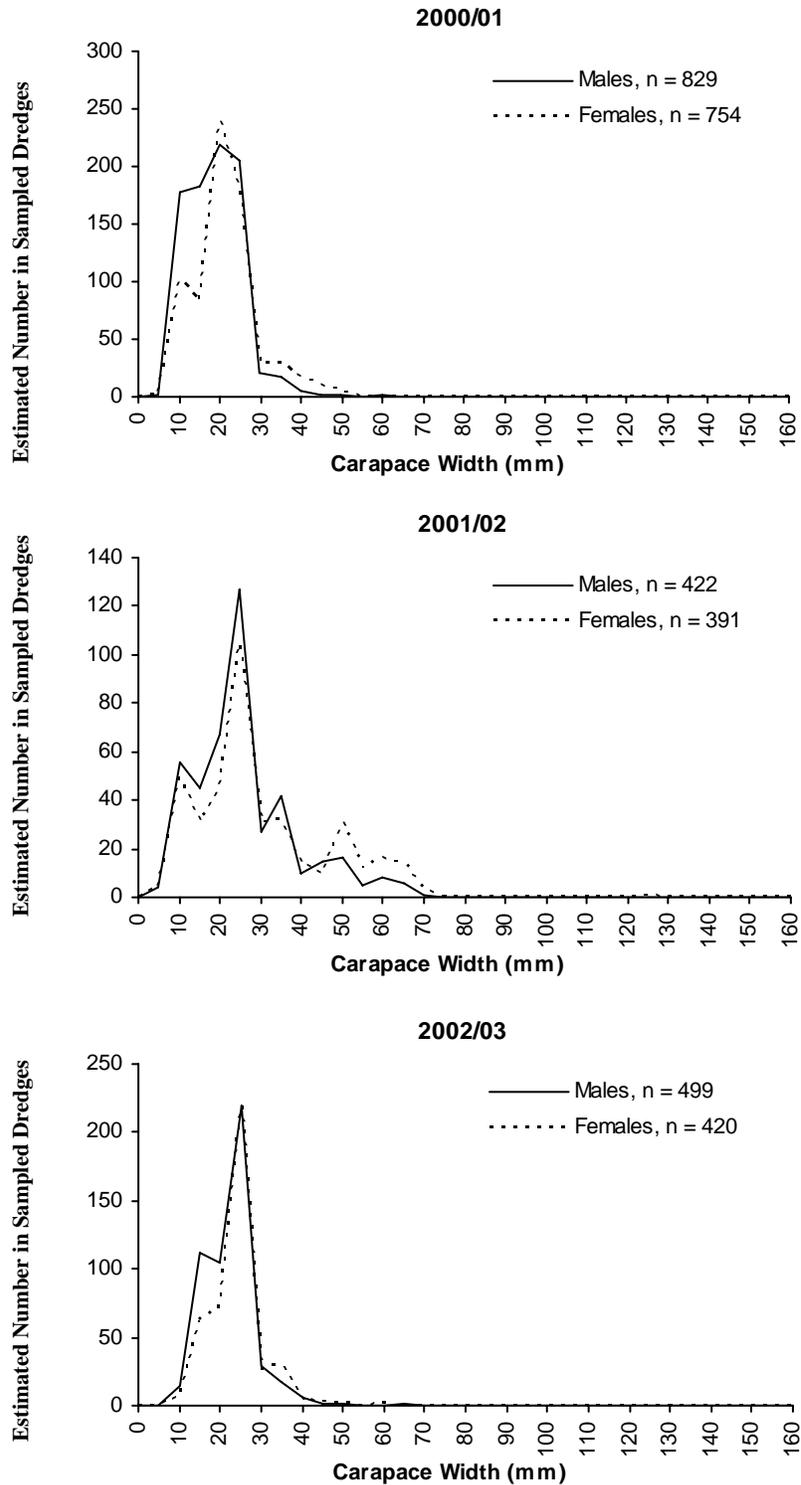


Figure 12.-Tanner crab carapace width distributions observed in bycatch sampling, Yakutat, Area D, 2000/01 through 2002/03 weathervane scallop fishing seasons.

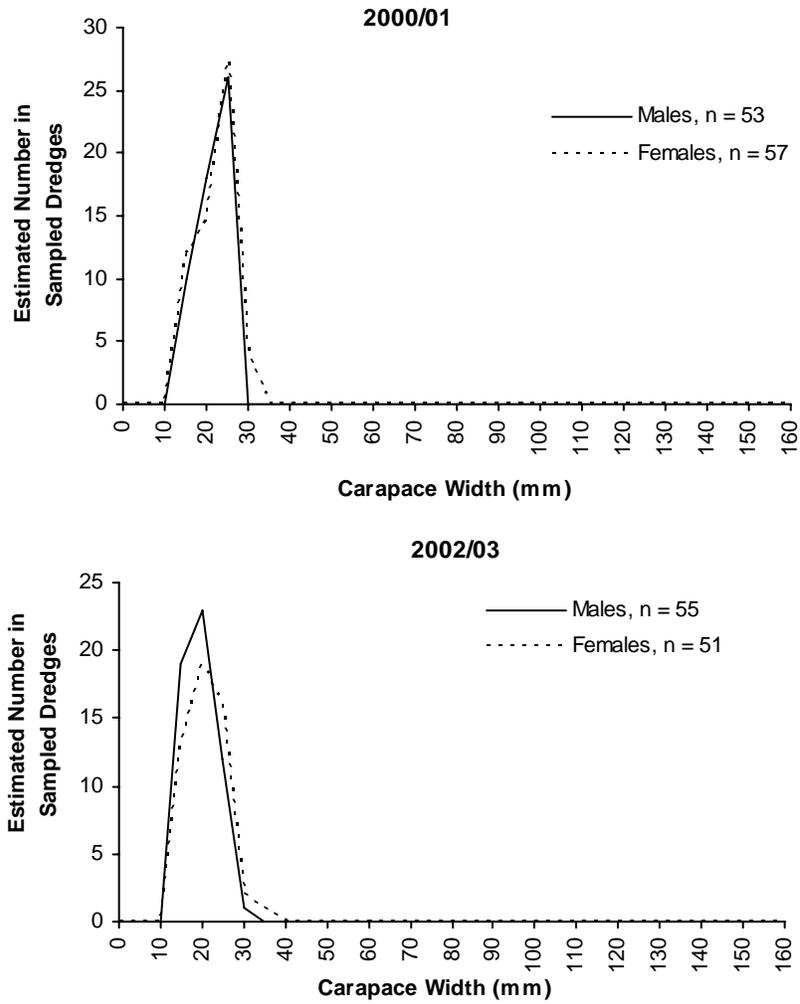


Figure 13.-Tanner crab carapace width distributions observed in bycatch sampling, Prince William Sound Registration Area, 2000/01 and 2002/03 weathervane scallop fishing seasons.

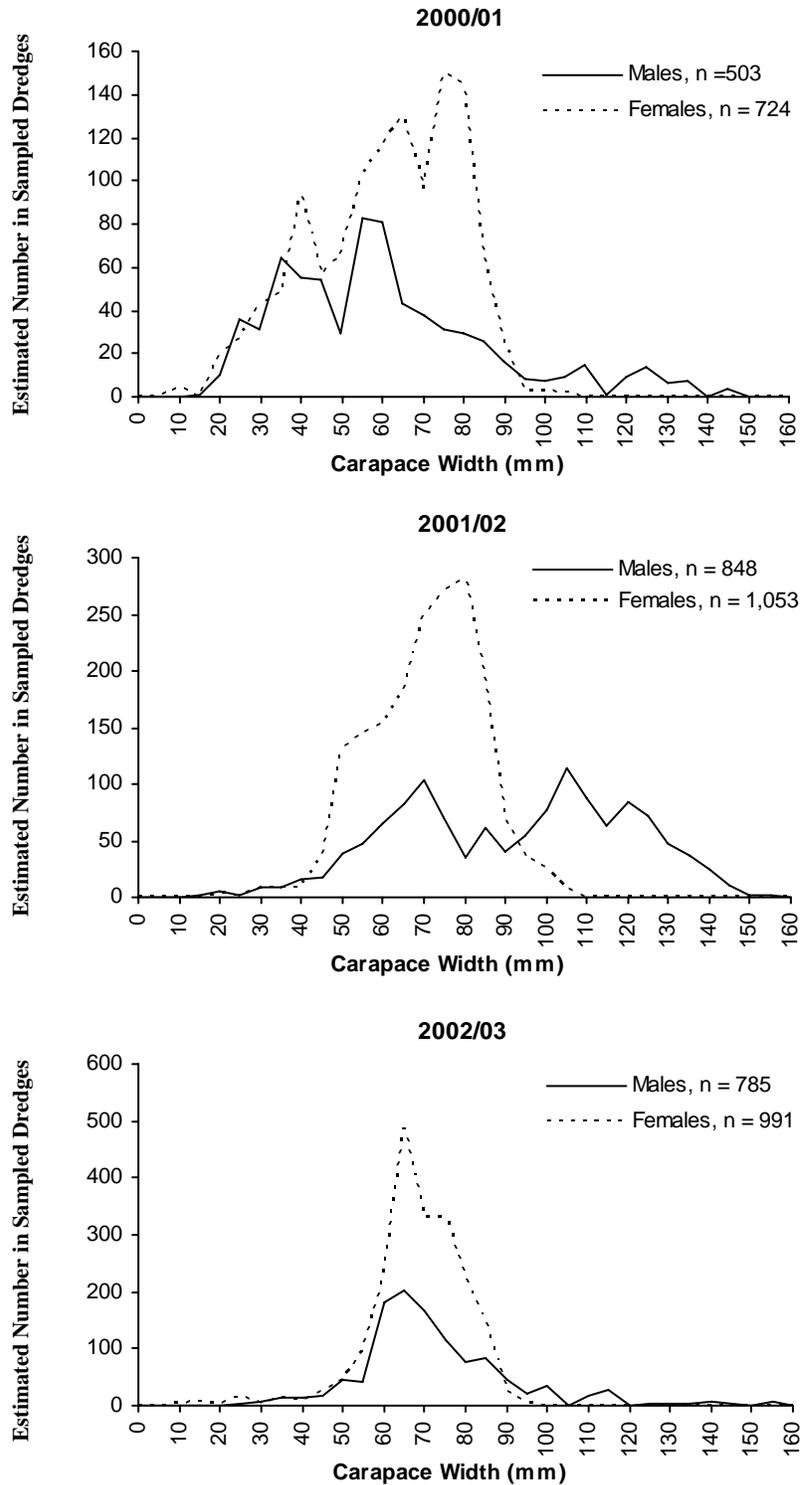


Figure 14.-Tanner crab carapace width distributions observed in bycatch sampling, Kodiak Registration Area, Northeast District, 2000/01 through 2002/03 weathervane scallop fishing seasons.

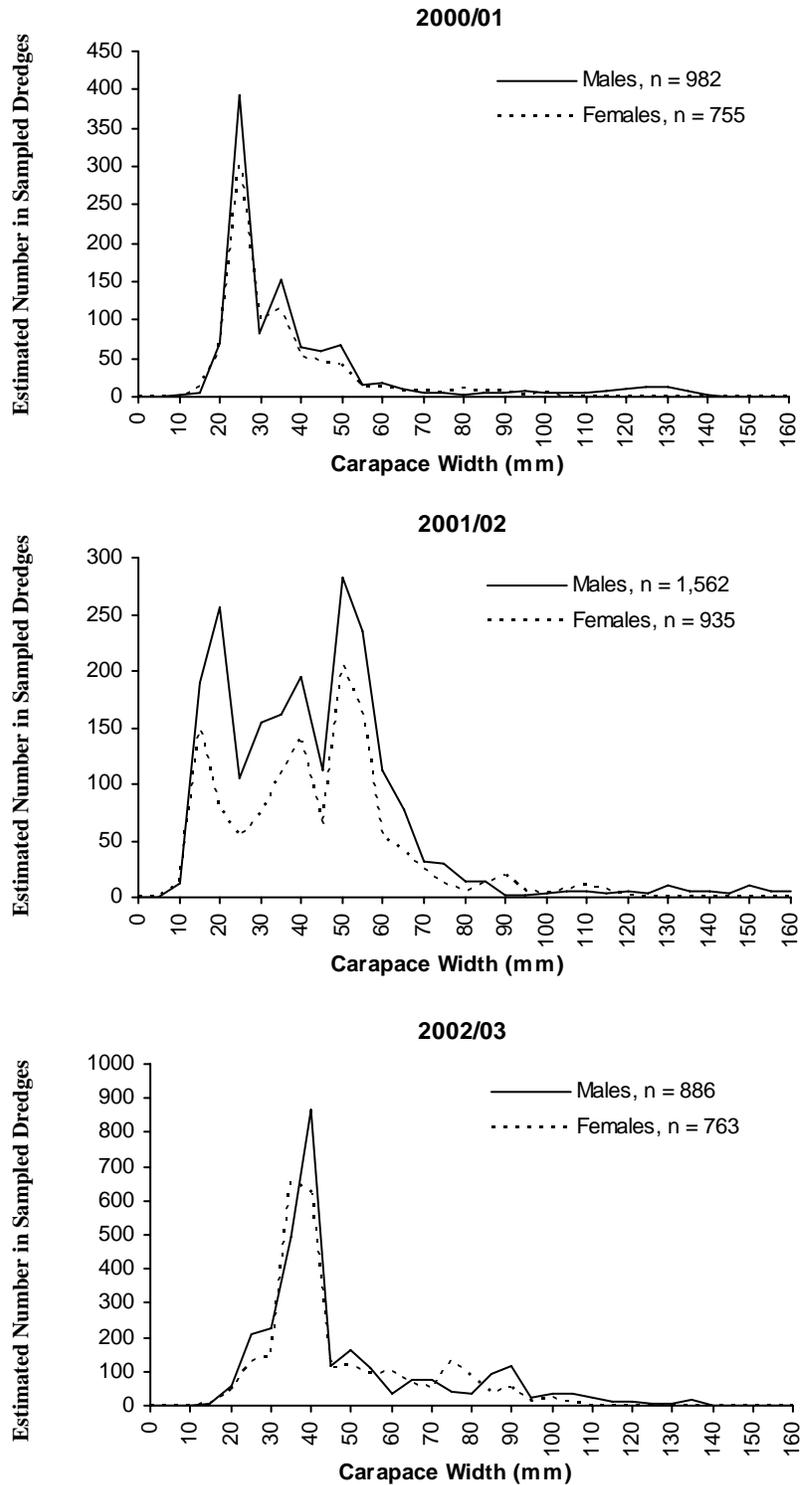


Figure 15.-Tanner crab carapace width distributions observed in bycatch sampling, Kodiak Registration Area, Shelikof District, 2000/01 through 2002/03 weather-vane scallop fishing seasons.

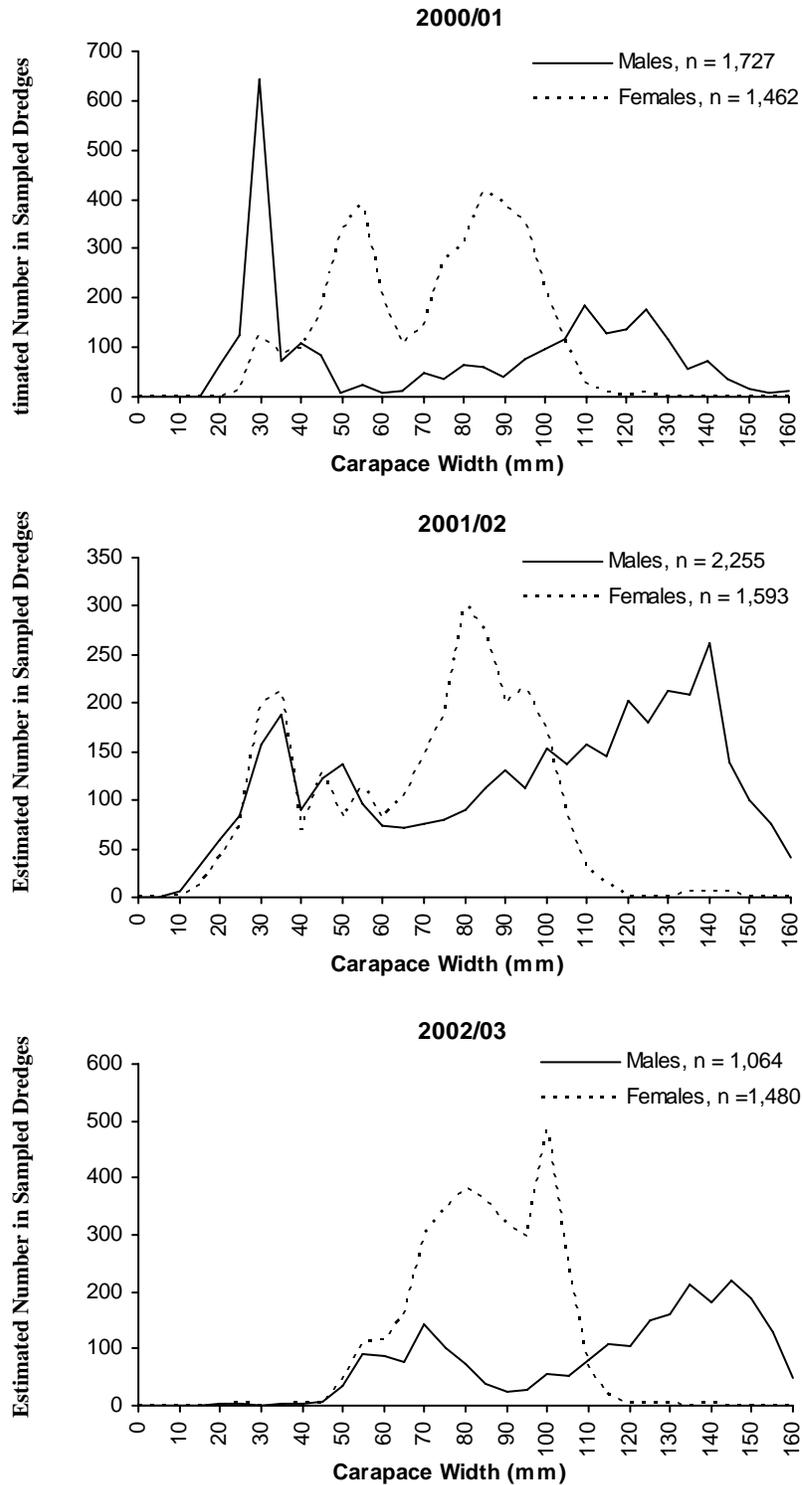


Figure 16.-Tanner crab carapace width distributions observed in bycatch sampling, Bering Sea Registration Area, 2000/01 through 2002/03 weathervane scallop fishing seasons

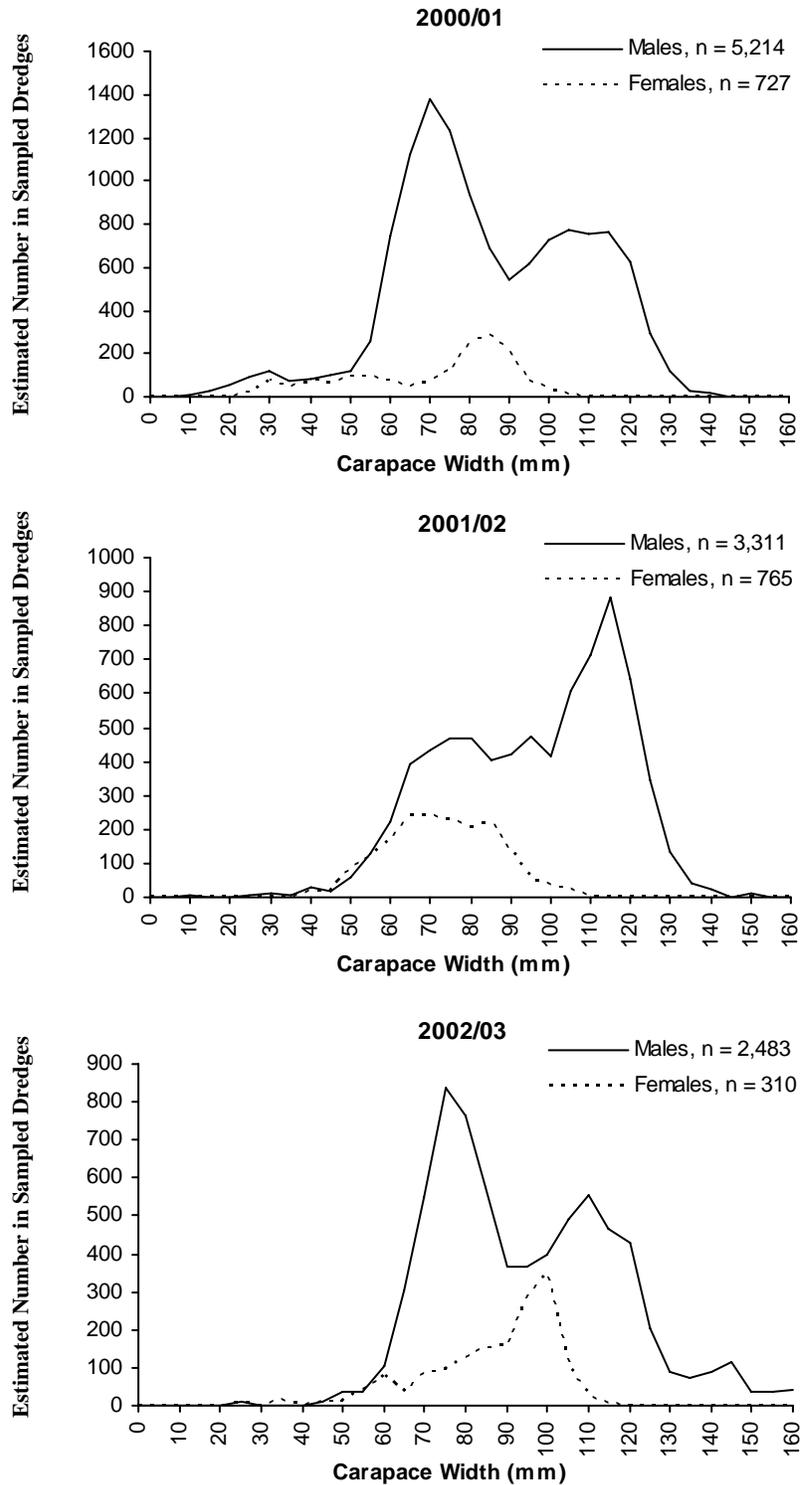


Figure 17. *Chionoecetes opilio* and *C. opilio* x *C. bairdi* hybrid crab carapace width distributions observed in bycatch sampling, Bering Sea Registration Area, 2000/01 through 2002/03 weathervane scallop fishing seasons.

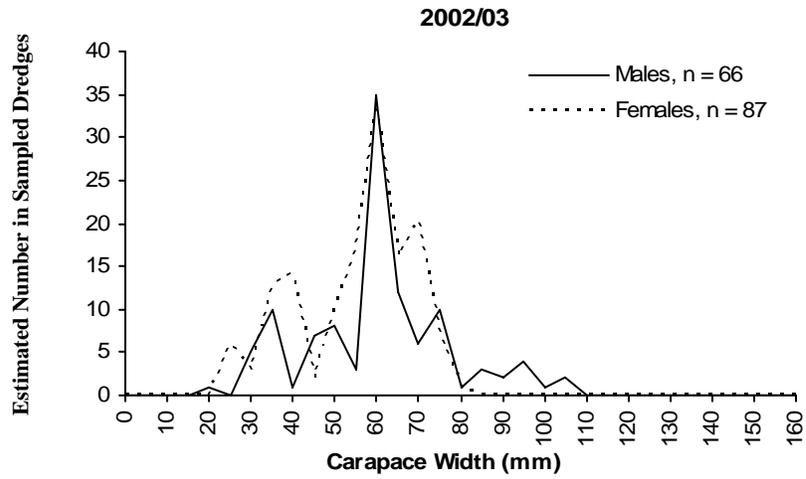


Figure 18.-Tanner crab carapace width distributions observed in bycatch sampling, Dutch Harbor Registration Area, 2002/03 weathervane scallop fishing season.