Fishery Data Series No. 10-97

Summary of Observer Data Collected During the 2008/09 Alaska Weathervane Scallop Fishery

by

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and

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December 2010

Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

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Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Measures (fisheries)

fork length	FL
mideye to fork	MEF
mideye to tail fork	METF
standard length	SL
total length	TL

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$log_{2,}$ etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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ABSTRACT

Onboard fishery observers have been required on all commercial vessels fishing for weathervane scallops *Patinopecten caurinus* in Alaska waters excluding Cook Inlet since 1994. Observer sampling provides biological information on the scallop population and tracks bycatch in the fishery. This report summarizes data collected by scallop fishery observers during the 2008/09 Alaska weathervane scallop fishing season. Observer sampling effort and fishery data are summarized, and estimates of crab and halibut bycatch are presented. Time series of scallop observer effort, commercial fishing harvest, and bycatch data beginning in 1993 are included as appendices.

Key words: weathervane scallops, Alaska, *Patinopecten caurinus*, fishery observer, marine fishery, bycatch

INTRODUCTION

Commercial fishing for weathervane scallops *Patinopecten caurinus* in Alaska began in 1967, when two Kodiak-based vessels were converted for scallop dredging (Kruse et al. 2005). The weathervane scallop fishery was passively managed by Alaska Department of Fish and Game (ADF&G) using measures such as seasons and area closures from the late 1960s until 1993, when an influx of scallop vessels from the east coast of the United States caused concerns about overfishing. This led ADF&G to officially designate the fishery a 'high impact emerging fishery.' ADF&G subsequently developed the Alaska Scallop Fishery Management Plan, which became regulation 5 AAC 38.076 adopted by Alaska Board of Fisheries in 1994.

The new management plan included provisions designed to limit efficiency and slow the scallop harvest. Additionally, it provided a framework for establishing crab bycatch limits and gave ADF&G authority to establish an onboard scallop fishery observer program. Observers have been required onboard all vessels fishing for scallops in Alaska waters outside Cook Inlet since that time, with primary goals of collecting biological information on the scallop population and monitoring bycatch. Alaska scallop fishery regulations, detailed descriptions of registration areas, and additional management information are available from ADF&G (e.g., Barnhart et al. 2008), and in the Fisheries Management Plan for the Scallop Fishery off Alaska (FMP)[1], a federal document approved by the North Pacific Fishery Management Council that grants authority to the state of Alaska to manage the scallop fishery in federal waters between 3 and 200 nautical miles offshore.

Scallop fishery observers are employed by independent agents who contract with scallop vessel operators for their services. ADF&G coordinates observer activities including training, deployment, briefing, debriefing, and certification, and maintains a database of observer-collected data at the Kodiak ADF&G office.

This report summarizes data collected by scallop fishery observers during the 2008/09 Alaska statewide scallop fishing season. Biological data on the scallop catch, other species incidentally caught by scallop dredges (bycatch), and summaries of logbook data recorded by scallop vessel operators are presented. Time series data in tabular form that provide historical perspective on the scallop fishery and observer program dating back to its inception in 1993 are presented in Appendices A–C. Appendix A contains tables summarizing observer program statistics such as fishing dates, vessel days, and number of tows sampled by observers. Appendix B tables summarize fishery performance with statistics such as catch and CPUE. Appendix C contains tables summarizing bycatch of crabs and halibut.

[1] http://www.fakr.noaa.gov/npfmc/fmp/scallop/ScallopFMP2006.pdf

METHODS

Scallop fishery observers were trained prior to the 2008/09 season at University of Alaska's North Pacific Fisheries Observer Training Center using materials prepared by ADF&G including the Weathervane Scallop Observer Manual (Barnhart 2004). Observers were deployed on all trips of all vessels fishing scallops outside Cook Inlet during the 2008/09 season. Please refer to Appendix D for a list of terms describing scallops and scallop fishery operations that are used frequently in this report.

CATCH SAMPLING

Data summarized in this report were obtained through two types of catch sampling: *bycatch sampling* provided counts of incidentally caught crabs and halibut as well as weights and numbers of the retained and discarded scallop catch, and *haul composition sampling* documented all dredge contents by weight. Alaska scallop vessels typically fish almost 24 hours per day and most deploy 2 dredges simultaneously. Observers were instructed to sample a single dredge from different tows at different times throughout the day and to choose the port or starboard dredge (if available) for sampling prior to viewing dredge contents.

Bycatch Sampling

Scallop observers' bycatch sampling goal for the 2008/09 season was a single dredge from 5 separate tows on each full day of fishing. After dredge contents were emptied on deck and the scallop vessel crew removed the retained catch of scallops for shucking, observers examined the remaining contents of the selected dredge.

Pacific halibut *Hippoglossus stenolepis* were counted, measured, examined, and returned to the sea. All incidentally caught crabs were identified by species, individuals of each species were counted, and samples of up to 20 each Dungeness crabs *Cancer magister*, red king crabs *Paralithodes camtschaticus*, Tanner crabs *Chionoecetes bairdi*, and snow crabs *C. opilio* (the first 20 encountered by the observer) were examined in detail. Carapace sizes of these individuals were measured with vernier calipers, and sex, shell condition, and injuries (intact or broken/crushed) were noted. Crabs that were crushed, dismembered, exhibited no movement, or that appeared to be severely injured and not likely to survive, were coded as dead. Carapace length (CL) of king crabs was measured, and carapace width (CW) was measured on all other crab species.

The scallop catch was also examined during bycatch sampling. Twenty scallops were selected from the retained catch via a systematic sampling procedure detailed in the Weathervane Scallop Observer Manual (Barnhart 2004). The sample was weighed and shell height (SH) of each scallop was measured (Figure 1). The discarded scallop catch, consisting of broken scallops and scallops judged by vessel crew members to be too small for shucking, was collected into baskets. One basket was sorted based on shell condition, with intact scallops separated from broken/crushed scallops. These intact scallops and broken/crushed scallop samples were weighed separately with a hanging spring scale and individuals were counted. Broken/crushed scallops with half or more of the soft body tissue attached were counted as one scallop. Shell height was measured on a systematic sample of 20 intact discarded scallops.

Haul Composition Sampling

Scallop observers targeted one dredge from one tow for haul composition sampling on each full day of fishing. After the retained scallop catch was collected in baskets by the crew, the scallop observer would sort the remaining contents to the lowest taxonomic level possible. Natural debris such as kelp, wood, and rocks was separated from man-made items such as plastics and derelict fishing gear. Complete weights were obtained for most species or items caught by the dredge using a hanging spring scale and baskets. Pacific halibut were measured to the nearest centimeter (cm) from the tip of the snout to the end of the central rays of the caudal fin, and weights were determined using a length/weight conversion table. Subsampling was used to estimate weight when large quantities of a single species or item were present. This was accomplished by weighing 3 baskets, then multiplying the average weight by the observer's visual estimate of the total number of baskets of the species or item.

To estimate the weight of retained scallops in the haul composition sample, the average weight of three baskets taken from all retained scallops was multiplied by the total number of baskets of retained scallops. All discarded scallops were weighed then discarded, and retained scallop weights were summed to obtain total weight of scallops in the sampled dredge.

VESSEL OPERATOR LOGBOOKS

Scallop vessel operators were required to complete logbooks supplied by ADF&G that detailed information on each tow. Observers were instructed to regularly check to assure that these forms were accurate, legible, and completed in a timely manner. Data recorded for each tow included date, time, number and width of dredges fished, starting latitude and longitude, tow duration, average depth, average speed, ADF&G statistical area, and estimated round weight of retained scallops.

ESTIMATION OF BYCATCH AND DISCARDED SCALLOP CATCH

Bycatch of Tanner and snow crabs, Dungeness crabs, and Pacific halibut was estimated using data collected during bycatch sampling. For each registration area or district, estimated total number of individuals of each species incidentally caught during the season, $\hat{B}$, was obtained by summing bycatch estimates for each vessel-day calculated as

$$\hat{B}_{vd} = \frac{c}{t} \cdot T \cdot D, \tag{1}$$

where

$\hat{B}_{vd}$ = estimated number of individuals of each species caught during vessel day

c = number crabs or halibut counted in sampled dredges during the vessel-day,

t = sampled dredge-hrs during the vessel-day,

T = total dredge-hrs during the vessel-day, and

D = average number of dredges fished during the vessel-day.

For vessel-days when no dredges were sampled, bycatch was estimated by multiplying the average catch rate (number/hr) for the same vessel in the same area by total dredge-hrs and average number of dredges fished during the vessel-day for which no samples were taken.

Ninety-five percent confidence intervals for the bycatch estimates were calculated using percentile-method bootstrapping (Barnhart et al. 1996).

Methods for estimating the number and weight of discarded scallops in each fishing area were similar to those used for bycatch estimation. Estimated number or weight ($\hat{X}$) of intact (or broken) scallops in the sampled dredges each vessel-day were estimated by

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

where

x_{vd} = number (or weight) of intact (or broken) scallops in subsampled baskets during the vessel-day,

W = weight of subsampled baskets during the vessel-day, and

R = weight of remaining scallops in sampled dredges during the vessel-day.

Estimates of daily totals for each vessel were obtained by substituting $\hat{X}$ for c in equation (1), and area/district estimates were obtained by summing estimates for each vessel-day. Days with no sampling were handled as above, using average catch rates (number or weight per dredge-hr) by the same vessel in the same area. Confidence intervals were calculated using percentile-method bootstrapping.

SCALLOP SHELL HEIGHT FREQUENCY DISTRIBUTIONS

Histograms depicting estimated SH distributions of the combined retained and discarded scallop catch were created for fishing areas with at least 200 measurements each of retained and discarded scallops. This was accomplished by resampling observer-collected SH measurements based on the estimated proportion of retained and discarded scallops in the catch. Plots of multiple years of SH histograms are presented to document changes in SH distributions over time.

RESULTS AND DISCUSSION

OBSERVER SAMPLING EFFORT

Four vessels participated in the 2008/09 statewide scallop fishery between July 1, 2008 and October 12, 2008 (Table 1). Four observers were deployed during the season, and they sampled on 232 of 270 vessel-days on which fishing occurred (Table 1).

Observer sampling effort was proportional to vessel fishing effort, with the largest number of samples taken in Yakutat Area D followed by Kodiak Northeast District and the Bering Sea Area. Only 13 unique vessel fishing days and 11 observed days occurred in Kodiak Shelikof District because fishing closed on July 12, 2008 and remained closed for the 2008/09 regulatory season due to Tanner crab bycatch that exceeded the bycatch cap established prior to the season. Overall, 1,042 or 25% of the 4,133 tows recorded in vessel operator logbooks were sampled by observers during the season.

FISHERY CATCH AND EFFORT

Scallop fishing effort during the 2008/09 season occurred in traditional fishing areas documented in observer program logbooks dating back to 1993 (Figure 2). A total of 342,434 lbs of scallop

meats were harvested during the season (Table 2, Figure 3). In declining order, catches were 150,289 lbs from Yakutat Area D, 74,863 lbs from Kodiak Northeast District, 49,995 lbs from the Bering Sea, 20,986 lbs from Yakutat District 16, 20,040 lbs from Prince William Sound, 13,761 lbs from Kodiak Shelikof District, 10,040 lbs from Dutch Harbor, and 2,460 lbs from the Alaska Peninsula. Dutch Harbor Area was reopened during the 2008/09 season after being closed since the spring of 2003 to promote scallop stock rebuilding.

Catches were close to GHLs in the 2008/09 Yakutat Area D, Yakutat District 16, Prince William Sound Area E, Dutch Harbor Area O and the Bering Sea Area Q scallop fisheries (Table 2). Only 8% of the GHL was harvested in Kodiak Shelikof District due to the early closure. Eighty-three percent of the GHL was harvested in the Kodiak Northeast Management District, where 15,000 lbs of the GHL were assigned to an exploratory area north of Cape Izhut; the scallop fleet discontinued fishing this area after completing 13 exploratory tows. A portion of the Alaska Peninsula Registration Area M was opened with a GHL of 10,000 pounds in 2008/09. The scallop fleet harvested 25% of the GHL and discontinued fishing after 151 dredge hours.

Scallop fishing CPUE for the 2008/09 season was highest in Prince William Sound at 64 lbs meat/dredge-hr and lowest in Alaska Peninsula at 16 lbs meat/dredge-hr (Table 2, Figure 3). Statewide scallop CPUE for the season was 49 lbs meat/dredge-hr, a reduction from 56 lbs meat/dredge-hr during the 2007/08 season.

Estimated round weight of 2008/09 scallop discards (Table 2) totaled 759,949 lbs statewide, accounting for 15% of the total round weight landed. Of the total estimated discarded scallops (whole lbs; Table 2), 63% by weight were comprised of intact scallops and 37% were broken.

Weathervane scallop fishing occurred in depths ranging from 38 to 144 m during the 2008/09 season (Table 3), with 77% of the tows in depths 73–101 m. This was similar to depths fished during previous seasons with the exception of the Alaska Peninsula and Dutch Harbor. The Alaska Peninsula was fished at a shallower minimum depth of 38 m compared to a minimum depth of 59 m in 2006 (Rosenkranz 2009). Dutch Harbor, which hadn't been fished for a number of years, was fished at an average depth of 80 m compared to a 71 m average during the 2002/03 season (Barnhart and Rosenkranz 2006).

Distances towed and area dredged (Table 3) corresponded to dredge-hrs (Table 2), with the highest values recorded in Yakutat Area D at 8,068 nautical miles (nmi). During the 2008/09 season, an average tow was 53 minutes at 4.8 knots. With two 15 ft dredges (the legal maximum), an average tow swept an area of about 71,803 m^2 or 0.021 nmi^2.

DISCARDED SCALLOP CATCH

Estimated weights and associated confidence intervals for discarded scallops are presented in Table 4. Expressed as a percentage of estimated total round weight catch including discarded scallops, discard rates varied from a high of 27% in Yakutat District 16 to 9% in Prince William Sound. In declining order by area, scallop discard proportion was 27% in Yakutat District 16, 26% in Dutch Harbor, 17% in Yakutat Area D, 17% in Kodiak Shelikof District, 12% in Kodiak Northeast District, 12% in the Alaska Peninsula, 10% in the Bering Sea, and 9% in Prince William Sound.

SCALLOP SHELL HEIGHT DISTRIBUTIONS

Observers measured shell height of 36,169 scallops during the 2008/09 season (Table 5). Average SH of retained scallops was highest in the Bering Sea and lowest in Yakutat District 16. In ascending order from lowest to highest, average retained SH was 125 mm in Yakutat District 16, 130 mm in Yakutat Area D, 137 mm in both Prince William Sound and the Alaska Peninsula, 145 mm in Dutch Harbor, 147 mm in Kodiak Shelikof District, 150 mm in Kodiak Northeast District, and 156 mm in the Bering Sea.

Histograms of estimated scallop SH distributions from recent seasons (Figures 4–11) illustrate geographic differences in size frequency as well as changes over time. Interpretation of these figures is affected by size selectivity of dredges used in the fishery; dredge bags are required by Alaska law to be constructed from 4 in (101.6 mm) rings, so scallops less than about 100 mm SH are caught with lower efficiency than larger scallops. In general, the largest and widest range of scallops was found in Bering Sea catches (Figure 11) and in the Kodiak Area (Figures 7–8). Yakutat Area and Prince William Sound catches featured smaller scallops with the narrowest size ranges (Figures 4–6). These results were consistent with preliminary results from ADF&G shell-aging work that show slower growth and lower asymptotic sizes for Yakutat and Prince William Sound scallops than for those from the Kodiak vicinity and the Bering Sea.

Yakutat Area had the narrowest size range of retained scallop catch in 2008/09 (Figures 4–5). Upper end of the range was 150–155 mm for both Area D and District 16, lower than in other areas for 2008/09. The mode of the 2008/09 distributions was 130 mm for Area D and 120 mm for District 16.

Prince William Sound 2008/09 retained scallop catch ranged in size from 110 mm to 160 mm SH (Figure 6) with the upper end of the range similar to that observed in earlier years. The mode of the 2008/09 distribution was 135–140 mm.

Kodiak Northeast District 2008/09 retained catch ranged from 120 mm to about 180 mm SH (Figure 7). The mode of the distribution was 150 mm SH, or 5–15 mm higher than in previous seasons.

Kodiak Shelikof District 2008/09 retained catch ranged from 115–180 mm SH (Figure 8), with the distribution mode at 145 mm. Discarded scallops 90–105 mm in 2008/09 should recruit to the exploited population of scallops in the next year.

Only one year of SH data was available for the Alaska Peninsula because no effort occurred during the 2003/04–2005/06 seasons (Figure 9; Appendix B7). Retained scallops during 2008/09 ranged from 110–160 mm SH with the mode of the distribution at 135 mm.

The Dutch Harbor Area (Area O) was closed to fishing during recent seasons (Appendix A8), so SH data from only the 2008/09 season are shown in Figure 10. Retained catch size ranged from 120 to 180 mm SH with the distribution mode at 140 mm.

Bering Sea scallop catch for 2008/09 ranged in size from 95 to 185 mm SH, with most scallops <130 mm SH discarded. The mode of the distribution for retained scallops was 155 mm SH.

BYCATCH

Bycatch Estimates

Approximately 149,401 Tanner crabs, (95% confidence interval 80,279–218,356), 13 Dungeness crabs (95% confidence interval 1–44), and 461 halibut (95% confidence interval 132–838), were incidentally landed by scallop vessels during the 2008/09 statewide scallop fishing season (Table 6, Figure 12). An estimated 17,205 snow crabs and *Chionoecetes* hybrids were also incidentally caught in the Bering Sea. Two red king crabs were incidentally caught in both the Bering Sea and Kodiak Northeast District fisheries.

In general, fewer crabs were caught in Yakutat Area, Prince William Sound, and Dutch Harbor, and a greater number of crabs were caught in Kodiak Area, Alaska Peninsula, and the Bering Sea (Table 6, Figure 12 top plot). Estimated 2008/09 Tanner crab bycatch was highest in the Bering Sea at about 60,373 animals. This is an increase of approximately 42% or 25,085 incidentally caught Tanner crabs from the Bering Sea compared to 2007/08 season (Appendix C9). Tanner crab bycatch in Kodiak Northeast District was estimated at 39,732 animals, a 49% decrease, or almost half as many incidental crabs caught compared to the 2007/08 season bycatch estimate (Appendix C4).

Estimated Tanner crab bycatch rate (Figure 12 bottom plot, Table 2 and Table 6) was highest in the Alaska Peninsula at 121 crabs/dredge-hr. The fleet voluntarily stopped fishing in the area after 151 dredge hours. Kodiak Shelikof District had the next highest crab bycatch rate at 102 crabs/dredge-hr, which led to the early closure. In decreasing order, rates from other areas were 63 crabs/dredge-hr in the Bering Sea, 29 crabs/dredge-hr in Kodiak Northeast, 5 crabs/dredge-hr in Dutch Harbor, 1–2 crabs/dredge-hr in Prince William Sound, and <1 crab/dredge-hr in Yakutat Area D and Yakutat District 16.

Dungeness crab bycatch during the 2008/09 scallop season occurred only in Kodiak Shelikof District, with an estimated 13 Dungeness crabs encountered (Table 6). No Dungeness crabs were caught in sampled tows in any of the other areas or districts. Halibut bycatch was highest in Kodiak Northeast District with approximately 174 individuals caught, (95% confidence interval 85–272; Table 6). Yakutat Area D had the second highest halibut bycatch followed by Dutch Harbor, Yakutat D16, Prince William Sound and the Alaska Peninsula. No halibut were reported in sampled dredges from Kodiak Shelikof District or the Bering Sea Area. Approximately 461 halibut were incidentally caught statewide (95% confidence interval 132–838).

Size Distributions of Incidentally Caught Tanner and Snow Crabs

Size distributions of Tanner crabs incidentally caught during the 2008/09 scallop season in each area are shown in Figures 13–21. The majority of crabs caught in Yakutat and Prince William Sound areas were small, measuring <30 mm carapace width (CW; Figures 13–15). A wide size range of crabs were encountered in Kodiak Northeast District, from 10 to 140 mm CW, with most of the crabs around 30 mm CW (Figure 16). Nearly all of the crabs caught in Kodiak Shelikof District were <70 mm CW (Figure 17). The bulk of Tanner crabs encountered in the Alaska Peninsula fishery were 50–70 mm CW (Figure 18). Tanner crab sizes in Dutch Harbor ranged from 10 to 120 mm with most females around 70 mm CW and most males around 100 mm CW. The largest crabs and a wide range of sizes were caught in the 2008/09 Bering Sea fishery (Figures 20–21). Tanner crabs ranged from 10 to 155 mm CW and combined snow crab and hybrid (snow × Tanner crab) ranged from 50 to 135 mm CW.

Tanner Crab and Halibut Mortality

Observers examined 4,910 incidentally caught Tanner crabs, snow crabs, and hybrid crabs during the 2008/09 season and classified 64% as dead (Table 7). Rosenkranz (2002) reviewed scallop observer data collected between 1993 and 2000 and noted high variability in Tanner crab bycatch mortality rates both between years and between vessels. Of 58 halibut encountered by observers during 2008/09 bycatch sampling, 24% were reported as dead.

HAUL COMPOSITION

Each scallop observer in the 2008/09 scallop season was instructed to sample the contents of one dredge from one haul per day to determine haul composition, which is the catch composition by weight of everything caught in the scallop dredge including scallops, other commercial and non-commercial species, and debris. Commonly caught invertebrates included sea stars such as sunflower sea stars (*Pycnopodia helianthoides*) and brittle stars (family *Ophiuroidae*), *Chionoecetes* crabs, and sea anemones (Order *Actinaria*). Various skate species, a variety of flatfish, and natural debris including empty weathervane scallop shells, kelp, wood, and rocks, were also frequently encountered by observers during haul composition sampling (Tables 8–15). Scallops were the most abundant species by weight in dredges sampled for haul composition, comprising 76% of the total weight in 195 dredges sampled statewide during the 2008/09 season (Tables 8–15). However, weathervane scallops comprised only 41% of the catch in the Alaska Peninsula. Empty weathervane scallop and other bivalve shells were the second most frequently encountered contents by weight in Yakutat Area D (Table 8), Yakutat District 16 (Table 9), Kodiak Shelikof District (Table 12), and Dutch Harbor (Table 14). Sea stars were frequently encountered in Prince William Sound, Kodiak Northeast District, and the Alaska Peninsula (Tables 10, 11 and 13). Basket stars comprised approximately 25% of the weight from haul composition sampling in the Alaska Peninsula during the 2008/09 season (Table 13). In the Bering Sea, Tanner crab were the second most abundant species by weight in dredges sampled for haul composition (Table 15).

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TABLES AND FIGURES

Table 1.–Observer program statistics from the 2008/09 weathervane scallop fishing season.

Area/District	Start of fishing	End of fishing	Number vessels	Fishing days[a]	Observed days[b]	Bycatch samples[c]	Haul Comp samples[d]
Yakutat Area D	7/11/2008	8/29/2008	3	115	94	401	81
Yakutat District 16	7/18/2008	8/29/2008	2	22	17	70	12
Prince William Sound	7/5/2008	7/15/2008	1	11	9	47	10
Kodiak Northeast District	7/8/2008	10/12/2008	3	59	53	235	44
Kodiak Shelikof District	7/1/2008	7/12/2008	2	13	11	41	10
Alaska Peninsula	9/5/2008	9/12/2008	1	8	8	25	6
Dutch Harbor	9/15/2008	9/27/2008	1	13	12	53	7
Bering Sea	8/18/2008	9/15/2008	1	29	28	123	25
Statewide Total	7/1/2008	10/12/2008	4	270	232	995	195

[a] Number unique vessel days with at least one haul.
[b] Number unique vessel days with at least one sampled haul.
[c] Total number bycatch-sampled hauls..
[d] Total number haul composition samples.

Table 2.–Fishery statistics from the 2008/09 weathervane scallop fishing season.

Area/District	GHL[a] (lbs meat)	Retained Catch (lbs meat)	Retained Catch (lbs whole)	Dredge hours	CPUE[b]	Discarded scallops (lbs whole)	
						Intact	Broken
Yakutat Area D	150,000	150,289	2,053,912	3,286	46	286,483	130,323
Yakutat District 16	21,000	20,986	207,251	423	50	44,868	29,827
Prince William Sound	20,000	20,040	316,118	313	64	9,816	20,361
Kodiak Northeast District	90,000	74,863	817,817	1,363	55	63,820	47,049
Kodiak Shelikof District	170,000	13,761	161,605	263	52	23,654	8,647
Alaska Peninsula	10,000	2,460	30,686	151	16	3,347	754
Dutch Harbor	10,000	10,040	93,957	225	45	20,205	12,378
Bering Sea	50,000	49,995	507,596	962	52	25,126	33,291
Statewide Total	521,000	342,434	4,188,942	6,987	49	477,319	282,630

[a] Upper catch target set prior to season.
[b] Catch per unit effort in lbs meat/dredge-hr.

Table 3.–Depth-range fished, distance towed, and area dredged during the 2008/09 weathervane scallop fishing season.

Area/District	Depths Fished (m)			Distance towed (nmi)	Area dredged (nmi^2)[a]
	Minimum	Maximum	Average		
Yakutat Area D	44	110	73	8,068	39.4
Yakutat District 16	62	91	71	1,078	5.2
Prince William Sound	66	95	74	756	3.7
Kodiak Northeast District	73	128	88	3,719	14.8
Kodiak Shelikof District	73	144	106	795	2.8
Alaska Peninsula	38	128	113	418	1.9
Dutch Harbor	46	123	80	654	2.8
Bering Sea	90	106	98	2,379	11.7
Statewide Total	38	144	82	17,868	82.3

[a] Calculated from logbook data by summing tow duration × average speed × dredge width for each tow; does not account for overlap between tows.

Table 4.–Estimated weight and proportion of intact and broken scallops discarded during the 2008/09 weathervane scallop fishing season.

Area/District	Weight discarded scallops (whole lbs)			Estimated proportion[b]	
	Estimate	Lower bound.[a]	Upper bound[a]	intact	broken
Yakutat Area D	416,807	361,063	541,083	0.12	0.05
Yakutat District 16	74,695	62,870	80,401	0.16	0.11
Prince William Sound	30,177	26,934	32,188	0.03	0.06
Kodiak Northeast District	110,869	85,551	130,998	0.07	0.05
Kodiak Shelikof District	32,301	22,726	53,246	0.12	0.04
Alaska Peninsula	4,101	1,084	4,588	0.09	0.02
Dutch Harbor	32,583	19,671	42,964	0.18	0.05
Bering Sea	58,417	50,547	62,119	0.04	0.06
Statewide Total	759,949	630,446	947,587	0.11	0.06

[a] Bounds from bootstrapped 95% confidence intervals.

[b] Proportion of total catch (retained whole lbs plus discarded whole lbs).

Table 5.–Average scallop shell heights and sample sizes from the 2008/09 weathervane scallop fishery.

Area/District	Retained catch		Discarded catch	
	Average SH (mm)	Sample size	Average SH (mm)	Sample size
Yakutat Area D	130	7,938	106	7,816
Yakutat District 16	125	1,340	104	1,337
Prince William Sound	137	897	120	665
Kodiak Northeast District	150	4,479	119	3,706
Kodiak Shelikof District	147	757	106	743
Alaska Peninsula	137	360	104	335
Dutch Harbor	145	600	111	612
Bering Sea	156	2,383	115	2,201
Statewide Total	139	18,754	111	17,415

Table 6.–Crab and halibut bycatch estimates for the 2008/09 weathervane scallop fishing season.

Area/District	Tanner crabs			Dungeness crabs			Halibut		
	Est number	Lower 95% c.i.[a]	Upper 95% c.i.[a]	Est number	Lower 95% c.i.	Upper 95% c.i.	Est number	Lower 95% c.i.	Upper 95% c.i.
Yakutat Area D	2,416	1,620	3,864	0			130	20	276
Yakutat District 16	189	116	272	0			56	13	114
Prince William Sound	424	272	616	0			16	2	37
Kodiak Northeast District	39,732	12,236	64,105	0			174	85	272
Kodiak Shelikof District	26,845	2,888	51,081	13	1	44	0		
Alaska Peninsula	18,302	12,155	23,804	0			8	1	24
Dutch Harbor	1,120	609	1,947	0			77	11	115
Bering Sea[b]	60,373	50,383	72,667	0			0		
Statewide	149,401	80,279	218,356	13	1	44	461	132	838

[a] 95% confidence intervals from bootstrapping.

[b] An estimated 17,205 snow crabs and snow crab × Tanner crab hybrids (95% confidence interval 15,602–18,707) were also incidentally caught in the Bering Sea, and two red king crabs were incidentally caught in both the Bering Sea and Kodiak Northeast District fishery.

Table 7.–Release condition of Tanner crabs and halibut sampled by observers during the 2008/09 scallop fishery.

	Tanner crabs			Halibut		
Area/District	Number dead	Number alive	Percentage dead	Number dead	Number alive	Percentage dead
Yakutat Area D	186	84	69	4	10	29
Yakutat District 16	10	21	32	2	8	20
Prince William Sound	33	23	59	0	2	0
Kodiak Northeast District	1,084	208	84	6	14	30
Kodiak Shelikof District	216	169	56			
Alaska Peninsula	243	139	64	0	1	0
Dutch Harbor	51	111	31	2	9	18
Bering Sea[a]	1,310	1,022	56			
Statewide Total	3,133	1,777	64	14	44	24

[a] Includes Tanner crabs, snow crabs, and hybrid snow × Tanner crabs.

Table 8.–Twenty most frequently encountered species and/or items by weight from haul composition sampling during the 2008/09 Yakutat Area D weathervane scallop fishery.

Rank	Common name	Scientific name	Percentage weight
1	weathervane scallop	*Patinopecten caurinus*	84.2
2	empty scallop & other bivalve shells		3.3
3	kelp, wood, rocks, etc.		1.4
4	sunflower sea star	*Pycnopodia helianthoides*	1.3
5	big skate	*Raja binoculata*	1.2
6	brittle star	*Ophiura sarsi*	0.8
7	spiny dogfish	*Squalus acanthias*	0.7
8	Dover sole	*Microstomus pacificus*	0.7
9	arrowtooth flounder	*Atheresthes stomias*	0.6
10	rex sole	*Glyptocephalus zachirus*	0.6
11	longnose skate	*Raja rhina*	0.5
12	Alaska skate	*Bathyraja parmifera*	0.5
13	lingcod	*Ophiodon elongatus*	0.4
14	sand star	*Luidia foliata*	0.3
15	skate unidentified	Family *Rajidae*	0.3
16	English sole	*Parophrys vetulus*	0.3
17	sea anemone unidentified	Order *Actiniaria*	0.2
18	solaster stimpsoni	*Solaster stimpsoni*	0.2
19	flathead sole	*Hippoglossoides elassodon*	0.2
20	Pacific cod	*Gadus macrocephalus*	0.2

Table 9.–Twenty most frequently encountered species and/or items by weight from haul composition sampling during the 2008/09 Yakutat District 16 weathervane scallop fishery.

Rank	Common name	Scientific name	Percentage weight
1	weathervane scallop	*Patinopecten caurinus*	80.0
2	empty scallop & other bivalve shells		3.2
3	kelp, wood, rocks, etc.		2.5
4	spiny dogfish	*Squalus acanthias*	2.0
5	brittle star	*Ophiura sarsi*	2.0
6	big skate	*Raja binoculata*	1.9
7	striped sunstar	*Solaster stimpsoni*	1.8
8	rex sole	*Glyptocephalus zachirus*	1.0
9	skate unidentified	Family *Rajidae*	1.0
10	solaster paxillatus	*Solaster paxillatus*	1.0
11	longnose skate	*Raja rhina*	0.6
12	wolf eel	*Anarrhichthys ocellatus*	0.5
13	sand star	*Luidia foliata*	0.4
14	arrowtooth flounder	*Atheresthes stomias*	0.3
15	Dover sole	*Microstomus pacificus*	0.3
16	Pacific cod	*Gadus macrocephalus*	0.2
17	crab barnacle	*Balanus hesperius*	0.2
18	bristle worm	*Aphrodita negligens*	0.1
19	vermillion sea star	*Mediaster aequalis*	0.1
20	sea anemone unidentified	Order *Actiniaria*	<0.1

Table 10.–Twenty most frequently encountered species and/or items by weight from haul composition sampling during the 2008/09 Prince William Sound weathervane scallop fishery.

Rank	Common name	Scientific name	Percentage weight
1	weathervane scallop	*Patinopecten caurinus*	86.5
2	striped sunstar	*Solaster stimpsoni*	3.9
3	brittle star	*Ophiura sarsi*	3.7
4	empty scallop & other bivalve shells		1.3
5	kelp, wood, rocks, etc.		0.7
6	sand star	*Luidia foliata*	0.5
7	Dungeness crab	*Cancer magister*	0.5
8	longnose skate	*Raja rhina*	0.4
9	arrowtooth flounder	*Atheresthes stomias*	0.3
10	big skate	*Raja binoculata*	0.3
11	rex sole	*Glyptocephalus zachirus*	0.2
12	solaster sp.	*Solaster sp.*	0.2
13	wolf eel	*Anarrhichthys ocellatus*	0.1
14	flathead sole	*Hippoglossoides elassodon*	0.1
15	Alaska skate	*Bathyraja parmifera*	<0.1
16	bristle worm	*Aphrodita negligens*	<0.1
17	spiny dogfish	*Squalus acanthias*	<0.1
18	skate unidentified	Family *Rajidae*	<0.1
19	Pacific tomcod	*Microgadus proximus*	<0.1
20	Aleutian skate	*Bathyraja aleutica*	<0.1

Table 11.–Twenty most frequently encountered species and/or items by weight from haul composition sampling during the 2008/09 Kodiak Northeast District weathervane scallop fishery.

Rank	Common name	Scientific name	Percentage weight
1	weathervane scallop	*Patinopecten caurinus*	68.3
2	sunflower sea star	*Pycnopodia helianthoides*	14.1
3	kelp, wood, rocks, etc.		5.5
4	empty scallop & other bivalve shells		2.8
5	sea anemone unidentified	Order *Actiniaria*	1.8
6	rock sole	*Pleuronectes bilineatus*	1.1
7	brittle star	*Ophiura sarsi*	0.7
8	arrowtooth flounder	*Atheresthes stomias*	0.6
9	octopus	*Octopus dofleini*	0.4
10	Dover sole	*Microstomus pacificus*	0.4
11	Tanner crab	*Chionoecetes bairdi*	0.3
12	longnose skate	*Raja rhina*	0.2
13	sun sea star	*Solaster stimpsoni*	0.2
14	rex sole	*Glyptocephalus zachirus*	0.2
15	spiny red sea star	*Hippasteria spinosa*	0.2
16	Alaska skate	*Bathyraja parmifera*	0.2
17	Oregon triton	*Fusitriton oregonensis*	0.2
18	butter sole	*Isopsetta isolepis*	0.2
19	debris–fishing gear		0.2
20	hermit sponge	*Suberites ficus*	0.2

Table 12.–Twenty most frequently encountered species and/or items by weight from haul composition sampling during the 2008/09 Kodiak Shelikof District weathervane scallop fishery.

Rank	Common name	Scientific name	Percentage weight
1	weathervane scallop	*Patinopecten caurinus*	83.9
2	empty scallop & other bivalve shells		3.4
3	kelp, wood, rocks, etc.		2.7
4	sunflower sea star	*Pycnopodia helianthoides*	2.1
5	Alaska skate	*Bathyraja parmifera*	1.0
6	Alaska plaice	*Pleuronectes quadrituberculatus*	1.0
7	Bering skate	*Bathyraja interrupta*	0.8
8	Oregon triton	*Fusitriton oregonensis*	0.7
9	arrowtooth flounder	*Atheresthes stomias*	0.7
10	flathead sole	*Hippoglossoides elassodon*	0.6
11	longnose skate	*Raja rhina*	0.5
12	Pacific cod	*Gadus macrocephalus*	0.3
13	sea anemone unidentified	Order *Actiniaria*	0.2
14	bristle worm	*Aphrodita negligens*	0.2
15	Tanner crab	*Chionoecetes bairdi*	0.2
16	Dover sole	*Microstomus pacificus*	0.1
17	Aleutian hermit crab	*Pagurus aleuticus*	<0.1
18	hermit crab unidentified	Family *Paguridae*	<0.1
19	empty gastropod shells		<0.1
20	cheilonereis cyclurus	*Cheilonereis cyclurus*	<0.1

Table 13.–Twenty most frequently encountered species and/or items by weight from haul composition sampling during the 2008/09 Alaska Peninsula weathervane scallop fishery.

Rank	Common name	Scientific name	Percentage weight
1	weathervane scallop	*Patinopecten caurinus*	40.6
2	basket star	*Gorgonocephalus caryi*	24.7
3	kelp, wood, rocks, etc.		8.7
4	Tanner crab	*Chionoecetes bairdi*	6.2
5	Dover sole	*Microstomus pacificus*	3.3
6	arrowtooth flounder	*Atheresthes stomias*	3.1
7	lingcod	*Ophiodon elongatus*	1.8
8	flathead sole	*Hippoglossoides elassodon*	1.6
9	octopus	*Octopus dofleini*	1.5
10	Pacific cod	*Gadus macrocephalus*	0.8
11	rex sole	*Glyptocephalus zachirus*	0.6
12	skate unidentified	Family *Rajidae*	0.5
13	Alaska skate	*Bathyraja parmifera*	0.5
14	sea anemone unidentified	Order *Actiniaria*	0.4
15	brown box crab	*Lopholithodes foraminatus*	0.3
16	crab barnacle	*Balanus hesperius*	0.2
17	orange bat star	*Ceramaster patagonicus*	0.2
18	orange-pink sea urchin	*Allocentrotus fragilis*	0.2
19	majestic sea star	*Pedicellaster magister*	0.2
20	Alaskan hermit crab	*Pagurus ochotensis*	0.2

Table 14.–Twenty most frequently encountered species and/or items by weight from haul composition sampling during the 2008/09 Dutch Harbor weathervane scallop fishery.

Rank	Common name	Scientific name	Percentage weight
1	weathervane scallop	*Patinopecten caurinus*	80.7
2	empty scallop & other bivalve shells		4.9
3	basket star	*Gorgonocephalus caryi*	2.2
4	kelp, wood, rocks, etc.		2.0
5	striped sunstar	*Solaster stimpsoni*	1.1
6	brittle star	*Ophiura sarsi*	0.8
7	butter sole	*Isopsetta isolepis*	0.7
8	solaster sp.	*Solaster sp.*	0.6
9	octopus	*Octopus dofleini*	0.5
10	Tanner crab	*Chionoecetes bairdi*	0.5
11	arrowtooth flounder	*Atheresthes stomias*	0.4
12	lyre crab	*Hyas lyratus*	0.4
13	daisy brittle star	*Ophiopholis aculeata*	0.4
14	longhead dab	*Limanda proboscidea*	0.4
15	rock sole	*Pleuronectes bilineatus*	0.4
16	horsehair crab	*Erimacrus isenbeckii*	0.3
17	Alaska skate	*Bathyraja parmifera*	0.3
18	*Chlamys* sp.	*Chlamys* sp.	0.2
19	flathead sole	*Hippoglossoides elassodon*	0.2
20	majestic sea star	*Pedicellaster magister*	0.2

Table 15.–Twenty most frequently encountered species and/or items by weight from haul composition sampling during the 2008/09 Bering Sea weathervane scallop fishery.

Rank	Common name	Scientific name	Percentage weight
1	weathervane scallop	*Patinopecten caurinus*	83.4
2	Tanner crab	*Chionoecetes bairdi*	2.8
3	Alaska skate	*Bathyraja parmifera*	2.2
4	empty scallop & other bivalve shells		1.5
5	sponge unidentified	Phylum *Porifera*	1.1
6	arrowtooth flounder	*Atheresthes stomias*	1.1
7	Tanner crab unidentified	*Chionoecetes* sp.	1.0
8	flathead sole	*Hippoglossoides elassodon*	1.0
9	sea anemone unidentified	Order *Actiniaria*	0.9
10	basket star	*Gorgonocephalus caryi*	0.8
11	sea whip unidentified	*Halipteris sp.*	0.5
12	rex sole	*Glyptocephalus zachirus*	0.3
13	snail unidentified	Class *Gastropoda*	0.3
14	Oregon triton	*Fusitriton oregonensis*	0.3
15	*Neptunea* sp.	*Neptunea* sp.	0.3
16	kelp, wood, rocks, etc.		0.3
17	yellowfin sole	*Pleuronectes asper*	0.2
18	great sculpin	*Myoxocephalus polyacanthocephalus*	0.2
19	hermit crab unidentified	Family *Paguridae*	0.2
20	walleye pollock	*Theragra chalcogramma*	0.2

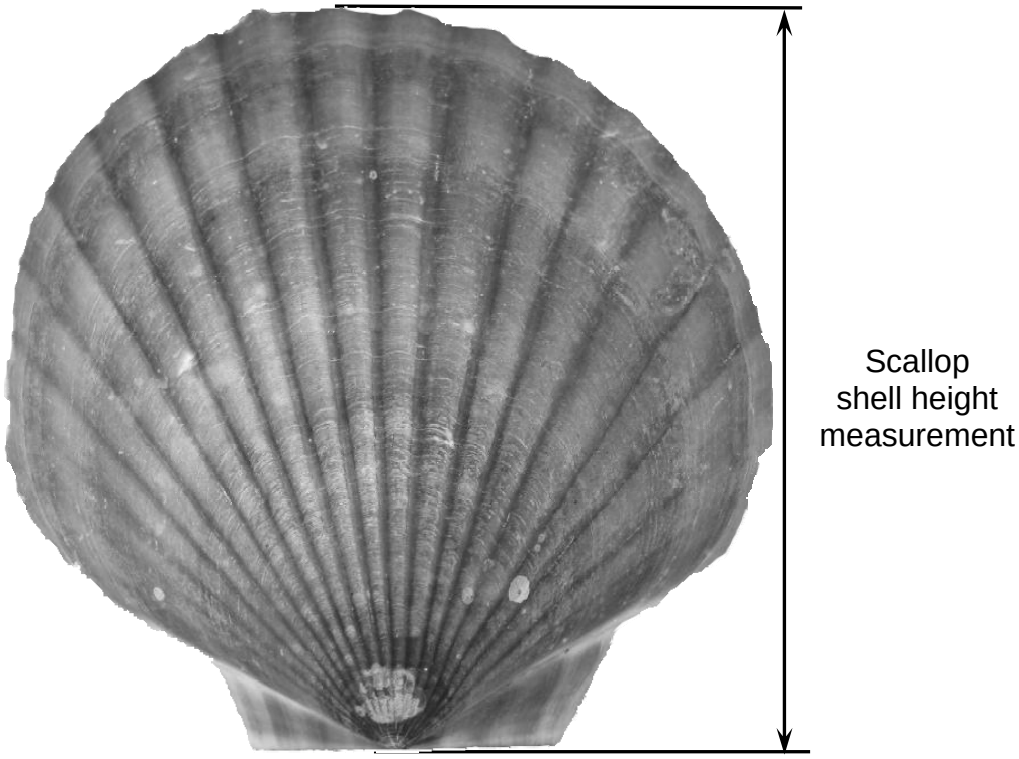


Figure 1.–Left (upper) valve of scallop shell showing orientation of shell height measurement.

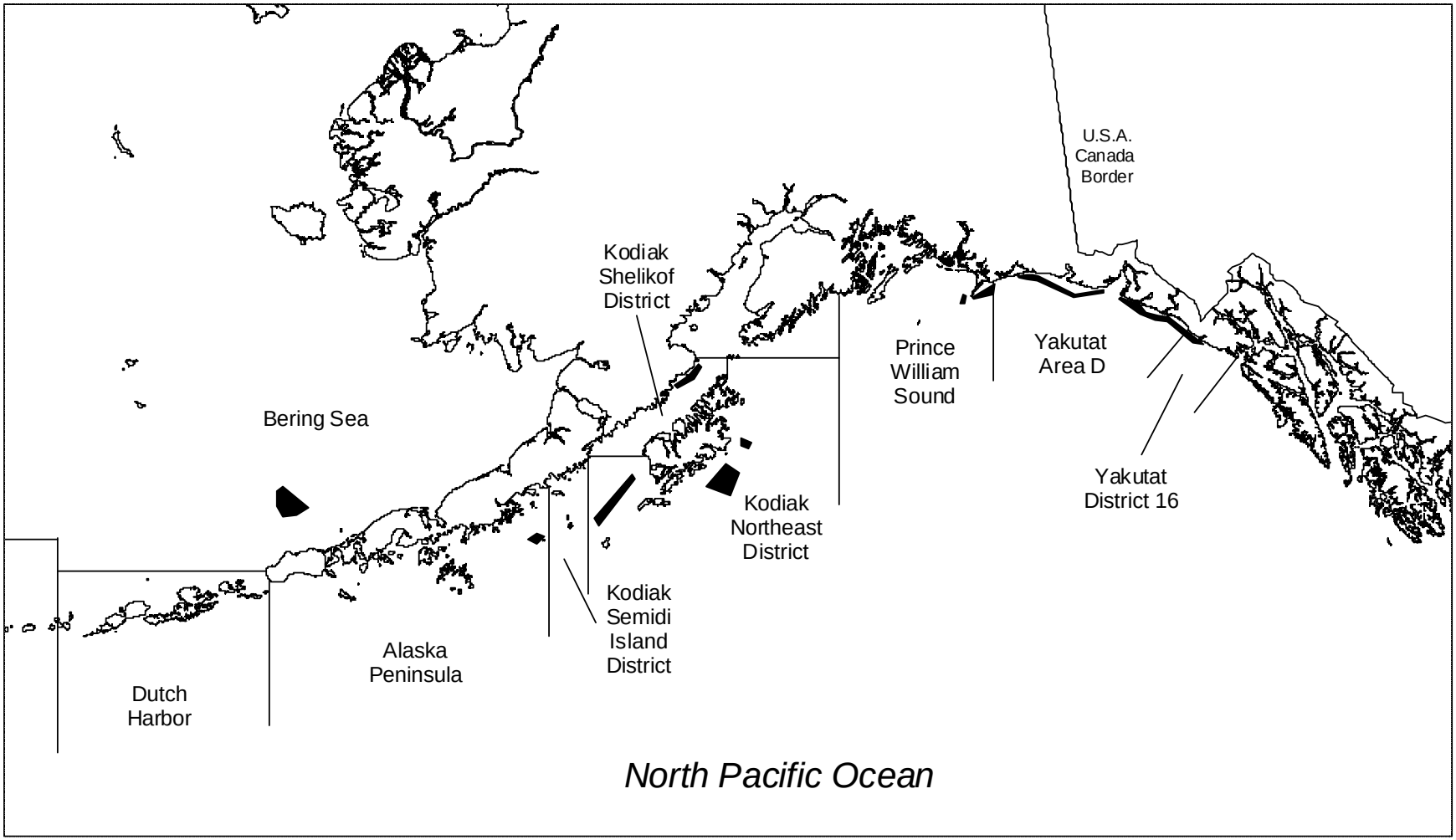


Figure 2.–Map showing Alaska scallop fishery registration areas. General areas of effort during the 2008/09 season are overlaid by black polygons.

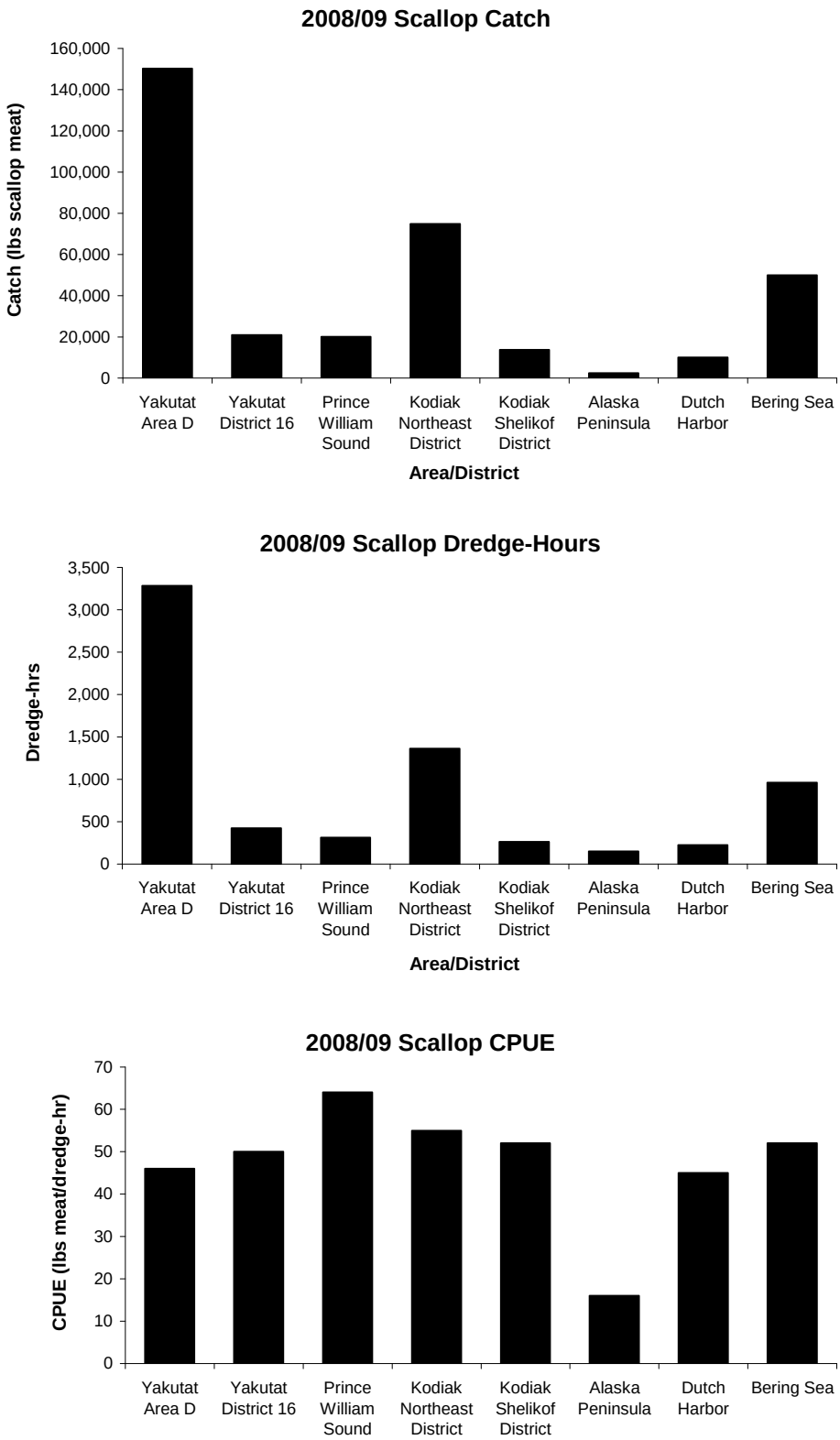


Figure 3.–Scallop catch (top), dredge-hrs (center), and CPUE (bottom) during the 2008/09 statewide weathervane scallop fishery.

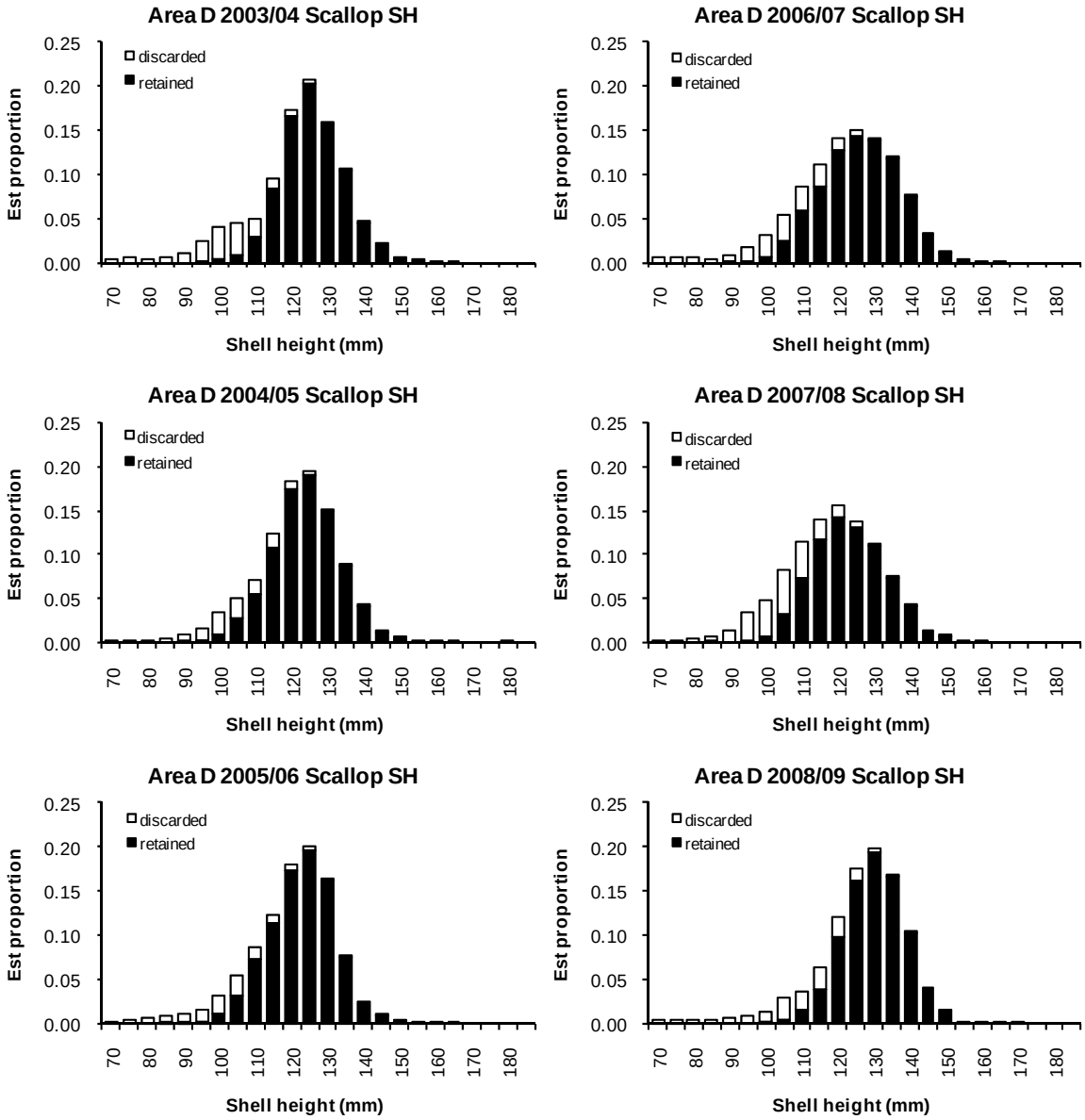


Figure 4.–Estimated scallop shell height (SH) distributions from resampling observer measurements from 2003/04 to 2008/09 Yakutat Area D fishing seasons.

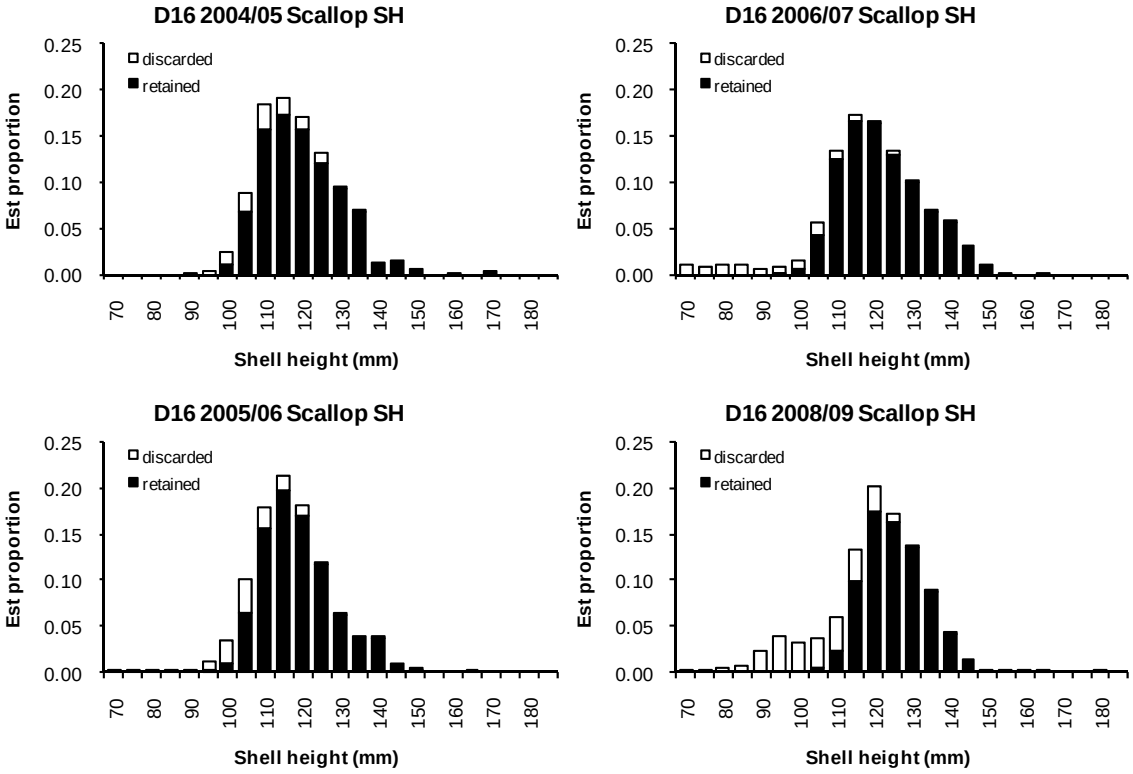


Figure 5.–Estimated scallop shell height (SH) distributions from resampling observer measurements collected during 2004/05–2008/09 Yakutat District 16 fishing seasons. Sample sizes from 2007/08 were not sufficient to create a combined plot.

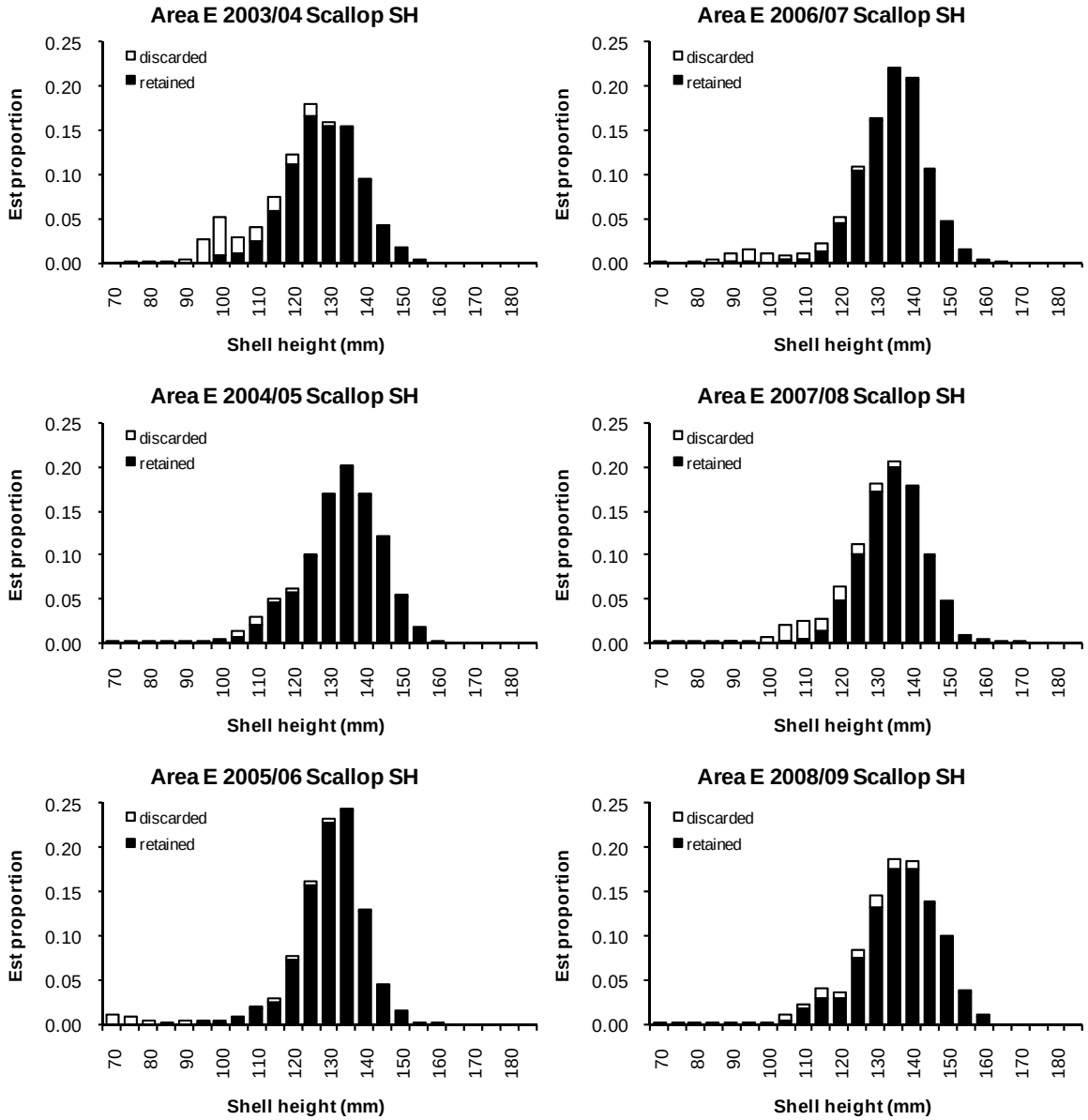


Figure 6.–Estimated scallop shell height (SH) distributions from the 2003/04–2008/09 Prince William Sound Area fishing seasons.

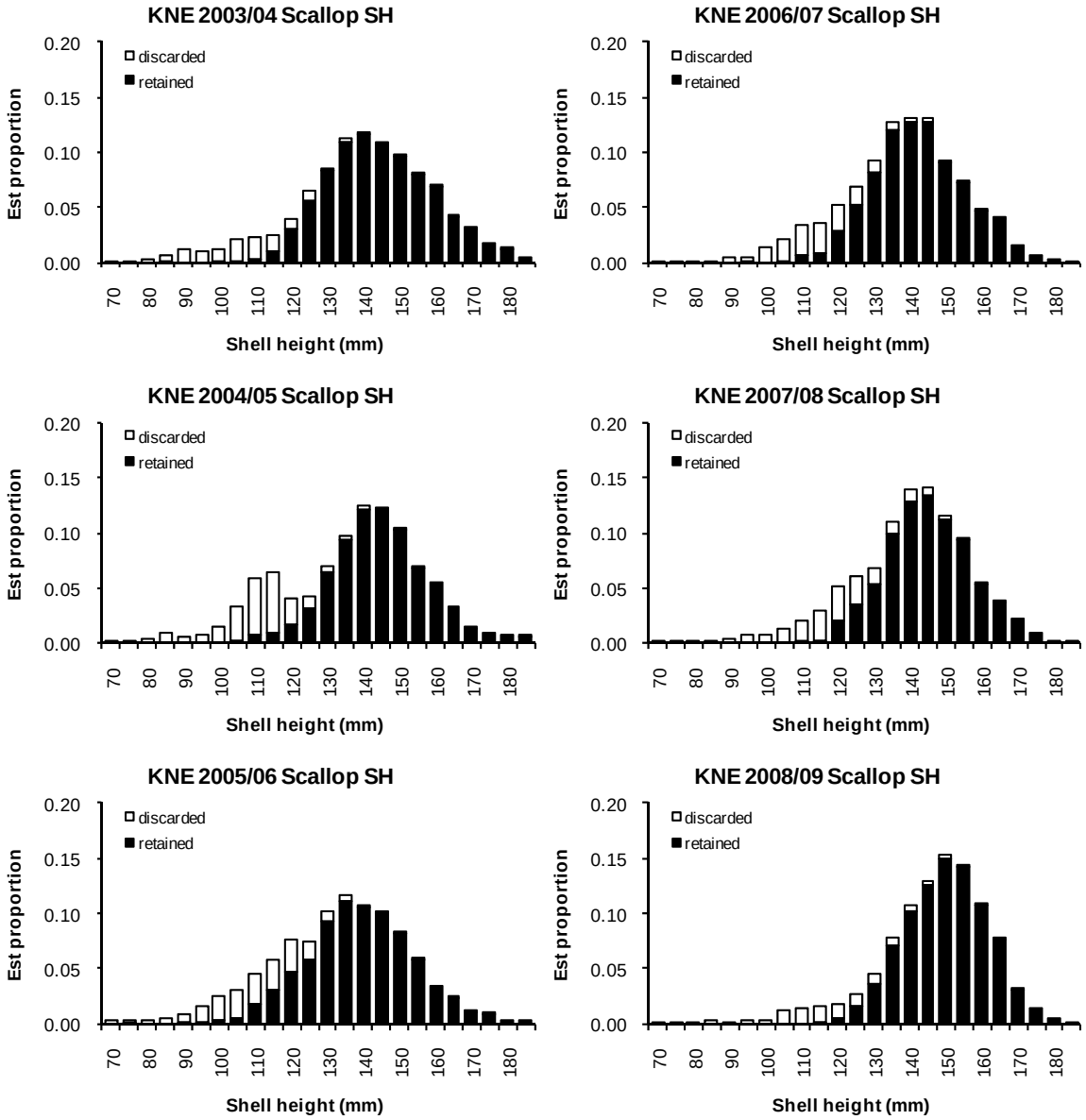


Figure 7.–Estimated scallop shell height (SH) distributions from the 2003/04–2008/09 Kodiak Northeast District (KNE) fishing seasons.

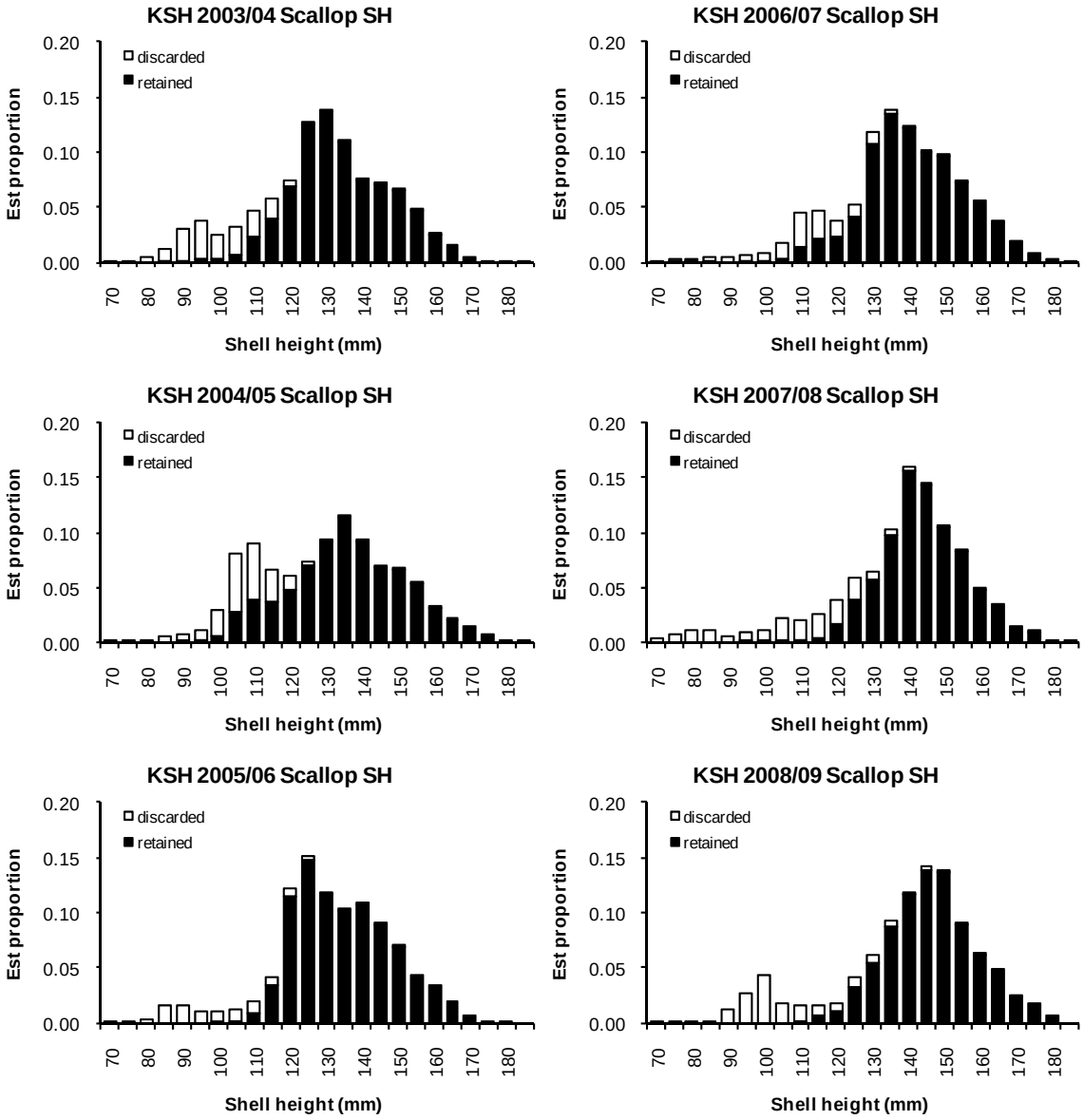


Figure 8.–Estimated scallop shell height (SH) distributions from the 2003/04–2008/09 Kodiak Shelikof District (KSH) fishing seasons.

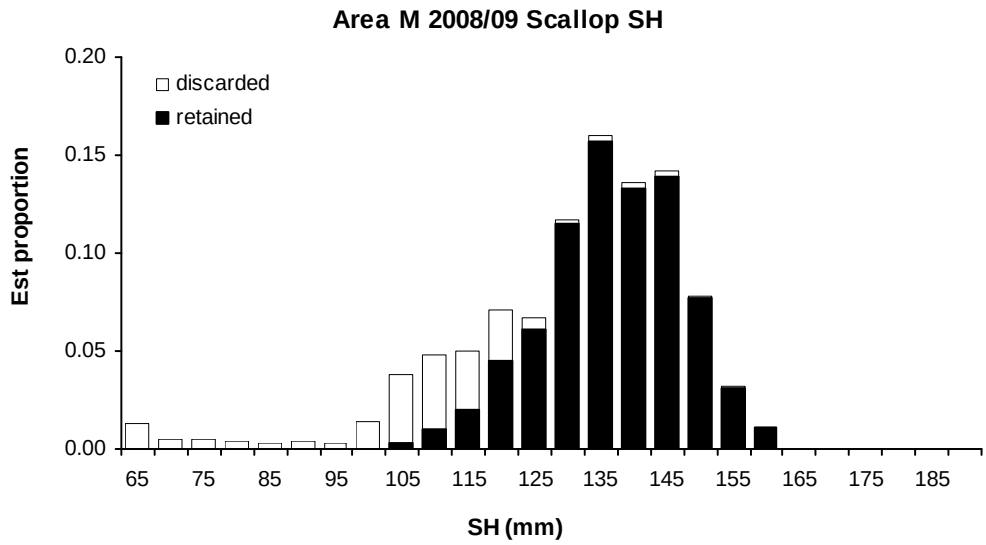


Figure 9.–Estimated scallop shell height (SH) distribution from the 2008/09 Alaska Peninsula scallop fishery.

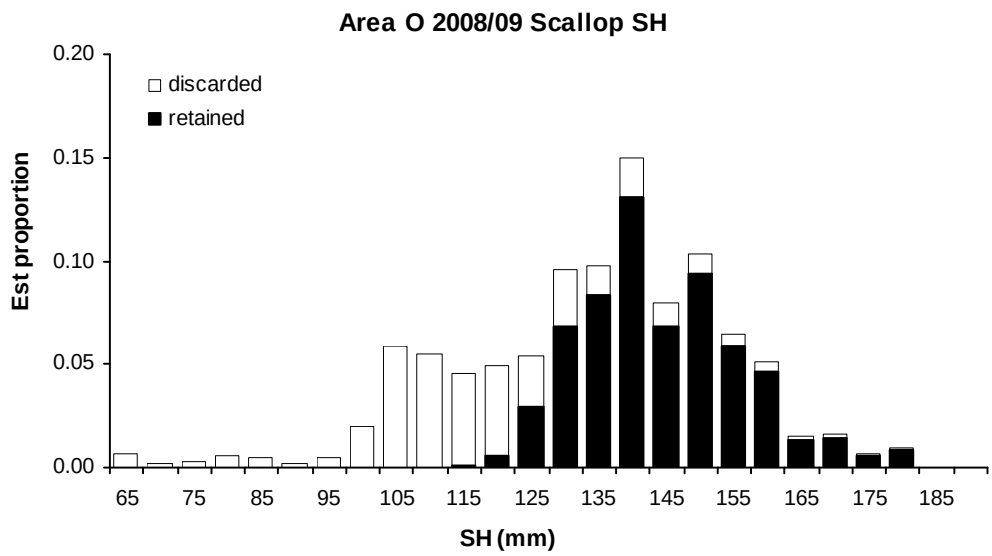


Figure 10.–Estimated scallop shell height (SH) distribution from the 2008/09 Dutch Harbor scallop fishery.

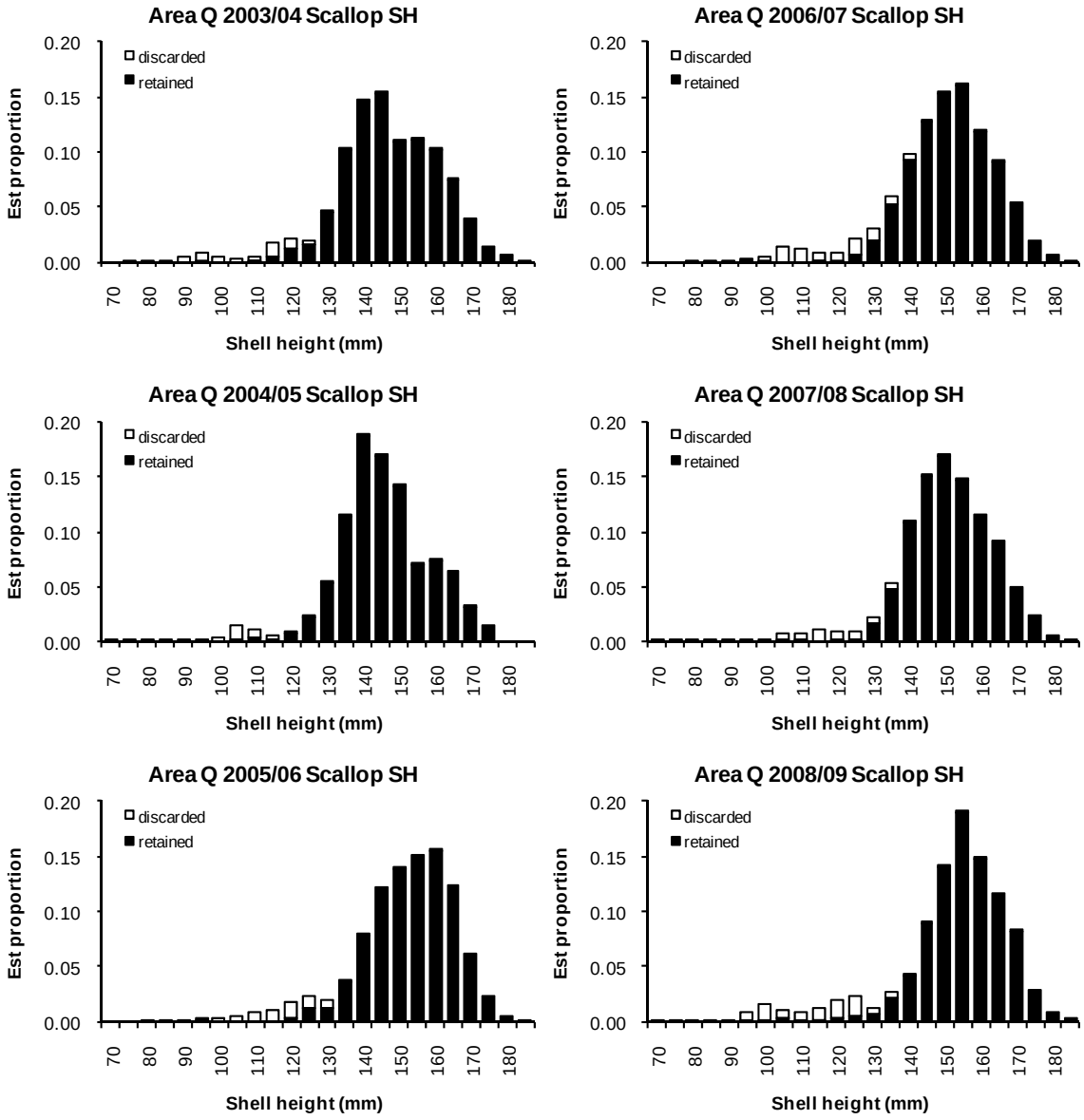
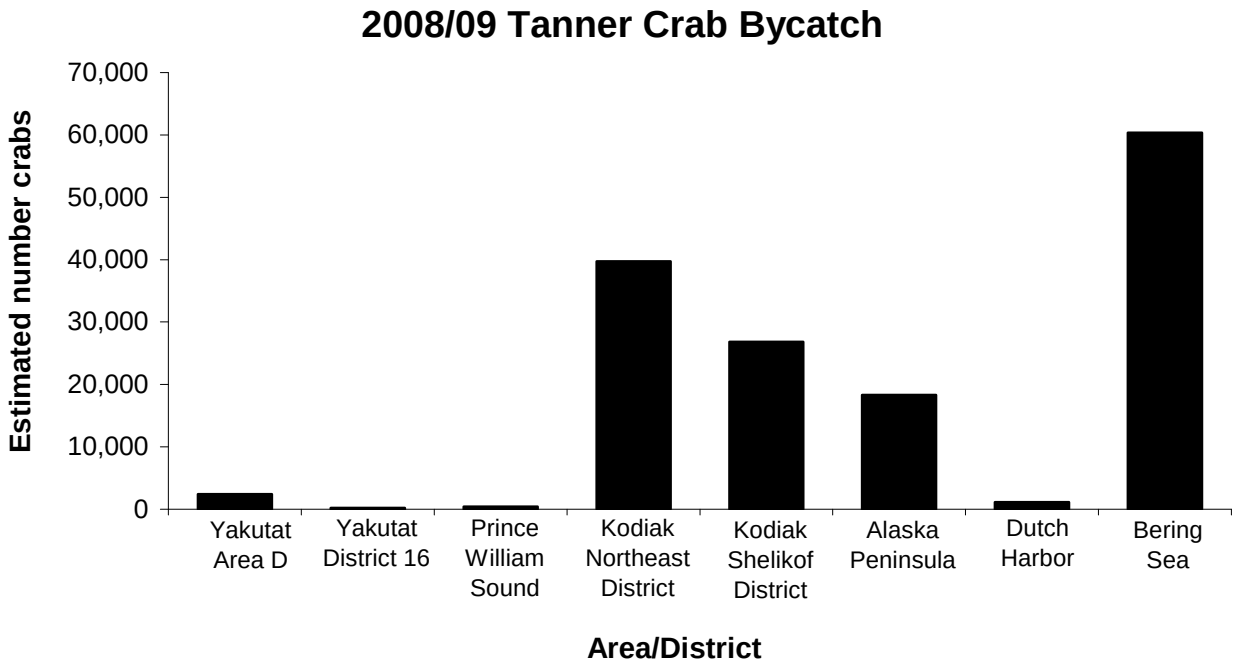


Figure 11.–Estimated scallop shell height (SH) distributions from the 2003/04–2008/09 Bering Sea fishing seasons.



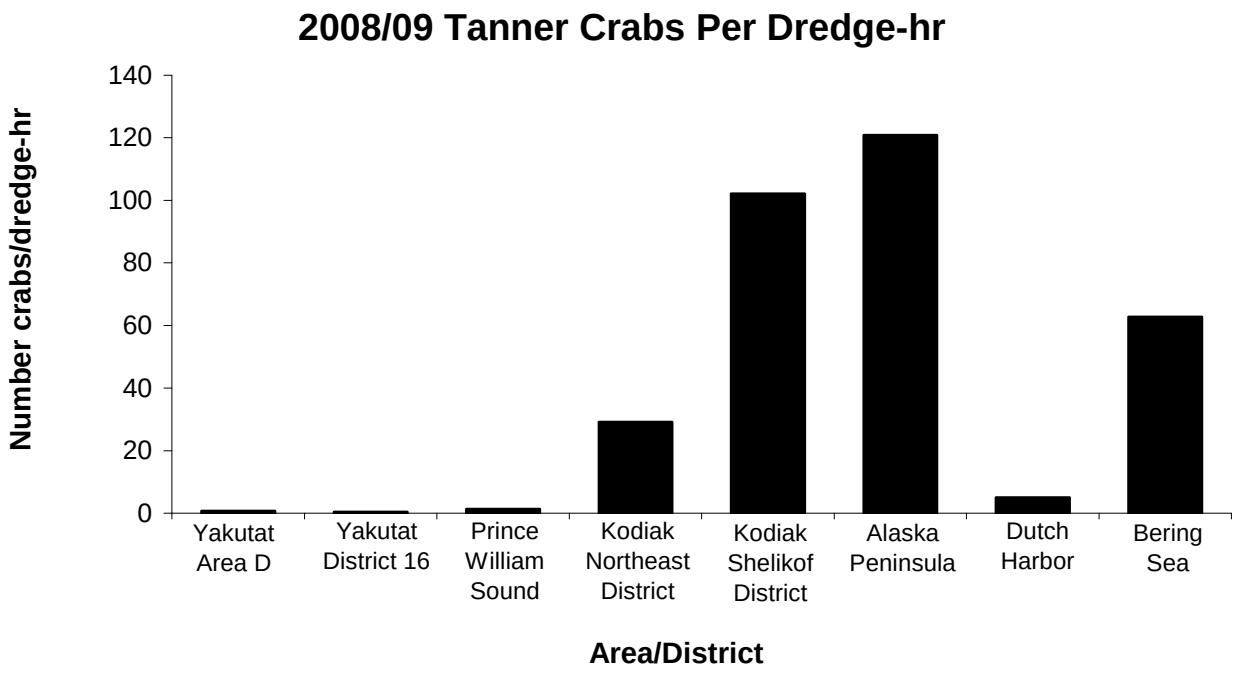


Figure 12.–Estimated Tanner crab bycatch (top) and bycatch rate (bottom) during the 2008/09 scallop fishing season.

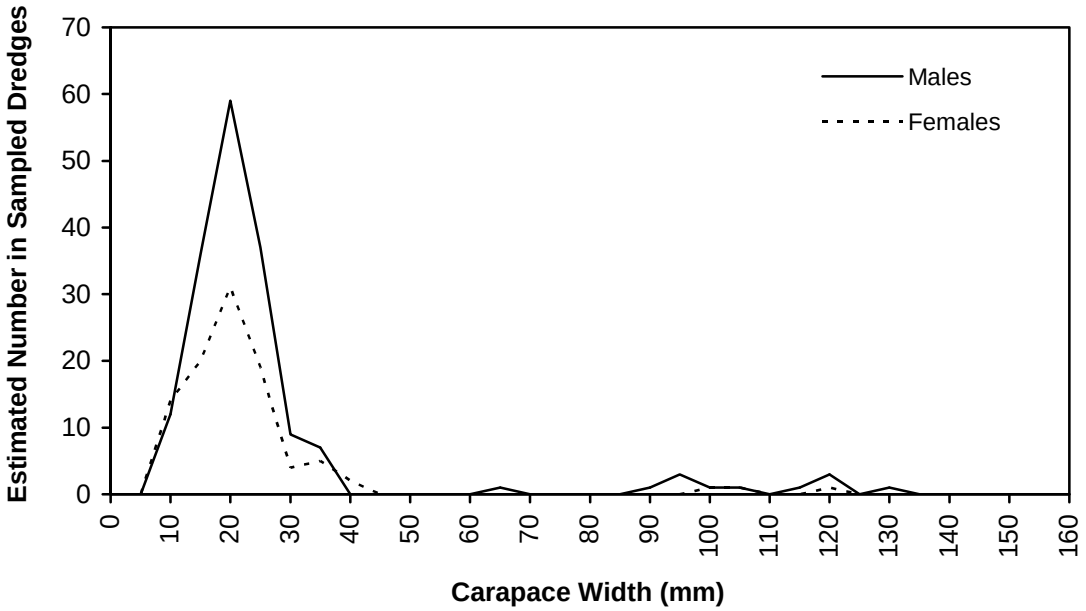


Figure 13.–Tanner crab carapace width distribution from bycatch sampling during the 2008/09 Yakutat Area D scallop fishery. Sample sizes were 172 males and 98 females.

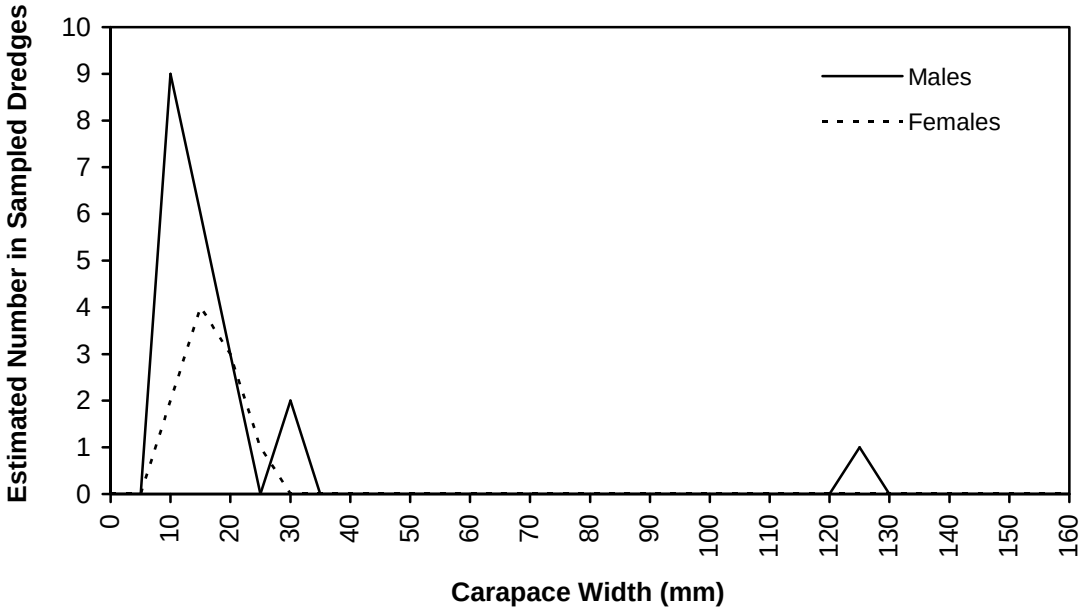


Figure 14.–Tanner crab carapace width distribution from bycatch sampling during the 2008/09 Yakutat District 16 scallop fishery. Sample sizes were 21 males and 10 females.

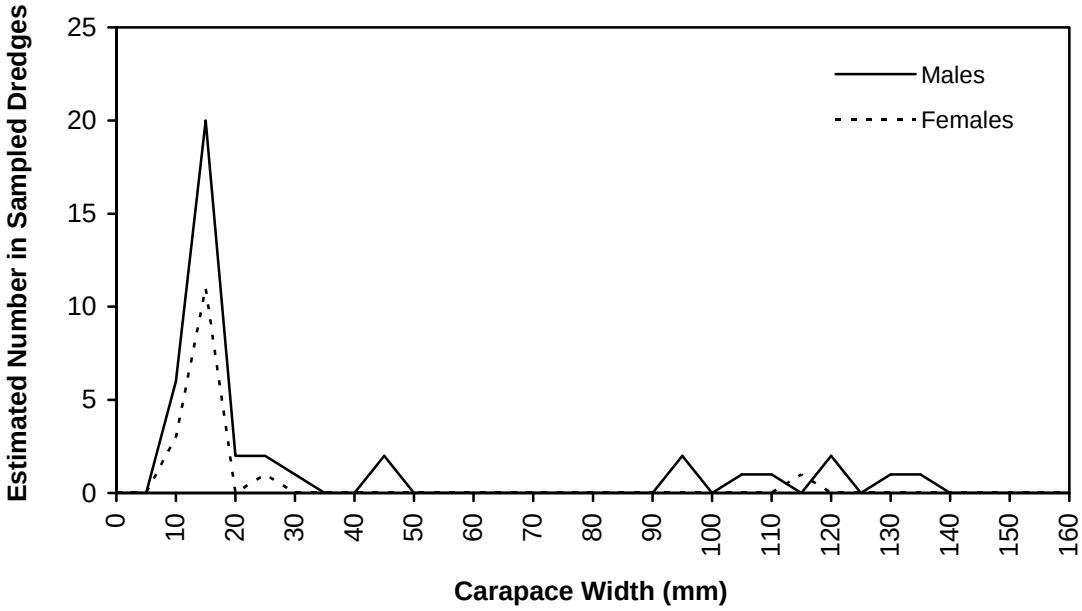


Figure 15.–Tanner crab carapace width distribution from bycatch sampling during the 2008/09 Prince William Sound scallop fishery. Sample sizes were 41 males and 16 females.

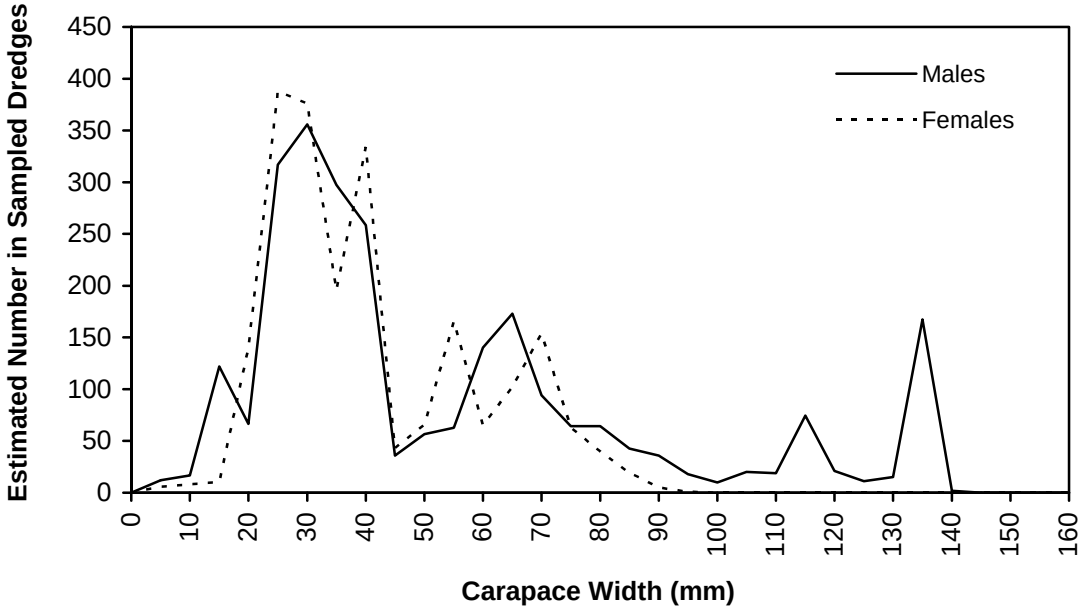


Figure 16.–Tanner crab carapace width distribution from bycatch sampling during the 2008/09 Kodiak Northeast District scallop fishery. Sample sizes were 700 males and 617 females.

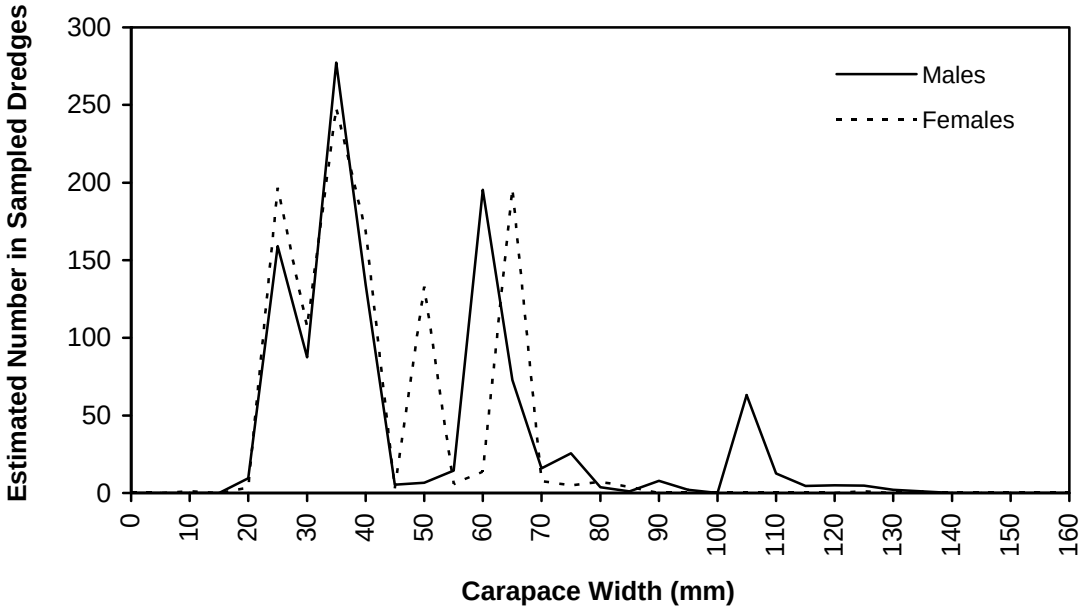


Figure 17.–Tanner crab carapace width distribution from bycatch sampling during the 2008/09 Kodiak Shelikof District scallop fishery. Sample sizes were 220 males and 161 females.

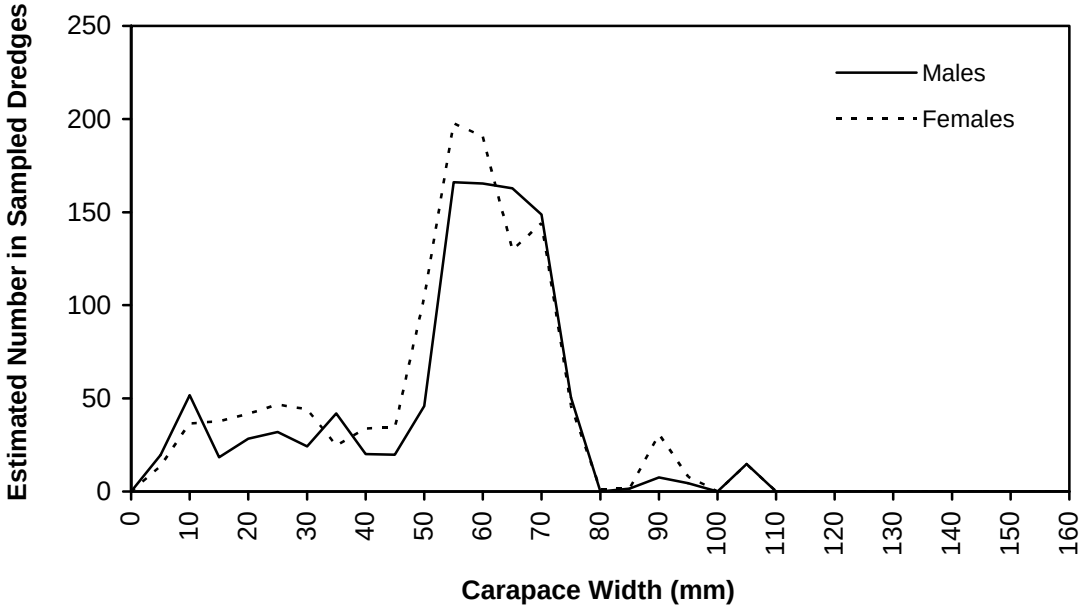


Figure 18.–Tanner crab carapace width distribution from bycatch sampling during the 2008/09 Alaska Peninsula scallop fishery. Sample sizes were 172 males and 210 females.

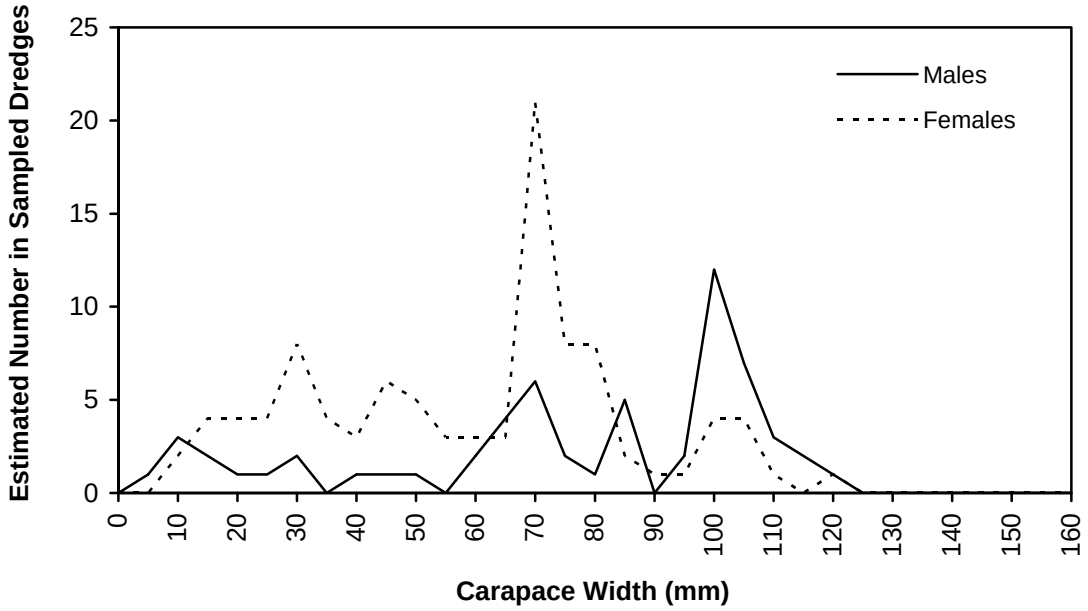


Figure 19.–Tanner crab carapace width distribution from bycatch sampling during the 2008/09 Dutch Harbor scallop fishery. Sample sizes were 60 males and 100 females.

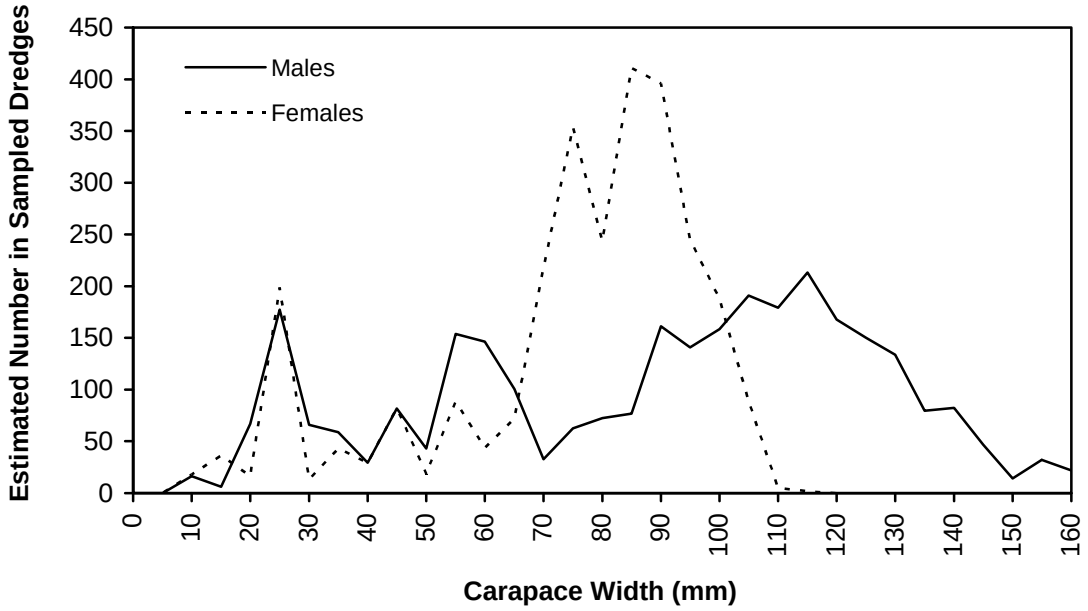


Figure 20.–Tanner crab carapace width distribution from bycatch sampling during the 2008/09 Bering Sea scallop fishery. Sample sizes were 871 males and 814 females.

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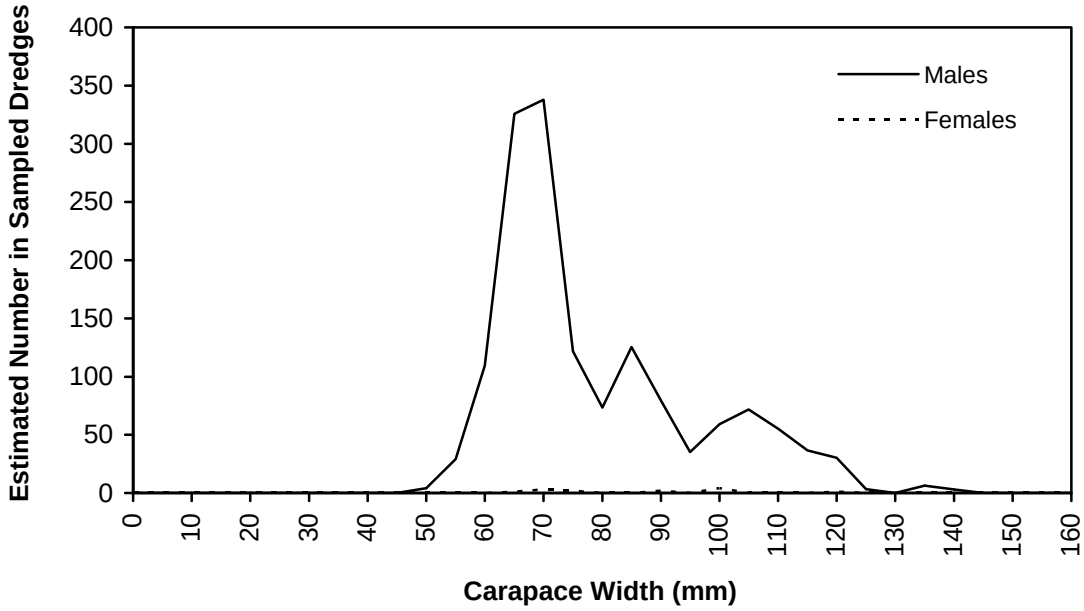

Figure 21.–Combined snow crab and hybrid snow crab × Tanner crab carapace width distribution from bycatch sampling during the 2008/09 Bering Sea scallop fishery. Sample sizes were 645 males and 12 females.

APPENDIX A. HISTORICAL ALASKA SCALLOP OBSERVER PROGRAM SUMMARY STATISTICS

Appendix A1.–Historical observer program summary statistics from the Yakutat Area D scallop fishery.

Season	Start of fishing	End of fishing	Number vessels	Fishing days[a]	Observed days[b]	Bycatch samples	Haulcomp samples[c]
1993	7/1/1993	7/11/1993	8	77	75	466	NA
1994	1/10/1994	1/20/1994	11	88	83	496	NA
1994	7/1/1994	7/12/1994	4	60	60	280	95
1995	1/10/1995	2/14/1995	10	166	134	429	71
1996	1/10/1996	1/25/1996	3	47	43	141	37
1996	8/1/1996	9/4/1996	3	82	80	424	69
1997	1/10/1997	2/19/1997	4	144	129	502	85
1998/99	7/1/1998	10/5/1998	8	160	148	767	121
1999/2000	7/1/1999	9/21/1999	3	132	123	616	104
2000/01	7/1/2000	2/14/2001	3	170	134	510	113
2001/02	7/7/2001	2/15/2002	2	86	81	318	66
2002/03	7/2/2002	8/29/2002	2	83	77	339	72
2003/04	8/10/2003	2/8/2004	2	105	85	354	67
2004/05	9/1/2004	2/15/2005	2	88	74	294	60
2005/06	8/5/2005	1/25/2006	2	162	137	574	104
2006/07	7/11/2006	10/24/2006	2	92	84	383	64
2007/08	8/14/2007	2/13/2008	2	92	84	369	67
2008/09	7/11/2008	8/29/2008	3	115	94	401	81

[a] Number unique vessel days with at least one haul.

[b] Number unique vessel days with at least one sampled haul.

[c] Number haul composition samples. Haul composition sampling began in July, 1994.

Appendix A2.–Historical observer program summary statistics from the Yakutat District 16 scallop fishery.

Season	Start of fishing	End of fishing	Number vessels	Fishing days[a]	Observed days[b]	Bycatch samples	Haulcomp samples[c]
1993	7/17/1993	7/25/1993	1	9	9	28	NA
1994	1/20/1994	1/20/1994	7	7	7	48	NA
1994	7/13/1994	7/16/1994	1	4	3	16	6
1995	1/10/1995	2/13/1995	6	42	35	114	21
1996	1/15/1996	1/20/1996	1	6	5	8	2
1996	8/4/1996	11/28/1996	2	23	21	91	18
1997	1/21/1997	2/21/1997	3	27	14	71	11
1998/99	7/1/1998	10/6/1998	6	33	24	117	18
1999/2000	7/28/1999	9/26/1999	2	23	16	67	12
2000/01	9/17/2000	2/14/2001	4	29	23	83	16
2001/02	7/10/2001	10/8/2001	2	21	17	57	8
2002/03	7/1/2002	7/9/2002	2	6	4	10	1
2003/04	8/30/2003	2/8/2004	2	3	1	2	1
2004/05	9/3/2004	2/15/2005	2	18	18	33	12
2005/06	10/11/2005	1/30/2006	2	16	15	43	8
2006/07	8/19/2006	9/13/2006	2	12	11	47	6
2007/08	8/15/2007	11/27/2007	2	4	2	3	2
2008/09	7/18/2008	8/29/2008	2	22	17	70	12

[a] Number unique vessel days with at least one haul.

[b] Number unique vessel days with at least one sampled haul.

[c] Number haul composition samples. Haul composition sampling began in July, 1994.

Appendix A3.–Historical observer program summary statistics from the Prince William Sound scallop fishery. The area was not opened for fishing during 1994 and 1996.

Season	Start of fishing	End of fishing	Number vessels	Fishing days[a]	Observed days[b]	Bycatch samples	Haulcomp samples[c]
1993	7/15/1993	7/19/1993	7	29	27	182	NA
1995	1/10/1995	1/26/1995	2	21	21	75	15
1997	1/12/1997	1/19/1997	1	8	7	37	7
1998/99	7/1/1998	7/4/1998	2	8	8	26	3
1999/2000	7/1/1999	7/4/1999	2	8	6	18	3
2000/01	7/6/2000	8/2/2000	3	30	28	71	20
2001/02	1/22/2002	2/11/2002	1	21	16	29	13
2002/03	7/28/2002	2/15/2003	2	17	16	55	11
2003/04	12/11/2003	1/24/2004	1	15	13	23	8
2004/05	8/21/2004	11/2/2004	2	28	26	84	22
2005/06	7/1/2005	8/22/2005	3	56	51	180	36
2006/07	7/2/2006	7/11/2006	2	15	15	66	9
2007/08	7/7/2007	8/11/2007	2	20	20	66	16
2008/09	7/5/2008	7/15/2008	1	11	9	47	10

[a] Number unique vessel days with at least one haul.

[b] Number unique vessel days with at least one sampled haul.

[c] Number haul composition samples. Haul composition sampling began in July, 1994.

Appendix A4.–Historical observer program summary statistics from the Kodiak Northeast District scallop fishery. The area was not opened for fishing during 1995/96.

Season	Start of fishing	End of fishing	Number vessels	Fishing days[a]	Observed days[b]	Bycatch samples	Haulcomp samples[c]
1993/94	7/11/1993	11/24/1993	10	272	237	1,393	NA
1994/95	8/20/1994	11/11/1994	11	80	67	291	45
1996/97	10/31/1996	12/12/1996	3	29	19	73	12
1997/98	8/10/1997	12/8/1997	3	94	86	414	60
1998/99	7/6/1998	10/2/1998	4	89	80	418	55
1999/2000	7/1/1999	9/9/1999	3	40	38	197	30
2000/01	8/19/2000	9/26/2000	4	40	37	163	28
2001/02	8/8/2001	1/18/2002	3	45	39	166	33
2002/03	8/20/2002	2/10/2003	2	46	42	189	40
2003/04	7/18/2003	11/15/2003	2	42	40	166	31
2004/05	7/5/2004	8/9/2004	2	42	42	189	33
2005/06	7/7/2005	1/17/2006	3	63	53	199	63
2006/07	9/7/2006	12/2/2006	2	42	40	178	31
2007/08	9/29/2007	2/3/2008	2	47	37	125	24
2008/09	7/8/2008	10/12/2008	3	59	53	235	44

[a] Number unique vessel days with at least one haul.

[b] Number unique vessel days with at least one sampled haul.

[c] Number haul composition samples. Haul composition sampling began in July, 1994.

Appendix A5.–Historical observer program summary statistics from the Kodiak Shelikof District scallop fishery. The area was not opened for fishing during 1995/96.

Season	Start of fishing	End of fishing	Number vessels	Fishing days[a]	Observed days[b]	Bycatch samples	Haulcomp samples[c]
1993/94	7/1/1993	8/5/1993	5	82	80	499	NA
1994/95	7/1/1994	10/25/1994	11	265	257	1,405	203
1996/97	8/28/1996	10/18/1996	4	104	99	544	85
1997/98	7/1/1997	8/10/1997	4	153	150	841	134
1998/99	7/9/1998	8/21/1998	8	121	112	607	88
1999/2000	7/3/1999	9/6/1999	6	117	111	627	98
2000/01	7/3/2000	10/2/2000	5	90	81	384	79
2001/02	7/3/2001	12/8/2001	4	103	97	458	96
2002/03	7/3/2002	2/9/2003	3	115	110	484	96
2003/04	8/11/2003	1/13/2004	2	95	88	394	78
2004/05	7/27/2004	12/9/2004	2	100	96	445	86
2005/06	7/1/2005	12/11/2005	2	70	65	263	54
2006/07	7/5/2006	9/7/2006	3	73	72	325	68
2007/08	7/2/2007	11/29/2007	3	105	101	479	93
2008/09	7/1/2008	7/12/2008	2	13	11	41	10

[a] Number unique vessel days with at least one haul.

[b] Number unique vessel days with at least one sampled haul.

[c] Number haul composition samples. Haul composition sampling began in July, 1994.

Appendix A6.–Historical observer program summary statistics from the Kodiak Semidi Island District scallop fishery. The area was not opened for fishing in 1995. Regulatory changes in 2000 closed state waters in the Semidi District and no effort has occurred since.

Season	Start of fishing	End of fishing	Number vessels	Fishing days[a]	Observed days[b]	Bycatch samples	Haulcomp samples[c]
1993	11/5/1993	12/11/1993	3	27	26	180	NA
1994	1/26/1994	2/11/1994	6	48	44	260	NA
1994	7/18/1994	10/31/1994	2	10	10	51	7
1996/97	10/19/1996	12/1/1996	3	37	32	166	20
1997/98	11/26/1997	12/9/1997	1	14	14	64	14
1998/99	8/22/1998	9/25/1998	2	5	5	23	3
1999/2000	7/21/1999	9/17/1999	1	4	1	6	1

[a] Number unique vessel days with at least one haul.

[b] Number unique vessel days with at least one sampled haul.

[c] Number haul composition samples. Haul composition sampling began in July, 1994.

Appendix A7.–Historical observer program summary statistics from the Alaska Peninsula scallop fishery. The area was not opened for fishing during the 1995/96, 2001/02, and 2002/03 seasons. No effort occurred during the 2003/04–2005/06 and 2007/08 season seasons.

Season	Start of fishing	End of fishing	Number vessels	Fishing days[a]	Observed days[b]	Bycatch samples	Haulcomp samples[c]
1993/94	7/25/1993	10/21/1993	8	75	69	374	NA
1994/95	7/7/1994	9/21/1994	7	80	75	342	47
1996/97	10/21/1996	10/30/1996	2	13	12	47	9
1997/98	8/13/1997	2/10/1998	4	68	64	325	42
1998/99	8/28/1998	9/19/1998	4	48	46	228	31
1999/2000	8/23/1999	10/6/1999	5	73	65	343	46
2000/01	7/11/2000	8/28/2000	3	14	9	39	8
2006/07	10/26/2006	12/8/2006	2	7	5	21	1
2008/09	9/5/2008	9/12/2008	1	8	8	25	6

[a] Number unique vessel days with at least one haul.

[b] Number unique vessel days with at least one sampled haul.

[c] Number haul composition samples. Haul composition sampling began in July, 1994.

Appendix A8.–Historical observer program summary statistics from the Dutch Harbor Area scallop fishery. No effort occurred during the 1996/97 season, and fishing was not opened during the 2000/01–2001/02 and 2003/04–2007/08 seasons.

Season	Start of fishing	End of fishing	Number vessels	Fishing days[a]	Observed days[b]	Bycatch samples	Haulcomp samples[c]
1993/94	7/2/1993	9/16/1993	3	38	26	91	NA
1994/95	7/23/1994	8/20/1994	3	6	6	23	1
1995/96	7/11/1995	9/9/1995	1	38	35	145	27
1997/98	8/18/1997	8/25/1997	1	8	8	22	6
1998/99	9/6/1998	11/12/1998	4	37	34	173	16
1999/2000	9/17/1999	9/30/1999	1	13	10	54	6
2002/03	10/10/2002	10/17/2002	1	8	7	30	6
2008/09	9/15/2008	9/27/2008	1	13	12	53	7

[a] Number unique vessel days with at least one haul.

[b] Number unique vessel days with at least one sampled haul.

[c] Number haul composition samples. Haul composition sampling began in July, 1994.

Appendix A9.–Historical observer program summary statistics from the Bering Sea scallop fishery. Fishing was not opened during the 1995/96 season.

Season	Start of fishing	End of fishing	Number vessels	Fishing days[a]	Observed days[b]	Bycatch samples	Haulcomp samples[c]
1993/94	7/28/1993	9/5/1993	9	172	166	1,029	NA
1994/95	7/1/1994	9/7/1994	8	312	304	1,751	269
1996/97	8/1/1996	10/16/1996	1	63	54	204	35
1997/98	7/2/1997	8/11/1997	2	66	64	252	54
1998/99	7/16/1998	9/4/1998	4	73	64	293	39
1999/2000	7/1/1999	8/30/1999	2	94	76	440	60
2000/01	7/1/2000	8/23/2000	3	91	87	424	76
2001/02	7/1/2001	10/30/2001	3	84	82	372	72
2002/03	9/8/2002	1/2/2003	2	61	56	244	50
2003/04	7/2/2003	2/15/2004	2	28	26	127	18
2004/05	7/3/2004	7/9/2004	1	7	7	35	7
2005/06	12/18/2005	1/9/2006	1	21	18	77	17
2006/07	10/31/2006	12/13/2006	1	36	33	149	23
2007/08	9/10/2007	12/17/2007	2	33	31	141	25
2008/09	8/18/2008	9/15/2008	1	29	28	123	25

[a] Number unique vessel days with at least one haul.

[b] Number unique vessel days with at least one sampled haul.

[c] Number haul composition samples. Haul composition sampling began in July, 1994.

APPENDIX B. HISTORICAL ALASKA SCALLOP FISHERY SUMMARY STATISTICS

Appendix B1.–Historical summary statistics from the Yakutat Area D scallop fishery.

Season	GHL	Catch (lbs meat)	Catch (lbs whole)	Dredge hours	CPUE[a]	Estimated scallop discards		
						lbs whole	% intact[b]	% broken[b]
1993	125,000	141,423	2,082,824	1,999	71	NA	NA	NA
1994	250,000	158,660	2,085,942	2,547	62	NA	NA	NA
1994	NA[c]	94,400	1,713,094	1,715	55	NA	NA	NA
1995	250,000	242,491	3,214,968	4,712	51	NA	NA	NA
1996	250,000	53,310	832,756	1,142	47	NA	NA	NA
1996	NA[c]	185,426	2,362,498	2,840	65	295,933	6.0	5.2
1997	250,000	242,940	3,282,860	3,956	61	299,843	5.9	2.5
1998/99	250,000	241,678	3,475,996	4,192	58	271,506	3.5	3.8
1999/2000	250,000	249,681	3,119,103	3,840	65	533,172	9.6	5.0
2000/01	200,000	195,699	2,734,559	4,241	46	588,981	11.2	6.5
2001/02	200,000	103,800	1,521,537	2,406	43	272,300	7.3	7.9
2002/03	200,000	122,718	1,541,867	2,439	50	358,200	10.6	8.2
2003/04	200,000	160,918	1,939,004	3,358	48	392,993	11.5	5.4
2004/05	200,000	86,950	1,262,499	2,134	41	219,107	7.6	5.7
2005/06	200,000	199,351	2,662,031	5,089	39	395,686	4.4	8.5
2006/07	150,000	150,950	1,771,229	2,817	54	380,250	12.3	5.4
2007/08	150,000	125,960	1,593,223	2,601	48	520,017	18.4	6.2
2008/09	150,000	150,289	2,053,912	3,286	46	416,807	11.6	5.3

[a] CPUE in lbs meat/dredge hr.

[b] Percentage of total whole lbs.

[c] Included in yearly GHL.

Appendix B2.–Historical summary statistics from the Yakutat District 16 scallop fishery.

Season	GHL	Catch (lbs meat)	Catch (lbs whole)	Dredge hours	CPUE[a]	Estimated scallop discards		
						lbs whole	% intact[b]	% broken[b]
1993	35,000	NA	55,576	159	NA	NA	NA	NA
1994	35,000	13,301	150,962	276	48	NA	NA	NA
1994	NA[c]	NA	88,905	132	NA	NA	NA	NA
1995	35,000	33,302	447,469	1,095	30	NA	NA	NA
1996	35,000	8,090	85,086	167	48	NA	NA	NA
1996	NA[c]	25,970	336,978	750	35	159,899	27.2	5.0
1997	35,000	22,890	265,882	561	41	32,764	8.4	2.6
1998/99	35,000	34,153	384,286	702	49	25,292	3.5	2.7
1999/2000	35,000	34,624	292,625	674	51	57,718	10.0	6.5
2000/01	35,000	30,904	310,370	476	65	51,221	6.9	7.3
2001/02	35,000	20,398	245,319	417	49	48,879	4.6	12.1
2002/03	35,000	3,685	60,928	100	37	12,662	5.2	12.0
2003/04	35,000	1,072	16,780	18	60	1,079	0.6	5.5
2004/05	35,000	24,430	326,228	419	58	19,908	1.9	8.9
2005/06	35,000	13,650	209,487	407	34	35,791	5.8	8.8
2006/07	21,000	13,445	184,106	309	44	24,898	3.9	8.0
2007/08	21,000	180	8,888	14	30	2,020	4.8	13.7
2008/09	21,000	20,986	207,251	423	50	75,471	16.3	10.8

[a] CPUE in lbs meat/dredge hr.

[b] Percentage of total whole lbs.

[c] Included in yearly GHL.

Appendix B3.–Historical summary statistics from the Prince William Sound scallop fishery.

Season	GHL	Catch (lbs meat)	Catch (lbs whole)	Dredge hours	CPUE[a]	Estimated scallop discards		
						lbs whole	% intact[b]	% broken[b]
1993	50,000	63,068	850,718	638	99	NA	NA	NA
1995	50,000	108,000	736,455	NA	NA	NA	NA	NA
1997	17,200	18,000	257,230	171	105	NA	NA	NA
1998/99	20,000	19,650	334,152	179	110	12,789	0.8	2.8
1999/2000	20,000	20,410	211,140	149	137	18,500	1.0	7.1
2000/01	30,000	30,266	361,032	221	137	13,826	0.8	2.8
2001/02	30,000	30,090	511,761	263	114	23,824	2.0	2.5
2002/03	20,000	15,641	231,140	122	121	6,588	0.3	2.5
2003/04	20,000	19,980	261,720	216	93	53,591	4.1	12.9
2004/05	50,000	49,320	704,617	614	80	82,462	4.8	5.6
2005/06	50,000	49,205	818,741	491	100	62,627	0.3	6.8
2006/07	37,000	36,990	440,781	334	111	38,122	1.9	6.0
2007/08	37,000	37,105	570,972	428	87	79,886	5.6	6.7
2008/09	20,000	20,040	316,118	313	64	30,177	2.8	5.9

[a] CPUE in lbs meat/dredge hr.

[b] Percentage of total (retained plus discarded) whole lbs.

Appendix B4.–Historical summary statistics from the Kodiak Northeast District scallop fishery. Fishing was not opened during the 1995/96 season.

Season	GHL	Catch (lbs meat)	Catch (lbs whole)	Dredge hours	CPUE[a]	Estimated scallop discards		
						lbs whole	% intact[b]	% broken[b]
1993/94	NA[c]	155,122	2,214,427	6,940	22	NA	NA	NA
1994/95	NA[c]	35,207	389,202	1,773	20	NA	NA	NA
1996/97	NA[c]	11,430	147,269	581	20	8,355	1.7	3.7
1997/98	NA[c]	95,858	1,143,926	2,604	37	41,615	2.2	1.3
1998/99	NA[c]	120,010	1,365,836	2,749	44	190,480	8.9	3.3
1999/2000	75,000	77,119	952,972	1,384	56	113,349	5.2	5.4
2000/01	80,000	79,965	681,192	1,101	73	113,422	9.3	5.0
2001/02	80,000	80,470	822,110	1,142	70	108,835	5.9	5.8
2002/03	80,000	80,000	871,918	1,350	59	166,547	9.6	6.5
2003/04	80,000	79,965	747,517	1,248	64	113,536	6.1	7.1
2004/05	80,000	80,105	848,527	1,227	65	262,976	15.3	8.4
2005/06	80,000	79,990	831,378	1,759	45	209,906	13.4	6.7
2006/07	90,000	75,150	703,338	1,168	64	135,343	8.1	8.1
2007/08	90,000	75,105	822,697	1,170	64	203,059	8.5	11.3
2008/09	90,000	74,863	817,817	1,363	55	110,869	6.9	5.1

[a] CPUE in lbs meat/dredge hr.

[b] Percentage of total (retained plus discarded) whole lbs.

[c] Included in Kodiak Area GHL.

Appendix B5.–Historical summary statistics from the Kodiak Shelikof District scallop fishery. Fishing was not opened during the 1995/96 season.

Season	GHL	Catch (lbs meat)	Catch (lbs whole)	Dredge hours	CPUE[a]	Estimated scallop discards		
						lbs whole	% intact[b]	% broken[b]
1993/94	NA[c]	105,017	1,169,664	2,491	42	NA	NA	NA
1994/95	NA[c]	314,051	3,522,517	8,662	36	NA	NA	NA
1996/97	NA[c]	219,305	1,878,268	3,491	63	197,174	4.3	5.2
1997/98	NA[c]	258,346	3,101,152	5,492	47	93,221	2.1	0.8
1998/99	NA[c]	179,870	2,129,025	4,081	44	216,354	7.1	2.1
1999/2000	180,000	187,963	1,903,345	4,304	44	289,867	9.3	3.9
2000/01	180,000	180,087	1,768,376	2,907	62	128,614	4.5	2.3
2001/02	180,000	177,112	1,830,265	3,398	52	239,459	8.2	3.4
2002/03	180,000	180,580	1,857,466	3,799	48	496,577	17.1	3.9
2003/04	180,000	180,011	1,724,498	3,258	55	402,800	15.2	3.7
2004/05	180,000	174,622	1,641,608	3,467	50	435,844	16.2	4.7
2005/06	160,000	159,941	1,454,806	2,280	70	233,911	6.1	3.1
2006/07	160,000	162,537	1,405,382	2,183	74	234,979	12.4	2.0
2007/08	170,000	169,968	1,695,563	2,937	58	377,063	17.2	1.0
2008/09	170,000	13,761	161,605	263	52	32,301	12.2	4.5

[a] CPUE in lbs meat/dredge hr.

[b] Percentage of total (retained plus discarded) whole lbs.

[c] Included in Kodiak Area GHL.

Appendix B6.–Historical summary statistics from the Kodiak Semidi Island District scallop fishery. Fishing was not opened during the 1995/96 season. Regulatory changes that closed state waters to scallop fishing were enacted in 2000, and no effort has occurred since.

Season	GHL	Catch (lbs meat)	Catch (lbs whole)	Dredge hours	CPUE[a]	Estimated scallop discards		
						lbs whole	% intact[b]	% broken[b]
1993	NA[c]	55,487	261,910	1,819	31	NA	NA	NA
1994	NA[c]	NA	317,926	990	NA	NA	NA	NA
1994	NA[c]	NA	69,315	272	NA	NA	NA	NA
1996/97	NA[c]	37,810	288,117	1,017	37	6,000	0.4	1.6
1997/98	NA[c]	6,315	61,320	349	18	2,716	2.6	1.6
1998/99	NA[c]	1,720	15,806	106	16	508	1.7	1.4
1999/2000	NA[c]	930	11,310	45	21	375	1.8	1.4

[a] CPUE in lbs meat/dredge hr.

[b] Percentage of total (retained plus discarded) whole lbs.

[c] Included in Kodiak Area GHL.

Appendix B7.–Historical summary statistics from the Alaska Peninsula scallop fishery. The area was not opened for fishing during the 1995/96, 2001/02, and 2002/03 seasons. No effort occurred during the 2003/04–2005/06 and 2007/08 seasons.

Season	GHL	Catch (lbs meat)	Catch (lbs whole)	Dredge hours	CPUE[a]	Estimated scallop discards		
						lbs whole	% intact[b]	% broken[b]
1993/94	NA	112,152	1,061,925	1,847	61	NA	NA	NA
1994/95	NA	65,282	619,473	1,664	39	NA	NA	NA
1996/97	200,000	12,560	130,235	327	38	7,384	1.5	3.8
1997/98	200,000	51,616	654,960	1,752	29	38,219	3.6	1.9
1998/99	200,000	63,290	617,120	1,612	39	43,129	5.3	1.2
1999/2000	200,000	75,535	781,596	2,025	37	59,077	4.5	2.5
2000/01	33,000	7,660	95,510	320	24	4,538	3.0	1.5
2006/07	25,000	155	3,103	64	2	794	18.5	1.9
2008/09	10,000	2,460	30,686	151	16	4,101	9.3	2.1

[a] CPUE in lbs meat/dredge hr.

[b] Percentage of total (retained plus discarded) whole lbs.

Appendix B8.–Historical summary statistics from the Dutch Harbor (Area O) scallop fishery. Fishing was not opened during the 2000/01–2001/02 and 2003/04–2007/08 seasons. No effort occurred during the 1996/97 season.

Season	GHL	Catch (lbs meat)	Catch (lbs whole)	Dredge hours	CPUE[a]	Estimated scallop discards		
						lbs whole	% intact[b]	% broken[b]
1993/94	170,000	38,731	432,970	838	46	NA	NA	NA
1994/95	170,000	1,931	23,590	81	24	NA	NA	NA
1995/96	170,000	26,950	289,398	1,047	26	NA	NA	NA
1997/98	170,000	5,790	55,725	171	34	18,561	19.4	5.6
1998/99	110,000	46,432	427,422	1,025	45	29,348	4.0	2.4
1999/2000	110,000	6,465	68,070	273	24	4,284	1.4	4.5
2002/03	10,000	6,000	59,116	184	33	4,346	1.4	5.4
2008/09	10,000	10,040	93,957	225	45	32,584	16.0	9.8

[a] CPUE in lbs meat/dredge hr.

[b] Percentage of total (retained plus discarded) whole lbs.

Appendix B9.–Historical summary statistics from the Bering Sea (Area Q) scallop fishery. Fishing was not opened during the 1995/96 season.

Season	GHL	Catch (lbs meat)	Catch (lbs whole)	Dredge hours	CPUE[a]	Estimated scallop discards		
						lbs whole	% intact[b]	% broken[b]
1993/94	NA	284,414	3,447,681	5,763	49	NA	NA	NA
1994/95	NA	505,439	5,942,912	11,113	45	NA	NA	NA
1996/97	600,000	150,295	1,432,160	2,313	65	16,188	0.4	0.7
1997/98	600,000	97,002	1,082,825	2,246	43	38,262	1.9	1.5
1998/99	400,000	96,795	1,193,071	2,319	42	127,607	7.0	2.6
1999/2000	400,000	164,929	1,851,620	3,294	50	68,406	1.3	2.3
2000/01	200,000	205,520	2,376,601	3,355	61	97,994	2.4	1.5
2001/02	200,000	140,871	1,700,578	3,072	46	76,261	1.6	2.7
2002/03	105,000	92,240	952,958	2,038	45	55,197	2.5	3.0
2003/04	105,000	42,590	537,552	1,020	42	34,327	2.9	3.1
2004/05	105,000	10,050	129,220	275	37	5,639	1.3	2.9
2005/06	50,000	23,220	231,700	602	39	17,433	2.9	4.1
2006/07	50,000	48,246	529,590	1,138	42	54,503	5.2	4.2
2007/08	50,000	49,995	697,288	1,084	46	49,356	4.3	2.3
2008/09	50,000	49,995	507,596	962	52	58,417	4.5	5.9

[a] CPUE in lbs meat/dredge hr.

[b] Percentage of total (retained plus discarded) whole lbs.

APPENDIX C. HISTORICAL ALASKA SCALLOP FISHERY BYCATCH STATISTICS

Appendix C1.–Historical bycatch statistics from the Yakutat Area D scallop fishery. Crab bycatch limits have not been established for the Yakutat scallop fishery.

	Estimated bycatch (number animals)				Lbs meat
Season	Tanner	King	Dungeness	Halibut	per Tanner[a]
1993	1,700	40	351	99	83
1994	1,767	0	10	129	90
1994[b]	603	0	169	522	157
1995	3,751	0	2,379	1,361	65
1996	2,591	0	2,320	237	21
1996[b]	6,872	0	38	150	27
1997	5,884	0	277	353	41
1998/99	8,891	0	177	293	27
1999/2000	4,993	0	584	80	50
2000/01	17,395	0	313	65	11
2001/02	6,770	0	1,150	155	15
2002/03	8,423	0	779	291	15
2003/04	1,650	0	905	316	98
2004/05	863	0	223	247	101
2005/06	5,189	0	394	518	38
2006/07	7,961	0	159	366	19
2007/08	13,429	0	145	186	9
2008/09	2,416	0	0	130	62

[a] Ratio of pounds scallop meat harvested for each incidentally caught Tanner crab.

[b] Split seasons; see Appendix A for fishing dates.

Appendix C2.–Historical bycatch statistics from the Yakutat District 16 scallop fishery. Crab bycatch limits have not been established for the Yakutat scallop fishery.

Season	Estimated bycatch (number animals)				Lbs meat per Tanner[a]
	Tanner	King	Dungeness	Halibut	
1993	NA	NA	NA	NA	NA
1994	10	0	4	48	1,330
1994[b]	0	0	11	236	NA
1995	469	0	93	719	71
1996	39	0	140	108	207
1996[b]	669	0	1	68	39
1997	129	0	0	160	177
1998/99	273	0	0	24	125
1999/2000	48	0	0	111	721
2000/01	627	0	22	86	49
2001/02	833	0	32	86	24
2002/03	185	0	0	9	20
2003/04	0	0	21	10	NA
2004/05	0	0	170	110	NA
2005/06	175	0	0	0	78
2006/07	174	0	21	363	77
2007/08	12	0	0	7	15
2008/09	189	0	0	56	111

[a] Ratio of pounds scallop meat harvested for each incidentally caught Tanner crab.

[b] Split seasons; see Appendix A for fishing dates.

Appendix C3.–Historical bycatch statistics from the Prince William Sound Area scallop fishery. See Appendix A for season information including fishing dates.

Season	Tanner crab bycatch limit	Estimated bycatch (number animals)				Lbs meat per Tanner[a]
		Tanner	King	Dungeness	Halibut	
1993	500	200	0	0	27	315
1995	500	271	0	0	153	399
1997	500	0	0	0	8	NA
1998/99	500	20	0	0	0	983
1999/2000	500	6	0	0	0	3,402
2000/01	11,400	467	0	3	9	65
2001/02	11,400	43	0	0	5	700
2002/03	11,400	369	0	0	10	42
2003/04	11,400	8	0	8	2	2,489
2004/05	11,400	524	0	0	90	94
2005/06	11,400	465	0	0	32	106
2006/07	11,400	359	0	4	24	103
2007/08	11,400	205	0	0	27	181
2008/09	11,400	424	0	0	16	47

[a] Ratio of pounds scallop meat harvested for each incidentally caught Tanner crab.

Appendix C4.–Historical bycatch statistics from the Kodiak Northeast District scallop fishery. See Appendix A for season information including fishing dates.

	Crab bycatch limits		Estimated bycatch (number animals)				Lbs meat
Season	Tanner	King	Tanner	King	Dungeness	Halibut	per Tanner[a]
1993/94	NA	NA	33,511	9	5	1,513	5
1994/95	143,000	123	2,054	190	0	577	17
1996/97	130,000	66	27,722	0	0	704	<1
1997/98	91,600	50	11,914	0	0	58	8
1998/99	46,500	21	13,887	1	0	309	9
1999/2000	66,500	150	13,886	0	0	158	6
2000/01	81,000	200	13,311	0	0	47	6
2001/02	425,000	15	20,362	0	100	94	4
2002/03	1,100,000	15	22,821	0	0	175	4
2003/04	606,991	17	18,230	0	0	197	4
2004/05	527,388	40	30,717	1	0	109	3
2005/06	449,403	45	29,264	0	0	211	3
2006/07	302,000	24	16,899	0	0	261	4
2007/08	220,000	100	77,348	0	0	299	<1
2008/09	186,000	12	39,732	2	0	174	2

[a] Ratio of pounds scallop meat harvested for each incidentally caught Tanner crab.

Appendix C5.–Historical bycatch statistics from the Kodiak Shelikof District scallop fishery. See Appendix A for season information including fishing dates.

	Crab bycatch limits		Estimated bycatch (number animals)				Lbs meat
Season	Tanner	King	Tanner	King	Dungeness	Halibut	per Tanner[a]
1993/94	NA	NA	51,560	0	122	226	2
1994/95	98,000	219	64,444	29	1,097	851	5
1996/97	16,100	22	11,285	0	515	440	19
1997/98	51,000	35	36,744	0	4,359	448	7
1998/99	33,500	196	22,707	0	33	502	8
1999/2000	42,500	250	38,893	0	100	493	5
2000/01	49,000	125	15,133	2	54	366	12
2001/02	59,000	50	29,114	1	451	247	6
2002/03	67,500	50	51,165	0	2,704	301	4
2003/04	93,139	25	40,575	0	904	574	4
2004/05	35,069	25	33,338	1	1,647	579	5
2005/06	51,822	1,345	18,055	0	1,267	177	9
2006/07	66,132	76	27,688	0	2,078	260	6
2007/08	84,000	1.200	17,454	0	535	155	10
2008/09	16,900	3	26,845	0	13	0	<1

[a] Ratio of pounds scallop meat harvested for each incidentally caught Tanner crab.

Appendix C6.–Historical bycatch statistics from the Kodiak Semidi Island District scallop fishery. Fishing was not opened during the 1995/96 season. Regulatory changes that closed state waters to scallop fishing were enacted in 2000, and no effort has occurred since.

	Estimated bycatch (number animals)				Lbs meat
Season	Tanner	King	Dungeness	Halibut	per Tanner[a]
1993/94	67,726	29	12,905	136	<1
1994/95	984	22	64	21	NA
1996/97	8,902	9	0	79	4
1997/98	8,500	1	856	21	<1
1998/99	780	0	37	17	2
1999/2000	66	0	0	0	14

[a] Ratio of pounds scallop meat harvested for each incidentally caught Tanner crab.

Appendix C7.–Historical bycatch statistics from the Alaska Peninsula Area scallop fishery. See Appendix A for season information including fishing dates.

	Crab bycatch limits		Estimated bycatch (number animals)				Lbs meat
Season	Tanner	King	Tanner	King	Dungeness	Halibut	per Tanner[a]
1993/94	52,530	85	180,319	25	0	329	2
1994/95	44,000	119	25,287	0	73	157	2
1996/97	22,000	435	19,045	0	4	25	<1
1997/98	45,300	79	21,971	0	0	347	1
1998/99	48,500	900	47,780	0	140	226	1
1999/2000	75,500	300	28,160	1	2,349	178	1
2000/01	42,000	100	2,636	1	0	8	<1
2007/08	26,500	156	4,693	0	0	4	<1
2008/09	120,000	35	18,302	0	0	8	<1

[a] Ratio of pounds scallop meat harvested for each incidentally caught Tanner crab.

Appendix C8.–Historical bycatch statistics from the Dutch Harbor Area scallop fishery. See Appendix A for season information including fishing dates.

	Crab bycatch limits		Estimated bycatch (number animals)				Lbs meat
Season	Tanner	King	Tanner	King	Dungeness	Halibut	per Tanner[a]
1993/94	50,500	45	69,354	35	0	270	<1
1994/95	87,000	47	757	7	0	0	3
1995/96	10,700	10	5,980	0	0	37	5
1997/98	10,700	10	12,582	1	0	22	<1
1998/99	10,700	10	6,479	0	23	35	7
1999/2000	10,700	10	4,274	0	0	39	2
2002/03	10,700	50	2,744	0	29	0	2
2008/09	10,000	10	1,120	0	0	77	9

[a] Ratio of pounds scallop meat harvested for each incidentally caught Tanner crab.

Appendix C9.–Historical bycatch statistics from the Bering Sea Area scallop fishery. Fishing was not opened during the 1995/96 season. See Appendix A for season information including fishing dates.

	Crab bycatch limits			Estimated bycatch (number animals)				Lbs meat per
Season	Tanner	King	Snow	Tanner	King	Snow	Halibut	Tanner/snow[a]
1993/94	260,000	17,000	NA	290,913	207	15,000	165	<1
1994/95	260,000	17,000	NA	220,710	22	34,867	3,513	2
1996/97	257,000	500	275,000	16,642	0	106,935	124	1
1997/98	238,000	500	172,000	28,446	0	195,345	98	<1
1998/99	215,000	500	130,000	39,363	146	232,911	98	<1
1999/2000	65,000	500	300,000	62,268	2	159,656	106	<1
2000/01	65,000	500	150,000	52,505	2	103,350	50	1
2001/02	65,000	500	300,000	48,718	2	68,458	76	1
2002/03	65,000	500	300,000	48,053	2	70,795	85	<1
2003/04	65,000	500	150,000	31,316	0	16,206	61	<1
2004/05	65,000	500	150,000	15,303	0	3,843	0	<1
2005/06	65,000	500	150,000	15,529	2	5,211	53	1
2006/07	260,000	500	300,000	45,204	10	8,543	82	<1
2007/08	260,000	500	300,000	35,288	1	19,367	11	<1
2008/09	260,000	500	300,000	60,373	2	17,205	0	<1

[a] Ratio of pounds scallop meat harvested for each incidentally caught Tanner crab or snow crab × Tanner crab hybrid.

APPENDIX D. TERMS COMMONLY USED IN THE ALASKA SCALLOP FISHERY

Appendix D1.–Commonly used terms, abbreviations and definitions related to scallops and the scallop fishery used in this report.

bycatch	non-target species and other items incidentally caught in dredges during scallop fishing operations
CPUE	catch per unit effort, fishery performance statistic expressed in pounds meat per dredge hour (lbs mt/dredge-hr)
CW	carapace width, size measurement for *Chionoecetes* spp. crabs
discarded scallop catch	small and/or broken scallops captured by the dredge that are not removed from deck by vessel crew for shucking
dredge-hr	fishery effort unit; one scallop dredge towed one hour
GHL	guideline harvest level; anticipated scallop catch in a given area established prior to season
observer	onboard scallop fishery observer
retained scallop catch	whole scallops caught in dredge and removed from deck by vessel crew for shucking
SH	scallop shell height in mm measured as in Figure 1
shucking	process of removing adductor muscle (scallop meat) from shell and viscera
vessel-day	24-hr period beginning at midnight for a specific vessel