Fishery Data Series No. 13-09

Summary of Observer Data Collected During the 2010/11 Alaska Weathervane Scallop Fishery

by

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and

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March 2013

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

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

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)

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 1993. Observer sampling provides biological information on scallop populations and tracks bycatch in the scallop fishery. This report summarizes data collected by scallop fishery observers during the 2010/11 Alaska weathervane scallop fishing season. Observer sampling effort and fishery data are summarized, and estimates of crab and halibut bycatch from the scallop fishery are presented. Historical scallop observer data by management area dating back to 1993 are included as appendices.

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

INTRODUCTION

Commercial fishing for weathervane scallops *Patinopecten caurinus* off Alaska began in 1967 when two Kodiak-based vessels were converted from other fisheries to scallop dredging (Kruse et al. 2005). Alaska Department of Fish and Game (ADF&G) passively managed the fishery by limiting open seasons and open waters until 1993, when an influx of scallop vessels from the east coast of the United States raised concerns about sustainability of the fishery. Subsequently, ADF&G designated the scallop fishery a "high impact emerging fishery" and drafted 5 AAC 38.076 *Alaska Scallop Fishery Management Plan* which was adopted by the Alaska Board of Fisheries in 1994. The management plan included provisions designed to limit fishing efficiency, provided a framework for establishing crab bycatch limits, and gave ADF&G authority to establish an onboard observer program. The scallop observer program was launched in 1994, with observers required on all vessels fishing for weathervane scallops in all Alaska waters excluding Cook Inlet. The Cook Inlet weathervane scallop fishery is limited by regulations specifying a single dredge with maximum width six feet and a requirement to accommodate an ADF&G employee as an onboard observer when requested.

The observer program was designed for collection of biological information on scallop populations and monitoring bycatch of commercially important species such as crabs. These data are used by ADF&G fishery managers in setting guideline harvest levels (GHLs) prior to fishing seasons and to monitor fishery performance and bycatch during each season. Detailed information on scallop fishery management including regulations, registration areas, seasons, license limitation, and the role of the North Pacific Fishery Management Council (NPFMC) in scallop fishery management are available in other ADF&G and NPFMC publications (e.g., Barnhart et al. 2008; NPFMC 2009).

Scallop fishery observers are employed by independent agents who contract with scallop vessel operators for observer services. All observer activities are coordinated and monitored by ADF&G scallop observer program personnel, including training, deployments, briefings, debriefings, sampling procedures, data management, and observer certification. All data collected by scallop observers are stored in a database maintained at the Kodiak ADF&G office.

This report summarizes data collected by scallop fishery observers during the 2010/11 Alaska statewide scallop fishing season for all areas excluding Cook Inlet. Biological data on the scallop catch and on other species incidentally caught by scallop dredges (bycatch) are presented as are summaries of logbook data recorded by scallop vessel operators. Tables of historical fishery and observer program data for each management area are presented in Appendices. Appendix A summarizes observer program statistics such as fishing dates and number of hauls sampled by observers, Appendix B summarizes fishery performance with statistics such as catch and CPUE, and Appendix C contains tables containing estimates of crab and halibut bycatch. Appendix D

contains a reference table with definitions of terms used in this report to describe scallop fishing operations and scallop fishery data.

METHODS

Scallop fishery observers were trained prior to the 2010/11 season at University of Alaska's North Pacific Fisheries Observer Training Center using materials prepared by ADF&G including the Scallop Observer Training and Deployment Manual (ADF&G 2010). Observers were deployed on all 2010/11 scallop fishing trips in all Alaska scallop fishing areas excluding Cook Inlet (see map Figure 1).

Alaska scallop fishing vessels deploy either one or two New Bedford style dredges (Figure 2) with maximum width 15 feet per dredge. We refer to the time period during which the dredge or dredges are set over the vessel's side, towed along the bottom, then retrieved and landed aboard the vessel, as a haul. Observers always sample one dredge only when a haul is sampled regardless of the number of dredges towed during the haul. Additional details on scallop fishing methods may be found in ADF&G (2010) and NPFMC (2009).

OBSERVER SAMPLING

Observer-collected data summarized in this report were obtained through scallop catch sampling and haul composition sampling described in detail below. During the season, scallop vessels often divided their crews into two watches and fished "around the clock." To obtain representative samples, observers were instructed to sample at different times throughout the day and to always make the decision to sample a haul prior to viewing dredge contents. Observers examined contents of one dredge only when sampling a haul.

Scallop Catch Sampling

Scallop observers' catch sampling goal for the 2010/11 season was a single dredge from five separate hauls on each full day of fishing. For each sample, observers monitored vessel crew as they sorted dredge contents, ensuring that nothing was discarded and counted the number of baskets of retained scallops. When present, all Pacific halibut *Hippoglossus stenolepis* were measured and released as soon as possible. Observers obtained three full baskets of retained scallops from the crew if catch was sufficient to calculate average basket weight. Scallops in the first weighed basket were also counted; these data were used to estimate round weight catch of retained scallops and average weight per scallop.

After the crew finished removing the retained scallop catch from deck, observers collected and weighed all remaining (discarded) scallops. One basket of discarded scallops was subsampled to determine the ratio by weight of intact to broken scallops. Twenty scallops were randomly selected from both the retained scallop catch and the intact discarded scallop catch for scallop shell height (SH) measurements (Figure 3). The top valve of two scallops was collected for return to the Kodiak ADF&G office for visual shell aging (described below). All scallop clappers (see definition in Appendix D) in the sampled dredge were collected, counted, broken apart, and discarded overboard.

All incidentally caught commercially important crabs were identified by species, and the number of individuals of each species was counted. Samples of up to 10 each Tanner crab *Chionoecetes bairdi*, Dungeness crab *Cancer magister*, *Chionoecetes* sp. (snow crab *C. opilio* and all *Chionoecetes* hybrids), red king crab *Paralithodes camtschaticus*, blue king crab *Paralithodes*

platypus, and hair crab *Erimacrus isenbeckii*, were examined in detail if present in the sampled dredge. Sex and condition of each of these crabs was recorded, and carapace size was measured with Vernier calipers to the nearest millimeter; carapace length was measured on king and hair crabs, and carapace width (CW) was measured on Tanner, Dungeness, snow, and *C.* hybrid crabs.

Haul Composition Sampling

From one haul selected each day for catch sampling, observers also weighed all dredge contents excepting live scallops and halibut to document haul composition. First, lengths of any halibut present in the sample were measured, and these fish were released overboard. All other fish, shellfish, benthic invertebrates, and shells, were identified to the lowest taxonomic level possible and sorted into baskets. Then, remaining dredge contents were divided into natural debris (e.g., kelp, wood, or rocks) or man-made debris (e.g., discarded plastics or fishing gear), and collected in baskets. After removing mud by washing with a deck hose, basket contents were weighed to the nearest pound using a hanging spring scale. Small amounts of animals or debris were weighed separately, with weights less than one pound rounded to one pound. Weight of live scallops was estimated by counting the total number of baskets filled and multiplying by average weight from three baskets. Weight of halibut was estimated by converting length measurements to weight using tables developed by the International Pacific Halibut Commission.

Observers occasionally used subsampling to estimate weight when large volumes of a single species or type of debris were encountered in the haul composition sample. This was accomplished by collecting all animals, animal parts, or debris in baskets, weighing three baskets with spring scales, and then multiplying average basket weight by total number of baskets filled.

SCALLOP SHELL AGING

Ages of scallops collected by observers from the retained catch during scallop catch sampling were estimated by Kodiak ADF&G staff after fishing was completed. The surface of the top valve of each shell was examined under a microscope using sharply angled illumination (raking light) which produced shadows highlighting circuli, the layers of new shell material laid down along the shell edge during growth. This allowed staff to identify and enumerate annuli, or annual markings produced by zones of compressed circuli occurring between zones of wider-spaced circuli. Estimated age was recorded as the number of annuli identified on each shell. Details on shell aging methods and complete shell aging results are contained in a separate report currently being prepared for publication.

VESSEL OPERATOR LOGBOOKS

Vessel operators were required to complete logbooks supplied by ADF&G during scallop fishing operations that provided detailed information on each haul. Observers marked which hauls were sampled in the logbook and performed regular checks to assure logbooks were completed in a timely manner and entries were accurate and legible. Data recorded for each haul included date, starting latitude and longitude, ADF&G statistical area, average depth, time dredge on and off bottom, average speed, number and width of dredges fished, gear performance, number of baskets from retained catch, estimated round weight of retained scallops, and number of king crab caught.

ESTIMATION OF BYCATCH AND DISCARDED SCALLOP CATCH

Bycatch of Tanner, snow, and Dungeness crabs, and Pacific halibut, was estimated using data collected by observers during scallop catch 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 estimates for each vessel-day calculated by

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

where

$\hat{B}_{vd}$ = estimated number of crab of each species or halibut caught during vessel-day,

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

t = sampled dredge-hrs during vessel-day,

T = total dredge-hrs during vessel-day.

For vessel-days without sampling, bycatch was estimated by multiplying the overall bycatch rate (number/dredge-hr) for the same vessel in the same registration area or district by dredge-hrs fished during the vessel-day. Ninety-five percent confidence intervals for all bycatch estimates were calculated using percentile-method bootstrapping (Barnhart et al. 1996).

Weight of discarded scallops was similarly estimated by summing estimates for each vessel-day,

$$\hat{X}_{vd} = \frac{x_{vd}}{t} \cdot T, \tag{2}$$

where

$\hat{X}_{vd}$ = estimated round weight of scallops discarded during the vessel-day,

x_{vd} = round weight of discarded scallops in sampled dredges during vessel-day,

t = sampled dredge-hrs during vessel-day,

T = total dredge-hrs during vessel-day.

Days with no observer sampling were handled as above, using overall discard rate (weight/dredge-hr) for the same vessel in the same area. Estimation of intact and broken scallop weight was based on the ratio of intact and broken scallop weight observed in all subsampled discarded scallop baskets from the same vessel in the same registration area or district. Confidence intervals were calculated using percentile-method bootstrapping.

Weight estimates for incidentally caught Tanner crab were calculated by multiplying the above numerical estimates by average crab weight from each area. Crab sex and CW measurements collected by observers during catch sampling were combined with allometric CW–weight relationships developed by NOAA Fisheries (Elizabeth Chilton, NOAA Fisheries, personal communication) to determine average weight for each area.

SCALLOP SHELL HEIGHT FREQUENCY DISTRIBUTIONS

Histograms depicting estimated scallop shell height (SH) distributions of the combined retained and discarded scallop catch were created for all fishing areas where at least 200 measurements of both retained and discarded scallops were collected during the season. This was accomplished by resampling observer-collected SH measurements based on the estimated proportion by weight of retained and discarded scallops in the catch. Multiple-year plots were constructed to illustrate changes in SH distributions over time.

RESULTS AND DISCUSSION

OBSERVER SAMPLING EFFORT

Four vessels participated in the 2010/11 statewide scallop fishery between July 1, 2010, and November 8, 2010 (Table 1). Four observers deployed during the season sampled 291 of 317 vessel-days on which fishing occurred (Table 1). Days without sampling occurred when sea conditions were rough, observers were ill, or when fishing effort was limited due to travel between fishing locations or port.

Observer sampling effort was proportional to fishing effort, with the largest number of hauls and the most sampling occurring in Kodiak Shelikof District and Yakutat District (Table 1). Overall, 1,254 or 22% of 2010/11 hauls recorded in vessel operator logbooks were sampled by observers (Table 1).

FISHERY CATCH AND EFFORT

A total of 459,759 lbs of weathervane scallop meats were harvested in Alaska waters excluding Cook Inlet during the 2010/11 season (Table 2). The Alaska Peninsula Area (Figure 1) remained closed during the 2010/11 season to promote scallop stock rebuilding. Season harvests were 171,065 lbs scallop meat from Kodiak Shelikof District, 156,984 lbs from Yakutat District, 64,465 lbs from Kodiak Northeast District, 50,099 lbs from Bering Sea Area, 8,442 lbs from Prince William Sound Area, 5,642 lbs from Dutch Harbor Area, and 3,062 lbs from Yakutat District 16 (Table 2, Figure 4).

Scallop harvest totals were close to 2010/11 guideline harvest levels (GHLs) for Yakutat District, Prince William Sound, Kodiak Northeast District, Kodiak Shelikof District, and the Bering Sea (Table 2). In Yakutat District 16, fishermen halted fishing after 54 hauls due to low CPUE and a significant proportion of small scallops in the catch. In the Dutch Harbor Area, where the 10,000 lb GHL was evenly split between Bering Sea and Pacific Ocean waters, catches were high in the Bering Sea outside Inanudak Bay but were poor in Pacific Ocean waters, causing the sole vessel participating to stop fishing before the upper end of the GHL was attained.

Scallop fishery CPUE for the 2010/11 season ranged from a high of 68 lbs meat/dredge-hr in the Dutch Harbor Area to 37 lbs meat/dredge-hr in Yakutat District 16 (Table 2, Figure 4). Statewide scallop CPUE for the season was 49 lbs meat/dredge-hr (Table 2), up slightly from 44 lbs meat/dredge-hr observed during the 2009/10 season (Rosenkranz and Spafard 2010).

Scallop fishing depths for 2010/11 ranged from 37 to 143 m (Table 3), with over 90% of hauls made in depths 65–120 m. Average depth fished during the season was 93 m, close to averages from recent seasons (e.g., Rosenkranz 2010; Rosenkranz and Spafard 2010; Rosenkranz and Spafard 2011).

Distance towed and area fished during the 2010/11 scallop season (Table 3) corresponded to fishing effort and dredge hours (Table 2), with the highest values recorded for Kodiak Shelikof District and Yakutat District. Average haul duration during the season was 51 minutes and average speed 4.8 knots, producing an average haul distance of 4.1 nmi and sweeping an area of 0.021 nmi.^{2}

DISCARDED SCALLOP CATCH

Estimated round weight of scallops discarded during the 2010/11 season in all areas excluding Cook Inlet was 1.20 million lbs (Tables 2 and 4), accounting for 18.7% of total estimated round weight landed. Of about 56,000 lbs of discarded scallops subsampled by observers, 62% by weight were intact and 38% were broken or crushed. Scallops were discarded due to small size or because they were broken such that shucking was difficult.

Discard rates varied between areas, with about 47% of total scallop weight landed discarded in the Yakutat District 16 fishery and less than 7% discarded in both the Prince William Sound and Dutch Harbor fisheries. Relatively high discard proportions were observed in areas with the largest retained catches: 578,494 lbs (21.9% of total) were discarded in Yakutat District and 423,118 lbs (18.9%) were discarded in Kodiak Shelikof District (Table 4).

SCALLOP SHELL HEIGHT AND AGE DISTRIBUTIONS

Observers measured shell height (Figure 3) of about 48,000 scallops captured in sampled dredges during the 2010/11 season (Table 5). Average retained scallop SH was highest in the Bering Sea at 154 mm and lowest in Yakutat District 16 at 124 mm. Average discarded scallop SH ranged from 123 mm for Prince William Sound to 96 mm for District 16. Average SH of discarded scallops was dependent on proportions of intact and broken discards, as intact discarded scallops were on average smaller than broken discards (e.g., see Rosenkranz 2010; Table 4).

Histograms of estimated scallop SH distributions from recent seasons (Figures 5–11) illustrate temporal and area-dependent effects of growth on scallop populations. Well-documented size selectivity of scallop dredges (e.g., Yochum and DuPaul 2008) needs to be taken into account when interpreting these figures. By Alaska regulation, commercial scallop gear must be constructed with 4 in (101.6 mm) rings in the bag section. This allows smaller scallops to pass through and affects capture efficiency for scallops up to 120 mm SH. Hence, size distributions depicted in Figures 5–11 are representative of unsorted catch but cannot provide a complete picture of size distributions of scallops on the seafloor.

ADF&G research on scallop aging and growth shows that eastern Gulf of Alaska (GOA) scallops from populations targeted in the Yakutat and Prince William Sound fisheries (Figures 5–7) grow slower and attain lower asymptotic sizes than scallops found in the western GOA and Bering Sea (Figures 8–11). For example, about 90% of scallops landed in the 2010/11 Yakutat District (Figure 5) and Yakutat District 16 (Figure 6) fisheries were less than 140 mm SH, whereas only about 40% of scallops caught in the 2010/11 Kodiak Northeast District fishery (Figure 8) were less than 140 mm SH. Additionally, average estimated age of retained scallops from a subsample of 2010/11 Yakutat District and District 16 shells was 11 years compared with 8 years for shells subsampled from the 2010/11 Kodiak Northeast District fishery. Hence, SH distributions from the eastern GOA tended to be unimodal with many different ages in the 120–140 mm SH range (Figures 5–7), while SH distributions of faster-growing Kodiak and western Alaska scallops

were generally wider and frequently bimodal due to larger size differences between age classes (Figures 8–11).

Results from visual aging of retained scallop shells followed the same theme: Estimated age distributions from Yakutat District (Figure 12) were wider than those from the Kodiak Area (Figures 13–14), with a higher proportion of older individuals in the retained catch. Retained scallops from Kodiak's Northeast District (Figure 13) and Shelikof District (Figure 14) contained a higher proportion of younger scallops, which were commercially valuable due to their larger size-at-age. We hypothesize that higher biological productivity in the western GOA compared to the eastern GOA was responsible for the observed differences. Sample sizes from visual aging of scallops caught in other areas were not sufficient to construct plots such as Figures 12–14.

BYCATCH

Bycatch Estimates

An estimated 116,199 Tanner crab, 829 Dungeness crab, and 1,411 halibut, were incidentally landed by vessels fishing for scallops during the 2010/11 season (Table 6, Figure 15). Additionally, 26 red king crab and 18,823 snow crab and snow crab × Tanner crab hybrids were incidentally caught in the Bering Sea scallop fishery.

Estimated Tanner crab bycatch was highest in the Bering Sea with 60,537 crab in addition to the snow crab and hybrids, followed by Kodiak Northeast District with about 21,000 crab, Kodiak Shelikof District with about 19,000 crab, and Yakutat District with around 15,000 crab (Table 6). Only four Tanner crab were sampled by observers during the 2010/11 Prince William Sound scallop fishery, leading to an estimate of 28 Tanner crab incidentally caught in the fishery. Tanner crab bycatch rate (Figure 15–lower plot) was also highest in the Bering Sea at 62 crabs/dredge-hr, followed by Kodiak Northeast District at 21 crabs/dredge-hr. Tanner crab bycatch rates for eastern GOA scallop fisheries were all below five crabs/dredge-hr.

No Dungeness crab were found in sampled dredges from most scallop fishing areas during the 2010/11 season. Estimates from catch sampling were 805 crab from Kodiak Shelikof District, 24 from Yakutat District, and zero for all other areas (Table 6). Estimated halibut bycatch ranged from a high of 749 individuals in the Kodiak Northeast District fishery to 10 individuals (one sampled) in the Bering Sea, with no halibut encountered in sampled dredges from the Prince William Sound fishery (Table 6).

Size Distributions and Weight of Incidentally Caught Tanner and Snow Crabs

Observer-collected information on size of Tanner and snow crabs incidentally caught in the 2010/11 fishery show that the eastern GOA Tanner crab bycatch was comprised of small crab that amounted to less than 120 lbs total round weight (Table 7, Figure 16). Estimated round weight of Tanner crab bycatch in the Kodiak Area was 8,190 lbs, with a high proportion of crab less than <40 mm CW taken in the Shelikof District (Table 7, Figure 16). In the Dutch Harbor Area an estimated 300 lbs of Tanner crab were incidentally caught, while about 20,100 lbs of Tanner crab and 14,000 lbs of snow crab and snow crab × Tanner crab hybrids were incidentally caught in the 2010/11 Bering Sea scallop fishery (Table 7, Figure 16). As has frequently been the case in recent years, few female snow crab and snow crab × Tanner crab hybrids were encountered by observers during Bering Sea catch sampling (Figure 16).

Tanner Crab and Halibut Mortality

Observers examined 6,064 incidentally caught Tanner crab, snow crab, and hybrid crab during the 2010/11 season and classified 41% as dead (Table 8). Analysis of scallop observer data collected between 1993 and 2000 (Rosenkranz 2002) showed that Tanner crab bycatch mortality rates varied significantly between years and between vessels. Observers sampled 153 halibut during the season and reported that 33% were dead (Table 8).

HAUL COMPOSITION

Results from haul composition sampling (Tables 9–16) documented scallop dredge contents from each fishing area during the 2010/11 season. Statewide, over 76% of total weight sampled was attributed to weathervane scallops (Table 16), with an additional 8.6% classified as shell or natural debris. Sea stars, skates, and flatfish were also commonly found in sampled dredges during the season. High proportions of natural debris in the Kodiak Northeast District (Table 12) were comprised of rocks that caught by dredges in certain parts of the district.

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TABLES AND FIGURES

Table 1.–Observer program statistics by management area from the 2010/11 weathervane scallop fishing season.

Area/District	Start of fishing	End of fishing	Number vessels	Fishing days[a]	Observed days[b]	Number hauls	Hauls sampled
Yakutat District	8/9/2010	11/8/2010	3	119	108	2,020	436
Yakutat District 16	9/10/2010	9/12/2010	1	3	3	54	13
Prince William Sound Area	8/18/2010	8/22/2010	1	5	5	101	24
Kodiak Northeast District	8/7/2010	8/29/2010	3	40	34	618	144
Kodiak Shelikof District	7/1/2010	8/6/2010	4	114	111	2,218	509
Dutch Harbor Area	9/30/2010	10/3/2010	1	4	3	53	13
Bering Sea Area	9/15/2010	10/19/2010	2	32	27	597	115
Statewide Total	7/1/2010	11/8/2010	4	317	291	5,661	1,254

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

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

Table 2.–Fishery statistics by management area from the 2010/11 weathervane scallop fishing season.

Area/District	GHL[a] (lbs meat)	Retained Catch (lbs meat)	Retained Catch (est. round lbs)	Dredge hours	Retained CPUE[b]	Discarded scallops (est. round lbs)[c]	
						Intact	Broken
Yakutat District	160,000	156,984	2,055,643	3,495	45	461,534	116,960
Yakutat District 16	25,000	3,062	31,845	83	37	17,558	10,475
Prince William Sound	8,400	8,442	130,075	161	52	1,742	7,636
Kodiak Northeast District	65,000	64,465	646,674	1,015	64	38,621	47,269
Kodiak Shelikof District	170,000	171,065	1,815,512	3,507	49	363,264	59,854
Dutch Harbor Area	10,000	5,642	43,835	83	68	1,133	2,105
Bering Sea Area	50,000	50,099	494,725	972	52	42,215	30,963
Statewide Total	488,400	459,759	5,218,309	9,316	49	926,067	275,262

[a] Guideline harvest level, catch target set prior to season.

[b] Retained catch per unit effort in lbs meat/dredge-hr.

[c] Estimated from catch sampling.

Table 3.–Depth-range, distance, and area fished by management area during the 2010/11 weathervane scallop fishing season.

Area/District	Depths fished (m)			Distance fished (nmi)	Area fished (nmi^2)[b]
	Minimum	Maximum	Average[a]		
Yakutat District	58	117	82	8,435	42
Yakutat District 16	64	90	78	200	1
Prince William Sound Area	75	106	81	386	2
Kodiak Northeast District	37	128	95	2,750	12
Kodiak Shelikof District	49	143	102	8,986	41
Dutch Harbor Area	62	90	81	195	1
Bering Sea Area	91	110	99	2,392	12
Statewide Total	37	143	93	23,344	111

[a] Calculated as average of vessel-operator-recorded average depth for each haul fished.
[b] Calculated from logbook data by summing haul duration × average speed × dredge width for each haul; does not account for overlap between hauls.

Table 4.–Estimated weight of discarded scallops and proportion of intact and broken discarded scallops by management area during the 2010/11 weathervane scallop fishing season.

Area/District	Weight discarded scallops (round lbs)			Estimated percentage[b]	
	Estimate	Lower bound[a]	Upper bound[a]	Intact	Broken
Yakutat District	578,494	495,097	642,636	17.5	4.4
Yakutat District 16	28,033	15,538	40,915	29.3	17.5
Prince William Sound	9,378	7,464	12,324	1.2	5.5
Kodiak Northeast District	85,890	71,845	108,673	5.3	6.5
Kodiak Shelikof District	423,118	366,912	480,482	16.2	2.7
Dutch Harbor Area	3,237	1,972	5,184	2.4	4.5
Bering Sea Area	73,178	61,873	80,857	7.4	5.5
Statewide Total	1,201,328	1,020,701	1,371,071	14.4	4.3

[a] Bounds from bootstrapped 95% confidence intervals.
[b] Percentage of estimated retained round pounds plus estimated discarded round lbs.

Table 5.–Average retained and discarded scallop shell heights and sample sizes by management area from the 2010/11 weathervane scallop fishing season.

	Retained catch		Discarded catch	
Area/District	Average SH (mm)	Sample size	Average SH (mm)	Sample size
Yakutat District	126	8,541	96	8,369
Yakutat District 16	124	240	107	240
Prince William Sound Area	141	480	123	317
Kodiak Northeast District	142	2,831	108	2,467
Kodiak Shelikof District	140	9,866	107	9,608
Dutch Harbor Area	142	260	116	214
Bering Sea Area	154	2,280	118	2,203
Statewide Total	136	24,498	105	23,418

Table 6.–Crab and halibut bycatch estimates by management area for the 2010/11 weathervane scallop fishing season.

	Tanner crab			Dungeness crab			Halibut		
Area/District	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 District	14,707	10,183	20,670	24	2	54	135	32	211
YakutatDistrict 16	92	63	119	0			17	6	25
Prince William Sound	28	4	117	0			0		
Kodiak Northeast	20,808	16,367	26,680	0			749	476	1,128
Kodiak Shelikof	19,126	14,942	23,535	805	87	1,690	450	251	657
Dutch Harbor Area	901	363	1,566	0			50	33	63
Bering Sea Area[b]	60,537	45,606	77,790	0			10	1	26
Statewide Total	116,199	87,527	150,478	829	89	1,745	1,411	800	2,110

[a] 95% confidence intervals from bootstrapping.

[b] An estimated 18,823 snow crab and snow crab × Tanner crab hybrids (95% confidence interval 17,238–20,527) were also incidentally caught in the Bering Sea.

Table 7.–Sample sizes, average size and weight, and estimated total weight of *Chionoecetes* crabs incidentally caught in each management area during the 2010/11 scallop season. Snow crab were caught only in the Bering Sea Area.

	Number crab measured		Average carapace width (mm)			
Area/district	males	females	males	females	Average weight (g)	Estimated total weight (lbs)[b]
Yakutat District	489	429	19	20	3.5	113
Yakutat District 16	2	7	37	32	14.2	3
Prince William Sound	2	1	18	25	2.8	<1
Kodiak Northeast District	454	469	55	52	77.6	3,556
Kodiak Shelikof District	835	660	56	37	110.0	4,634
Dutch Harbor	26	41	83	65	151.1	300
Bering Sea Tanner	391	715	69	66	150.7	20,091
Bering Sea Snow[a]	1,074	10	89	93	337.5	13,991

[a] Includes snow crab and hybrid snow × Tanner crab.
[b] Calculated by average weight × estimated number from Table 6.

Table 8.–Release condition of Tanner crabs and halibut sampled by observers in each management area during the 2010/11 scallop fishery.

	Tanner crabs			Halibut		
Area/district	Number dead	Number alive	Percentage dead	Number dead	Number alive	Percentage dead
Yakutat District	788	301	72	7	7	50
Yakutat District 16	2	9	18	1	1	50
Prince William Sound	4	0	100	32	47	41
Kodiak Northeast District	239	810	23	10	41	20
Kodiak Shelikof District	799	864	48	0	6	0
Dutch Harbor	9	64	12	1	0	100
Bering Sea[a]	639	1,536	29			
Statewide Total	2,480	3,584	41	51	102	33

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

Table 9.–Haul composition sampling results from the 2010/11 Yakutat District weathervane scallop fishery.

Rank	Common name	Scientific name	Percentage weight
1	weathervane scallop	*Patinopecten caurinus*	80.7
2	sunflower sea star	*Pycnopodia helianthoides*	5.2
3	empty bivalve shells		3.5
4	natural debris		2.6
5	big skate	*Raja binoculata*	1.5
6	notched brittlestar	*Ophiura sarsi*	0.9
7	sand sea star	*Luidia foliolata*	0.7
8	English sole	*Parophrys vetulus*	0.6
9	sea anemone unidentified	Order *Actiniaria*	0.5
10	longnose skate	*Raja rhina*	0.4
11	arrowtooth flounder	*Atheresthes stomias*	0.4
12	lingcod	*Ophiodon elongatus*	0.3
13	Alaska skate	*Bathyraja parmifera*	0.3
14	*Raja binoculata* egg case	*Raja binoculata* egg case	0.2
15	spiny dogfish shark	*Squalus acanthias*	0.2
16	Dover sole	*Microstomus pacificus*	0.2
17	empty gastropod shells		0.2
18	hairy triton	*Fusitriton oregonensis*	0.1
19	skate egg case unidentified		0.1
20	longnose skate egg case	*Raja rhina* egg case	0.1

Table 10.–Haul composition sampling results from the 2010/11Yakutat District 16 weathervane scallop fishery.

Rank	Common name	Scientific name	Percentage weight
1	weathervane scallop	*Patinopecten caurinus*	80.4
2	empty bivalve shells		3.4
3	big skate egg case	*Raja binoculata* egg case	3.3
4	giant octopus	*Octopus dofleini*	2.6
5	unsorted shab		2.5
6	longnose skate	*Raja rhina*	1.4
7	sunflower sea star	*Pycnopodia helianthoides*	1.1
8	sand sea star	*Luidia foliolata*	0.8
9	big skate	*Raja binoculata*	0.7
10	Pacific halibut	*Hippoglossus stenolepis*	0.6
11	English sole	*Parophrys vetulus*	0.6
12	lingcod	*Ophiodon elongatus*	0.4
13	arrowtooth flounder	*Atheresthes stomias*	0.3
14	*Bathyraja* sp. egg case	*Bathyraja* sp. egg case	0.2
15	notched brittlestar	*Ophiura sarsi*	0.2
16	sea anemone unidentified	Order *Actiniaria*	0.2
17	rex sole	*Glyptocephalus zachirus*	0.2
18	Alaskan scarlet sea star	*Pseudarchaster alascensis*	0.2
19	Aleutian moonsnail	*Cryptonatica aleutica*	0.1
20	Aleutian skate	*Bathyraja aleutica*	0.1

Table 11.–Haul composition sampling results from the 2010/11 Prince William Sound weathervane scallop fishery.

Rank	Common name	Scientific name	Percentage weight
1	weathervane scallop	*Patinopecten caurinus*	86.1
2	empty bivalve shells		4.1
3	natural debris		3.1
4	sunflower sea star	*Pycnopodia helianthoides*	2.4
5	sand sea star	*Luidia foliolata*	1.4
6	Bering skate	*Bathyraja interrupta*	0.7
7	notched brittlestar	*Ophiura sarsi*	0.4
8	flathead sole	*Hippoglossoides elassodon*	0.3
9	Dover sole	*Microstomus pacificus*	0.3
10	longnose skate	*Raja rhina*	0.2
11	lingcod	*Ophiodon elongatus*	0.2
12	longnose skate egg case	*Raja rhina* egg case	0.2
13	big skate	*Raja binoculata*	0.1
14	English sole	*Parophrys vetulus*	0.1
15	bristle worm	*Aphrodita negligens*	0.1
16	rex sole	*Glyptocephalus zachirus*	0.1
17	vermilion sea star	*Mediaster aequalis*	0.1
18	sea anemone unidentified	Order *Actiniaria*	<0.1
19	*Neptunea* sp. eggs	*Neptunea* sp. eggs	<0.1
20	big skate egg case	*Raja binoculata* egg case	<0.1

Table 12.–Haul composition sampling results from the 2010/11 Kodiak Northeast District weathervane scallop fishery.

Rank	Common name	Scientific name	Percentage weight
1	weathervane scallop	*Patinopecten caurinus*	72.4
2	natural debris		6.1
3	sunflower sea star	*Pycnopodia helianthoides*	5.5
4	empty bivalve shells		5.2
5	longnose skate	*Raja rhina*	1.1
6	Pacific halibut	*Hippoglossus stenolepis*	1.0
7	arrowtooth flounder	*Atheresthes stomias*	1.0
8	sea anemone unidentified	Order *Actiniaria*	0.9
9	Aleutian skate	*Bathyraja aleutica*	0.5
10	southern rock sole	*Lepidopsetta bilineata*	0.5
11	Tanner crab	*Chionoecetes bairdi*	0.4
12	Dover sole	*Microstomus pacificus*	0.4
13	Pacific cod	*Gadus macrocephalus*	0.4
14	Bering skate	*Bathyraja interrupta*	0.3
15	basket star	*Gorgonocephalus eucnemis*	0.3
16	notched brittlestar	*Ophiura sarsi*	0.3
17	rex sole	*Glyptocephalus zachirus*	0.3
18	*Halipteris* sea whip	*Halipteris* sp.	0.2
19	flathead sole	*Hippoglossoides elassodon*	0.2
20	*Solaster* sp.	*Solaster* sea star	0.2

Table 13.–Haul composition sampling results from the 2010/11 Kodiak Shelikof District weathervane scallop fishery.

Rank	Common name	Scientific name	Percentage weight
1	weathervane scallop	*Patinopecten caurinus*	73.8
2	empty bivalve shells		5.7
3	natural debris		4.8
4	sunflower sea star	*Pycnopodia helianthoides*	3.8
5	longnose skate	*Raja rhina*	1.4
6	sea anemone unidentified	Order *Actiniaria*	1.3
7	arrowtooth flounder	*Atheresthes stomias*	1.0
8	Alaska plaice	*Pleuronectes quadrituberculatus*	0.9
9	Alaska skate	*Bathyraja parmifera*	0.8
10	flathead sole	*Hippoglossoides elassodon*	0.8
11	hairy triton	*Fusitriton oregonensis*	0.8
12	Aleutian skate	*Bathyraja aleutica*	0.6
13	Bering skate	*Bathyraja interrupta*	0.5
14	big skate	*Raja binoculata*	0.4
15	man-made debris		0.3
16	Pacific cod	*Gadus macrocephalus*	0.3
17	Dover sole	*Microstomus pacificus*	0.2
18	Pacific halibut	*Hippoglossus stenolepis*	0.2
19	Tanner crab	*Chionoecetes bairdi*	0.2
20	Pacific lyre crab	*Hyas lyratus*	0.1

Table 14.–Haul composition sampling results from the 2010/11 Dutch Harbor weathervane scallop fishery.

Rank	Common name	Scientific name	Percentage weight
1	weathervane scallop	*Patinopecten caurinus*	77.9
2	sunflower sea star	*Pycnopodia helianthoides*	10.4
3	empty bivalve shells		2.3
4	natural debris		2.3
5	southern rock sole	*Lepidopsetta bilineata*	2.3
6	green sea urchin	*Strongylocentrotus droebachiensis*	0.7
7	notched brittlestar	*Ophiura sarsi*	0.6
8	Tanner crab	*Chionoecetes bairdi*	0.3
9	blackspined sea star	*Lethasterias nanimensis*	0.3
10	sea anemone unidentified	Order *Actiniaria*	0.2
11	sand sea star	*Luidia foliolata*	0.2
12	northern rock sole	*Lepidopsetta polyxystra*	0.2
13	*Chlamys* scallop	*Chlamys* sp.	0.2
14	flathead sole	*Hippoglossoides elassodon*	0.2
15	hairy triton	*Fusitriton oregonensis*	0.2
16	English sole	*Parophrys vetulus*	0.2
17	hairy hermit crab	*Pagurus capillatus*	0.1
18	*Buccinum* snail eggs	*Buccinum* sp. eggs	0.1
19	Alaskan scarlet sea star	*Pseudarchaster alascensis*	0.1
20	*Halipteris* sea whip	*Halipteris* sp.	0.1

Table 15.–Haul composition sampling results from the 2010/11 Bering Sea weathervane scallop fishery.

Rank	Common name	Scientific name	Percentage weight
1	weathervane scallop	*Patinopecten caurinus*	75.2
2	sponge unidentified	Phylum *Porifera*	3.9
3	empty bivalve shells		2.5
4	*Halipteris* sea whip	*Halipteris* sp.	2.2
5	Tanner crab	*Chionoecetes bairdi*	2.0
6	Tanner crab unidentified	*Chionoecetes sp.*	1.6
7	Alaska skate	*Bathyraja parmifera*	1.3
8	flathead sole	*Hippoglossoides elassodon*	1.3
9	northern rock sole	*Lepidopsetta polyxystra*	1.2
10	man-made debris		1.0
11	natural debris		0.9
12	Bering skate	*Bathyraja interrupta*	0.7
13	hairy triton	*Fusitriton oregonensis*	0.7
14	empty gastropod shells		0.7
15	arrowtooth flounder	*Atheresthes stomias*	0.6
16	sea anemone unidentified	Order *Actiniaria*	0.6
17	rock sole unidentified	*Lepidopsetta sp.*	0.4
18	Aleutian hermit crab	*Pagurus aleuticus*	0.4
19	basket star	*Gorgonocephalus eucnemis*	0.3
20	bigmouth sculpin	*Hemitripterus bolini*	0.3

Table 16.–Comparison of haul composition sampling results (percent weight) between fishing areas by taxonomic group for the 2010/11 weathervane scallop fishery.

Area/District	Weathervane scallops	flatfish	skates[a]	sea stars	sea whips, sea pens	snails, whelks, triton	shells, debris	*Chionoecetes* crabs[b]
Yakutat District	80.6	1.4	2.8	5.9	0.1	0.2	6.1	0.1
Yakutat District 16	80.8	1.8	5.8	2.1	0.0	0.2	6.0	0.0
Prince William Sound Area	86.1	0.8	1.1	3.9	0.0	0.1	7.2	0.0
Kodiak Northeast District	73.5	3.6	4.0	4.0	0.0	0.9	10.8	0.2
Kodiak Shelikof District	73.0	3.3	2.1	6.2	0.3	0.3	11.4	0.4
Dutch Harbor	77.6	2.9	0.1	11.3	0.1	0.4	4.5	0.3
Bering Sea Area	74.1	3.8	2.3	0.1	2.2	1.1	4.4	3.6
Statewide Total	76.3	2.7	3.1	4.7	0.2	0.6	8.6	0.4

[a] Includes all skate species and skate egg cases.
[b] Includes snow crab, Tanner crab, and snow crab × Tanner crab hybrids.

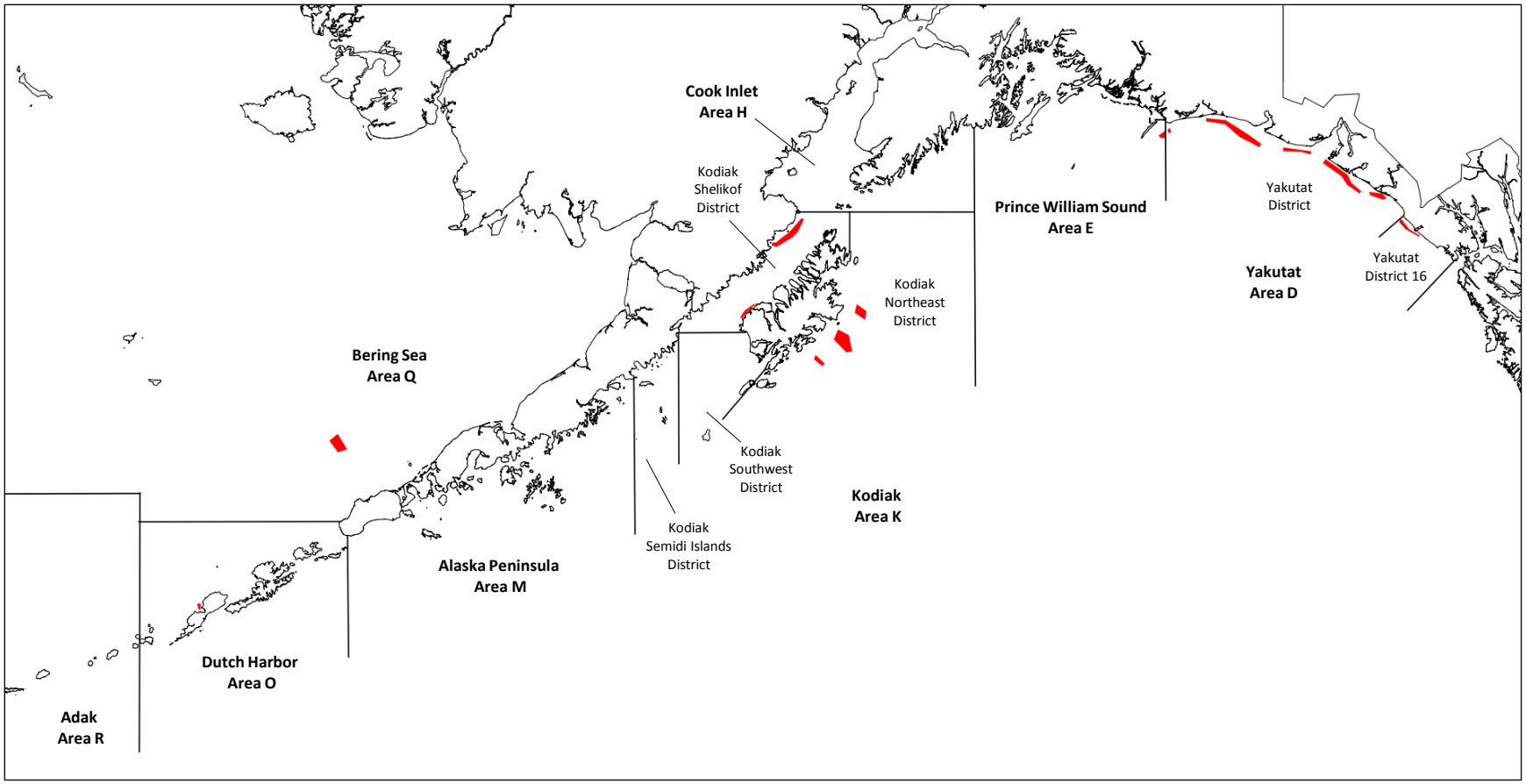

Figure 1.–Map showing Alaska scallop fishery registration areas. General areas of scallop fishing effort during the 2010/11 season are overlaid by red polygons.

Figure 2.–New Bedford style scallop dredge with catch of Alaska weathervane scallops.

Figure 3.–Weathervane scallop with orientation of shell height (SH) measurement on upper valve shown. The lower valve typically extends beyond the upper valve and can be seen at margin.

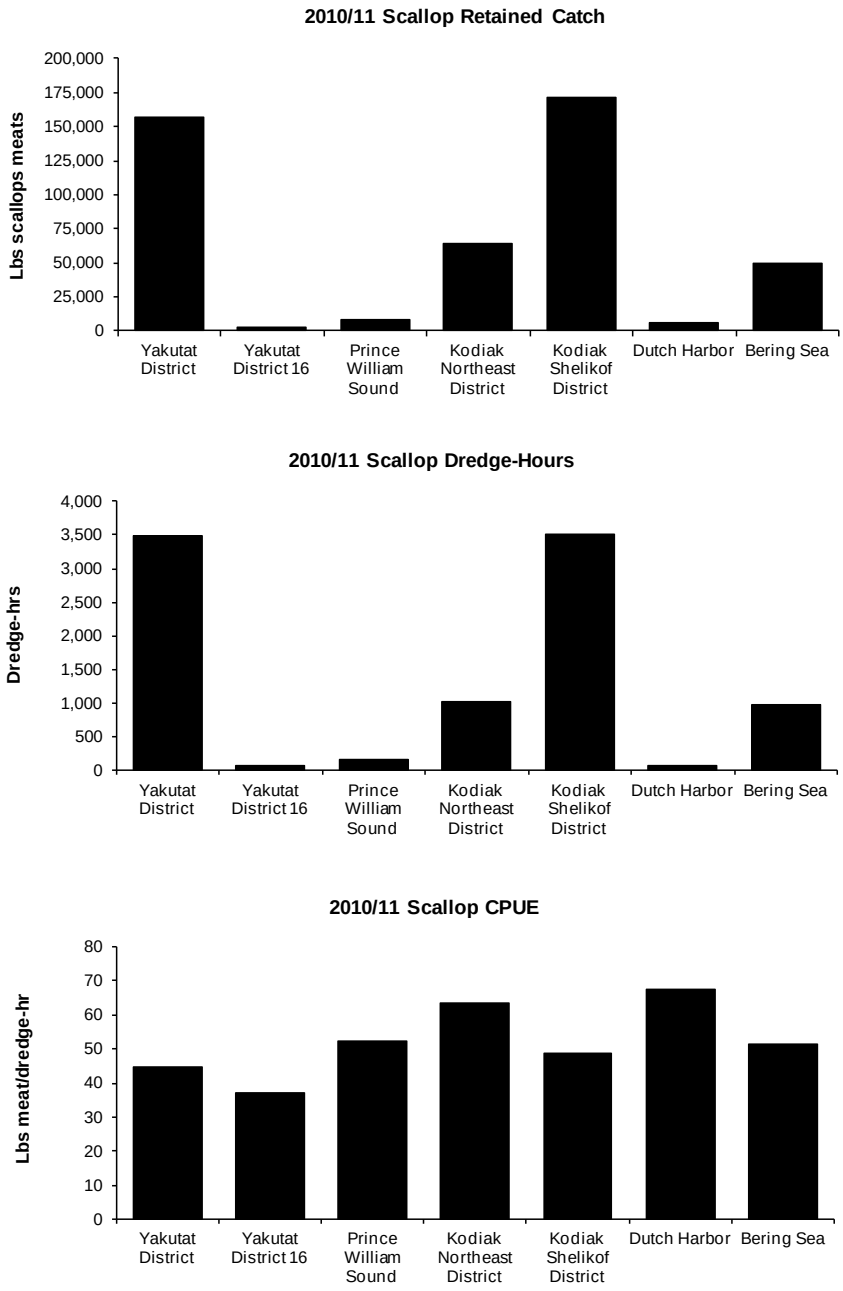

Figure 4.–Retained scallop catch (top), dredge-hrs (center), and CPUE (bottom) by management area during the 2010/11 statewide weathervane scallop fishery.

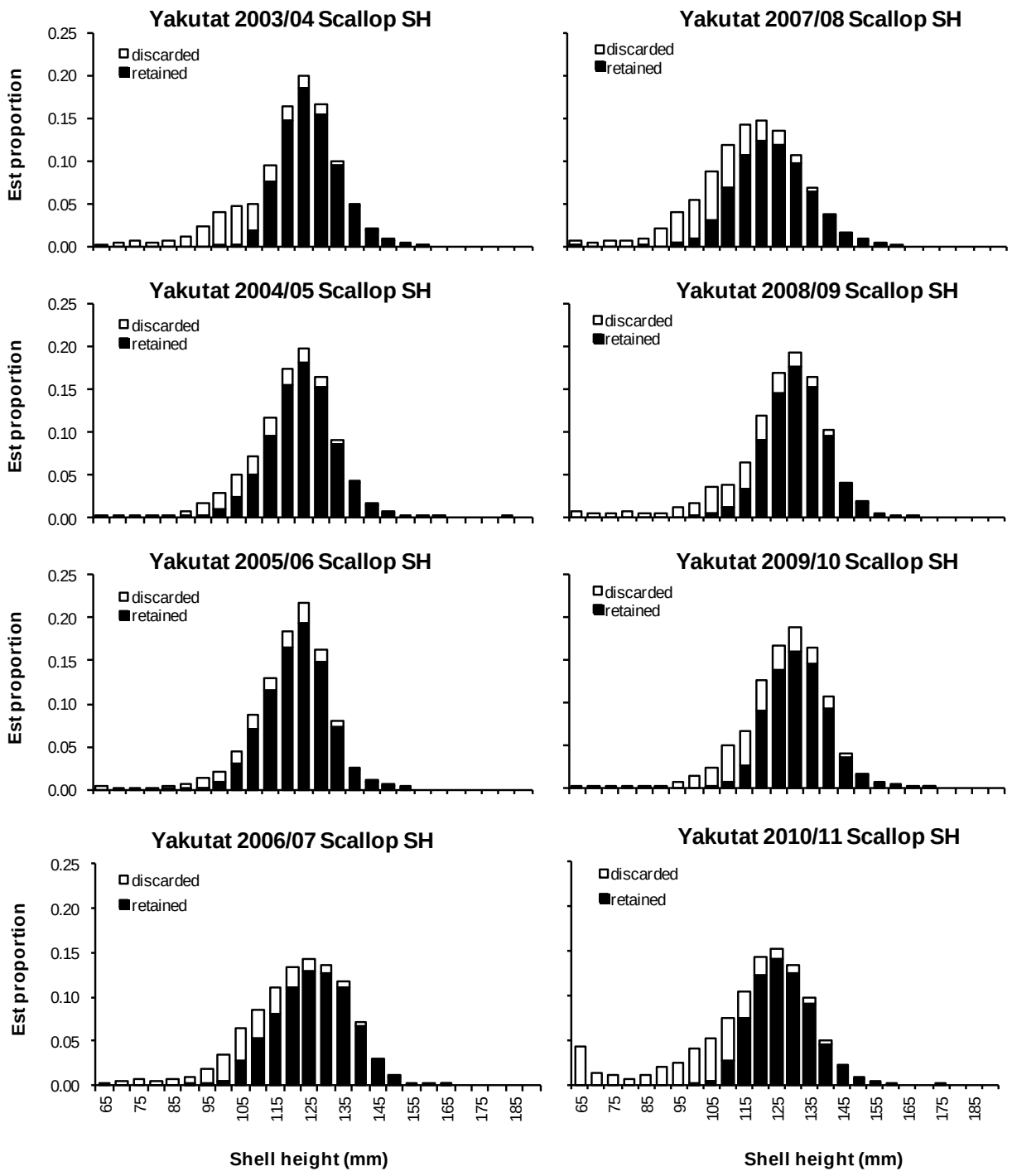

Figure 5.–Estimated scallop shell height distributions from resampling observer measurements from 2003/04–2010/11 Yakutat District fishing seasons.

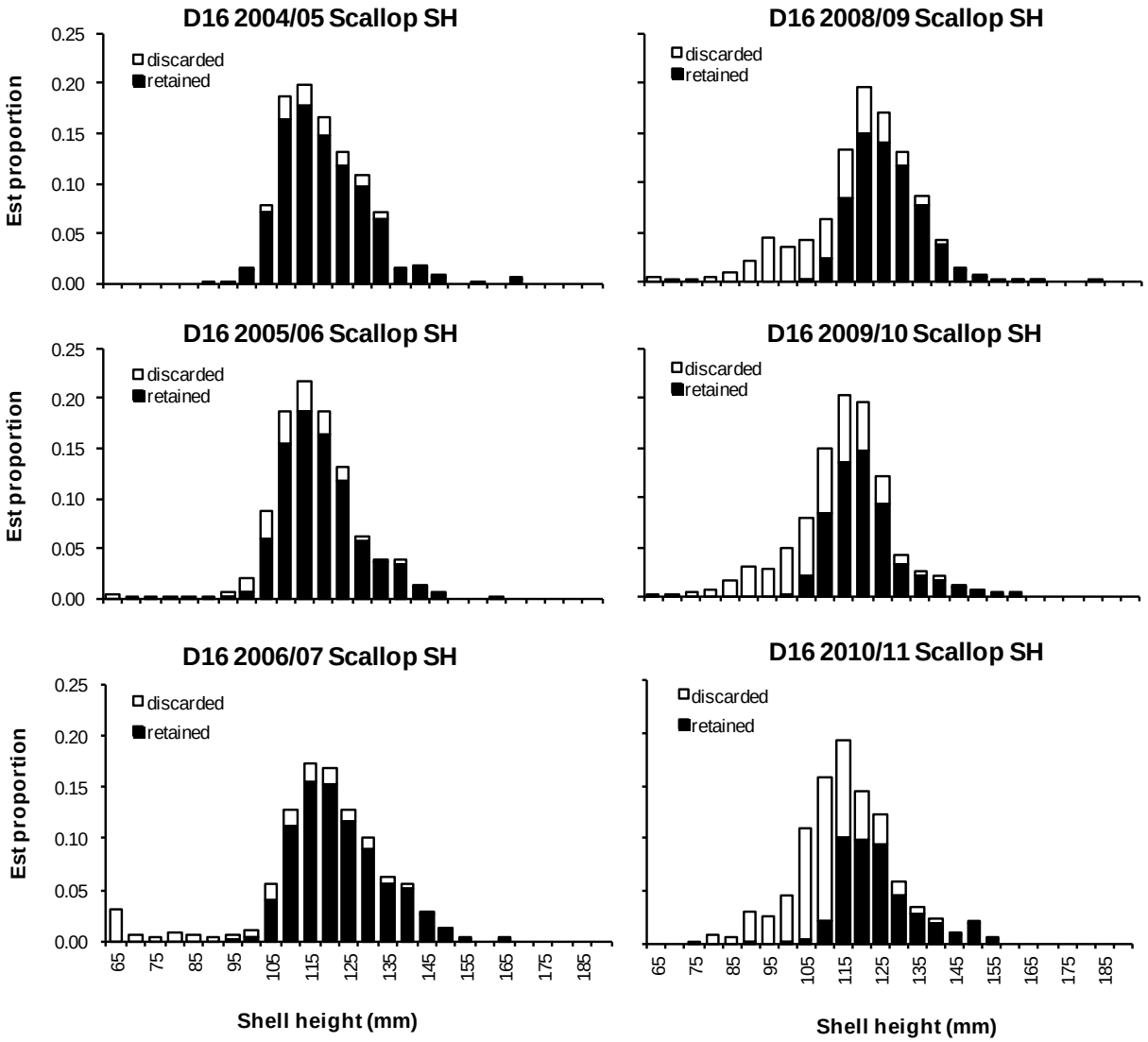

Figure 6.–Estimated scallop shell height distributions from resampling observer measurements collected during 2004/05–2006/07 and 2008/09–2010/11 Yakutat District 16 fishing seasons. Sample sizes from 2007/08 were not sufficient to create a plot.

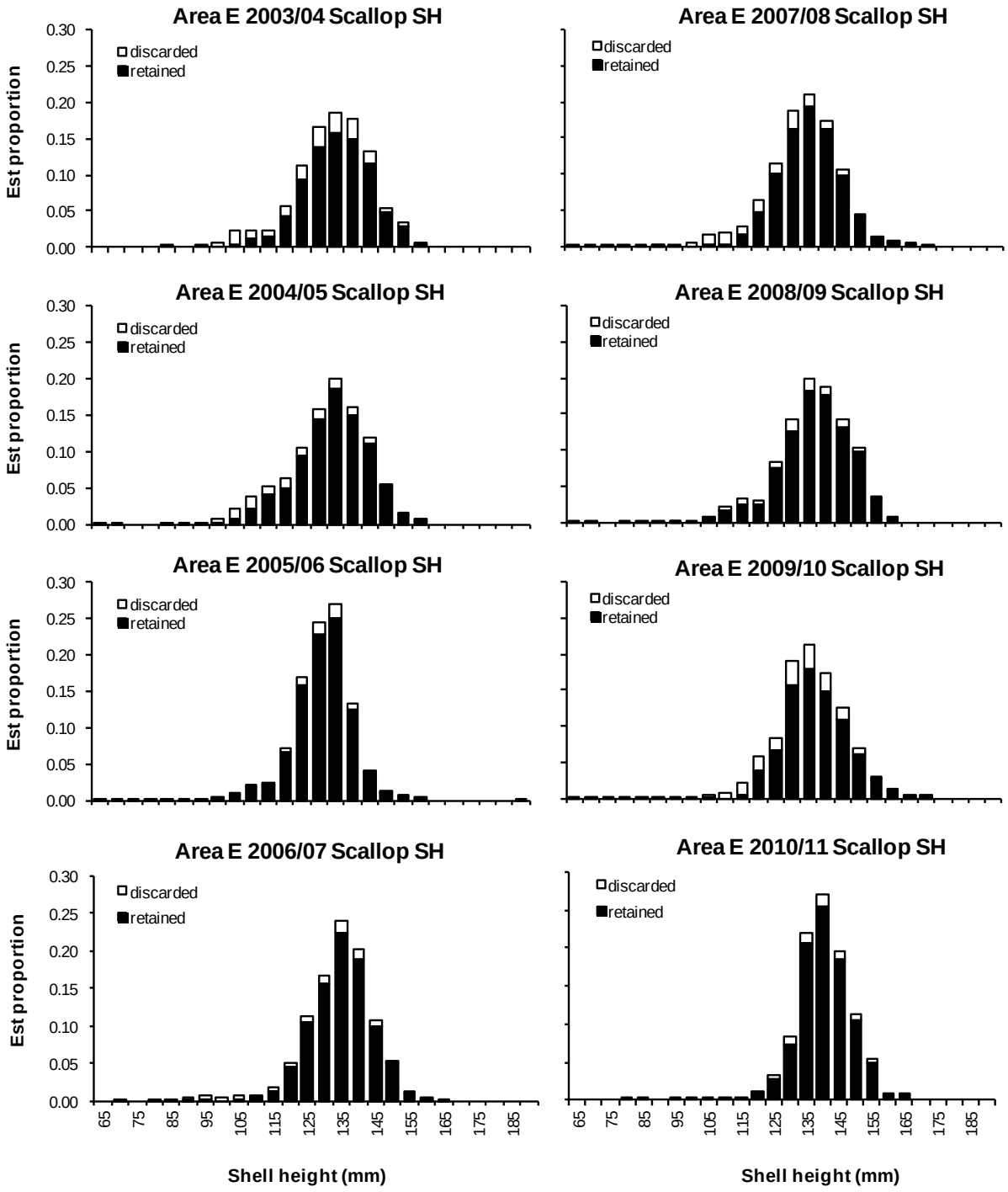

Figure 7.–Estimated scallop shell height distributions from resampling observer measurements collected during the 2003/04–2010/11 Prince William Sound (Area E) fishing seasons.

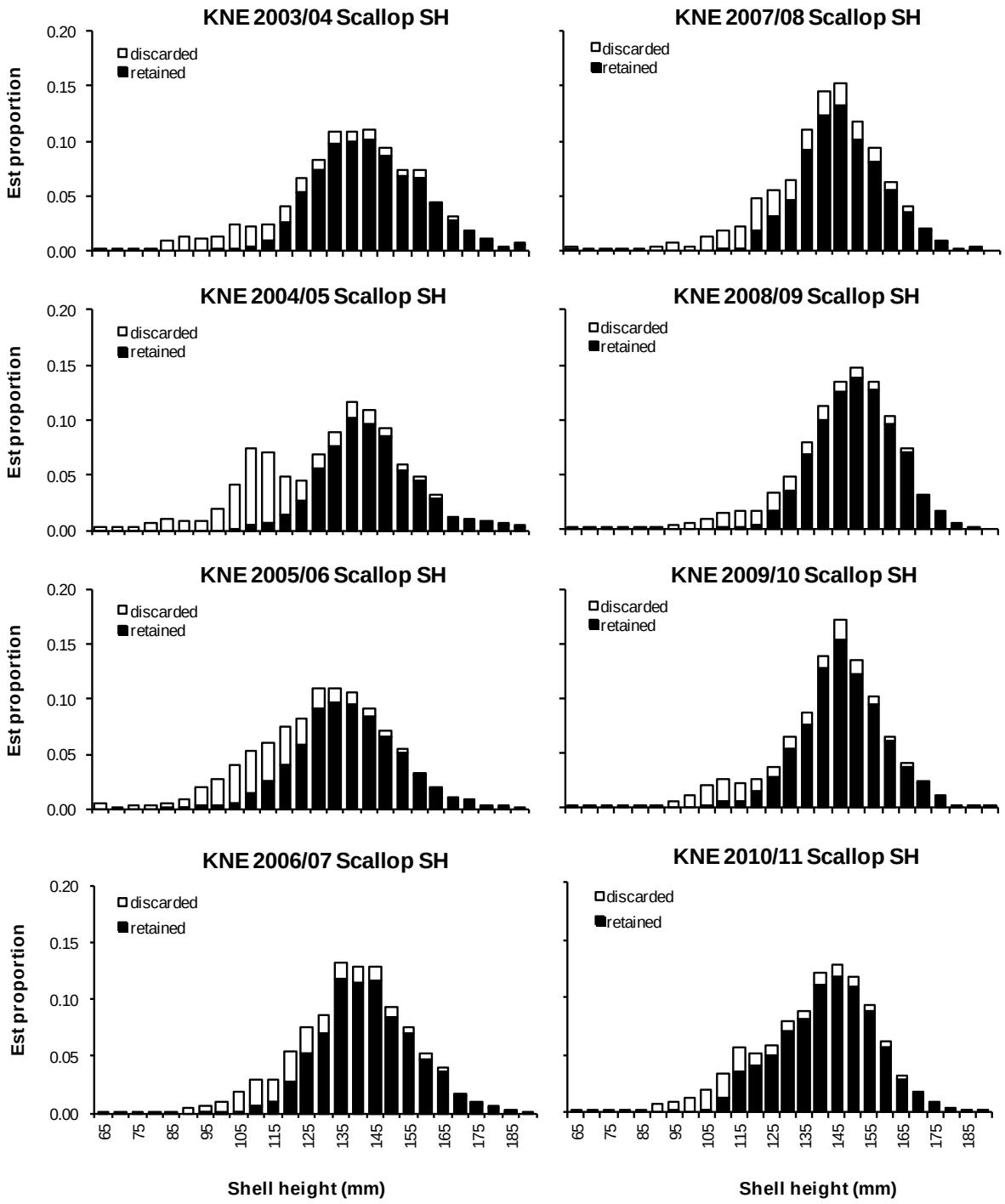

Figure 8.–Estimated scallop shell height distributions from resampling observer measurements collected during 2003/04–2010/11 Kodiak Northeast District (KNE) fishing seasons.

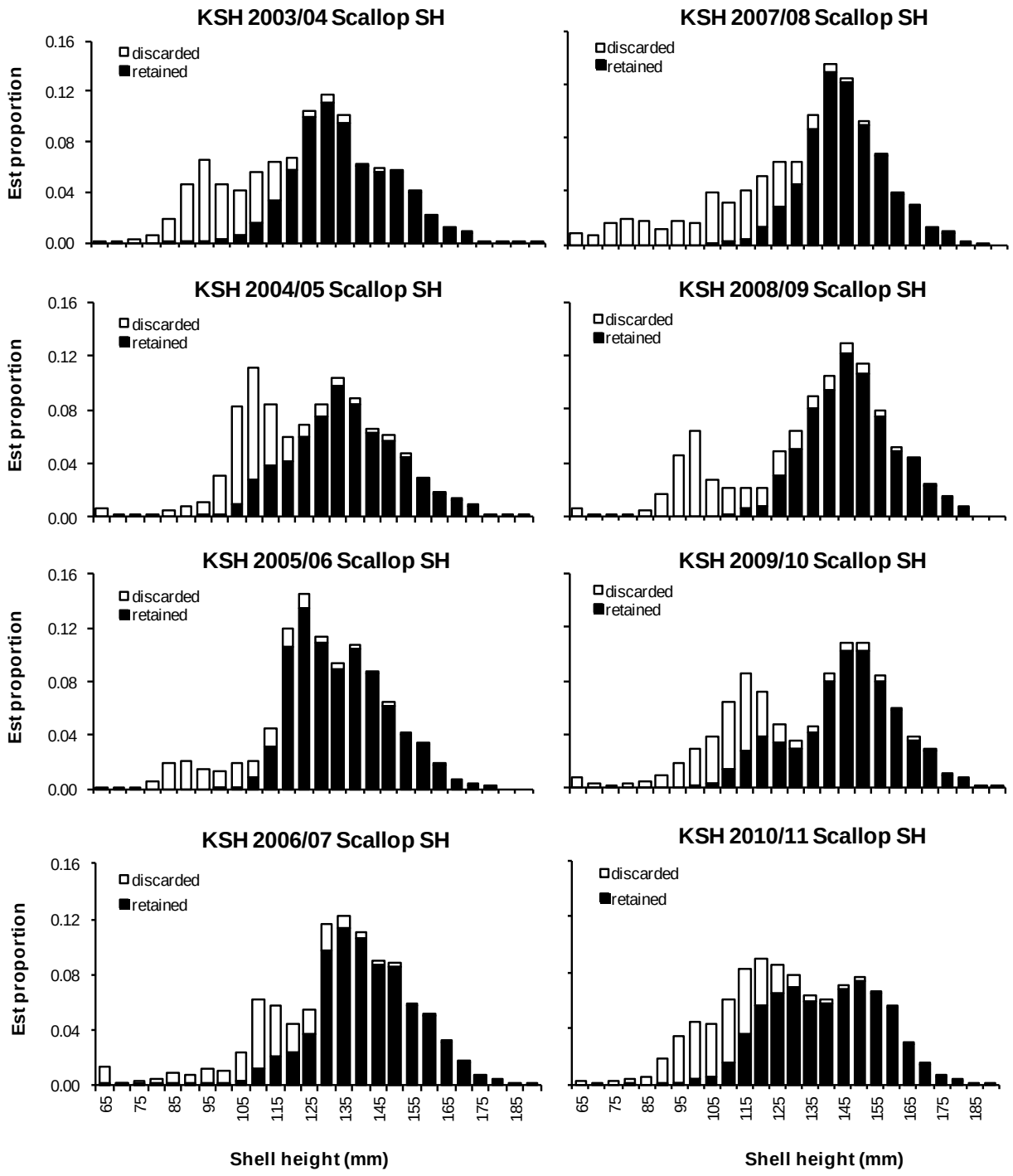

Figure 9.–Estimated scallop shell height distributions from resampling observer measurements collected during 2003/04–2010/11 Kodiak Shelikof District (KSH) fishing seasons.

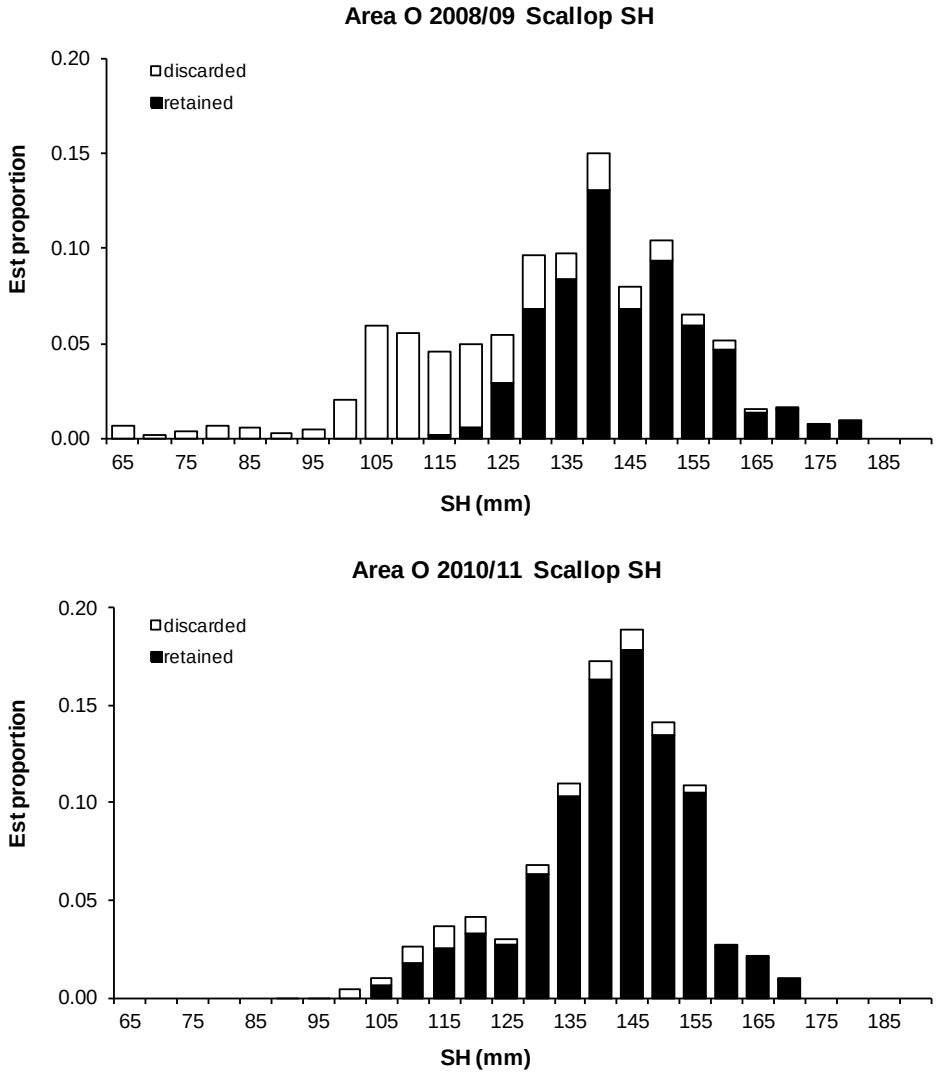

Figure 10.–Estimated scallop shell height distributions from resampling observer measurements collected during the 2008/09 (upper plot) and 2010/11 (lower plot) Dutch Harbor Area fisheries. Sample sizes from the 2009/10 fishery were not sufficient to construct a plot.

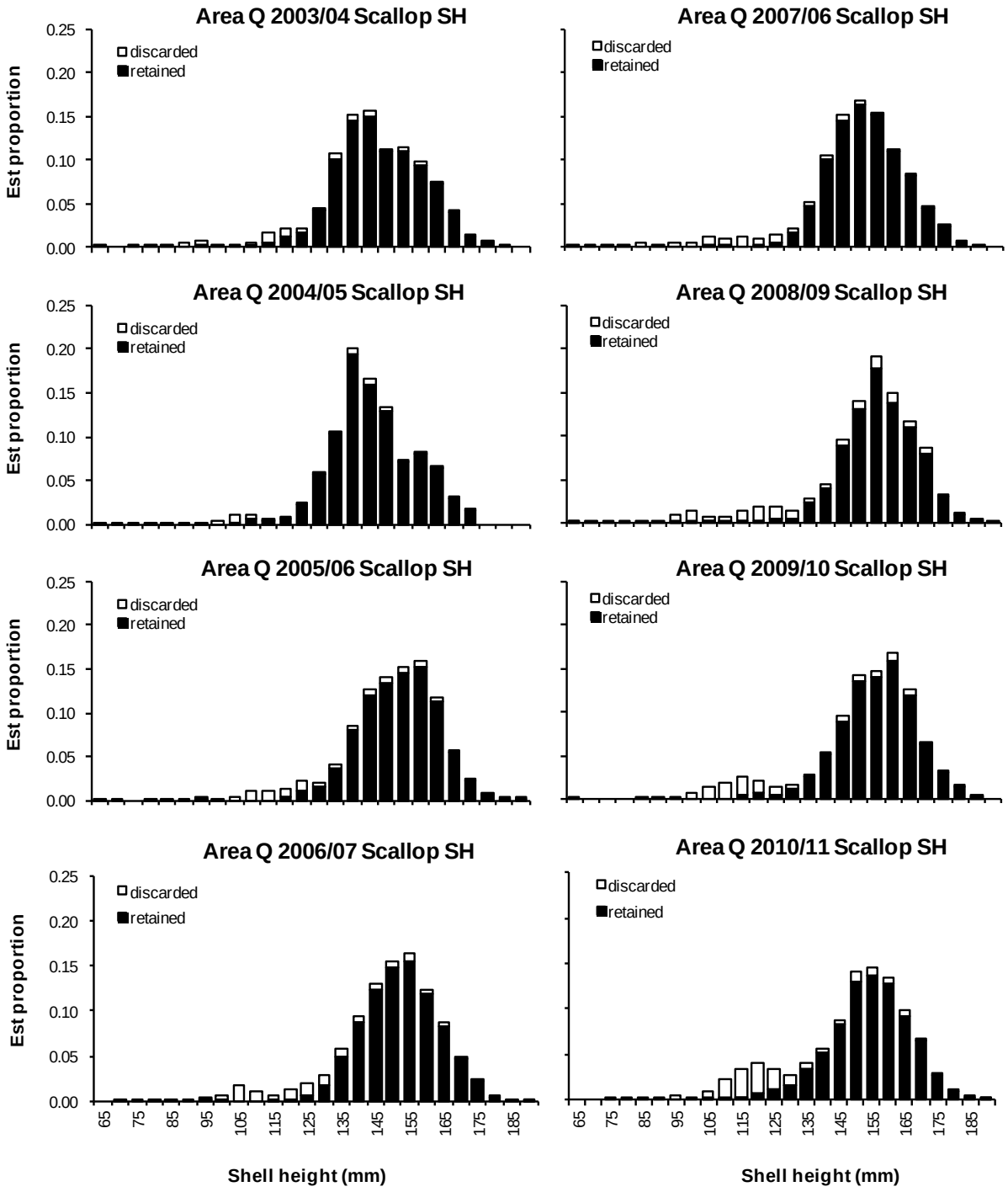

Figure 11.–Estimated scallop shell height distributions from resampling observer measurements collected during the 2003/04–2010/11 Bering Sea Area fishing seasons.

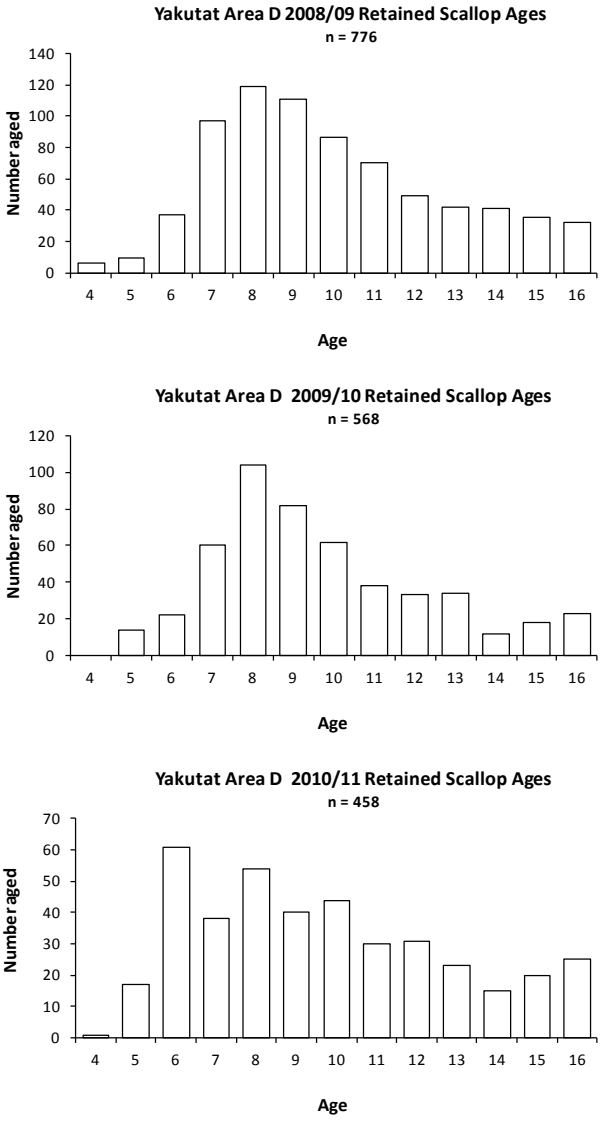

Figure 12.–Estimated retained scallop age distributions from the 2008/09–2010/11 Yakutat Area D fishing seasons.

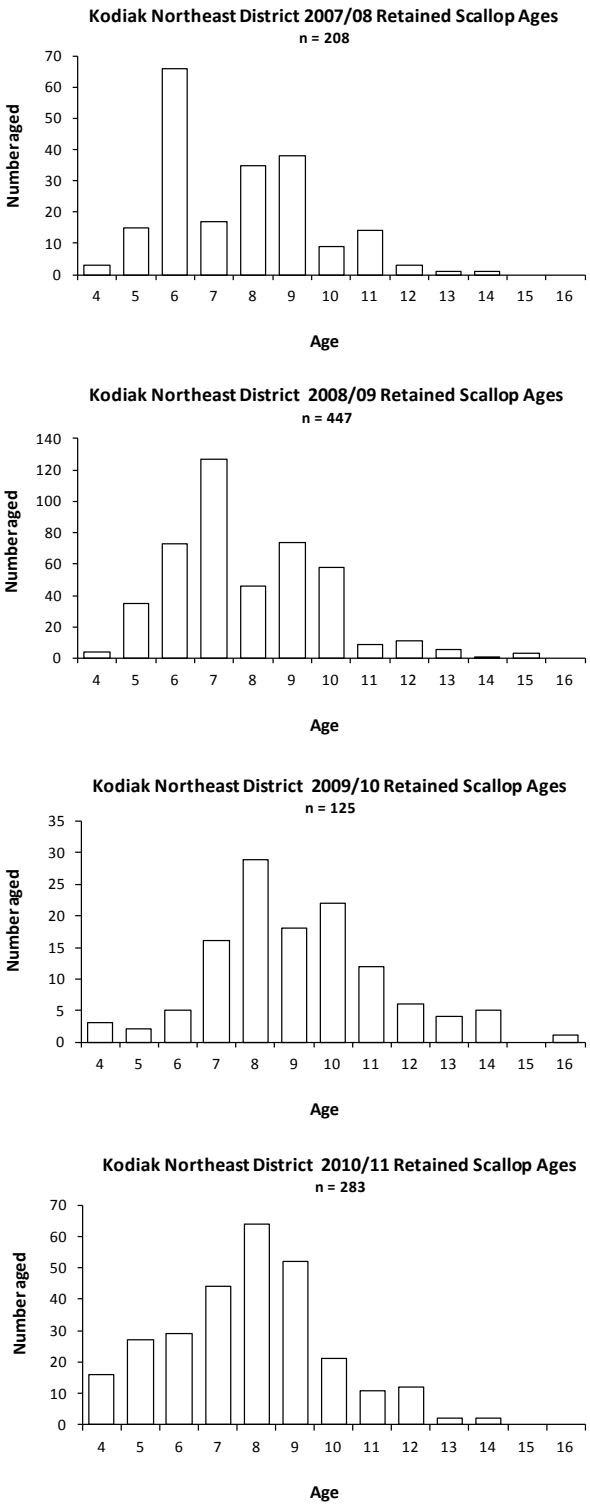

Figure 13.–Estimated retained scallop age distributions from the 2007/08–2010/11 Kodiak Northeast District fishing seasons.

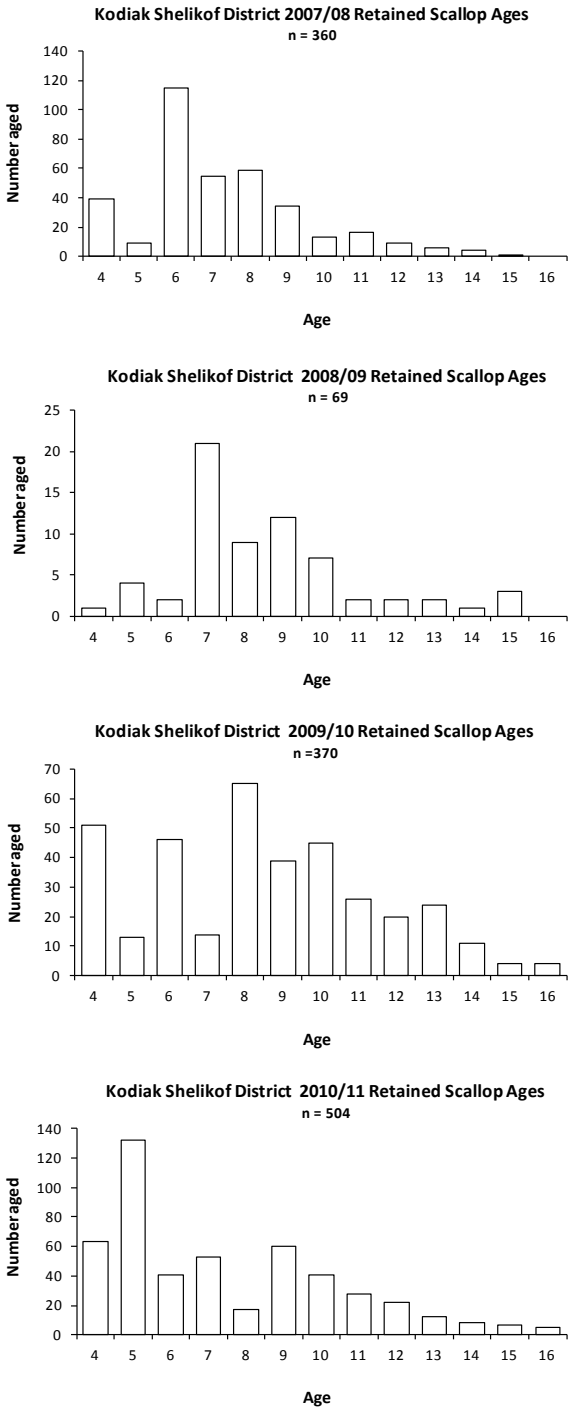

Figure 14.–Estimated retained scallop age distributions from the 2007/08–2010/11 Kodiak Shelikof District fishing seasons.

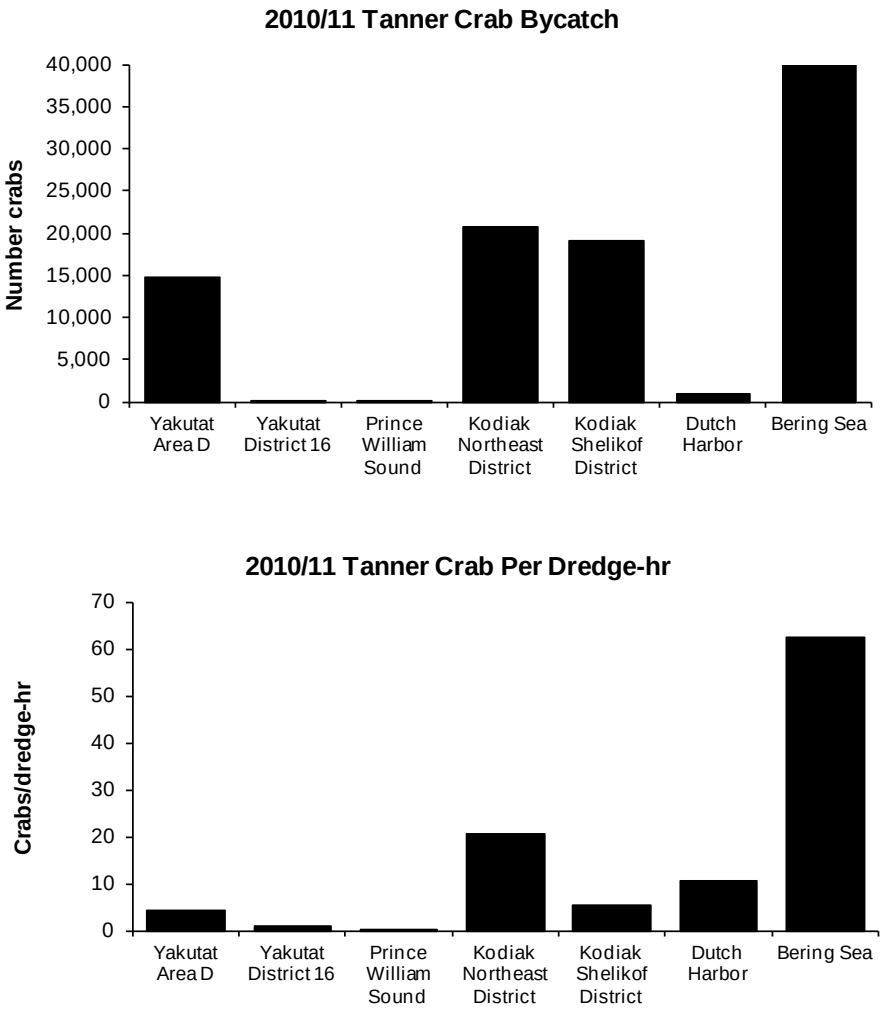

Figure 15.–Estimated Tanner crab bycatch (upper plot) and bycatch rate (lower plot) by management area during the 2010/11 scallop fishing season.

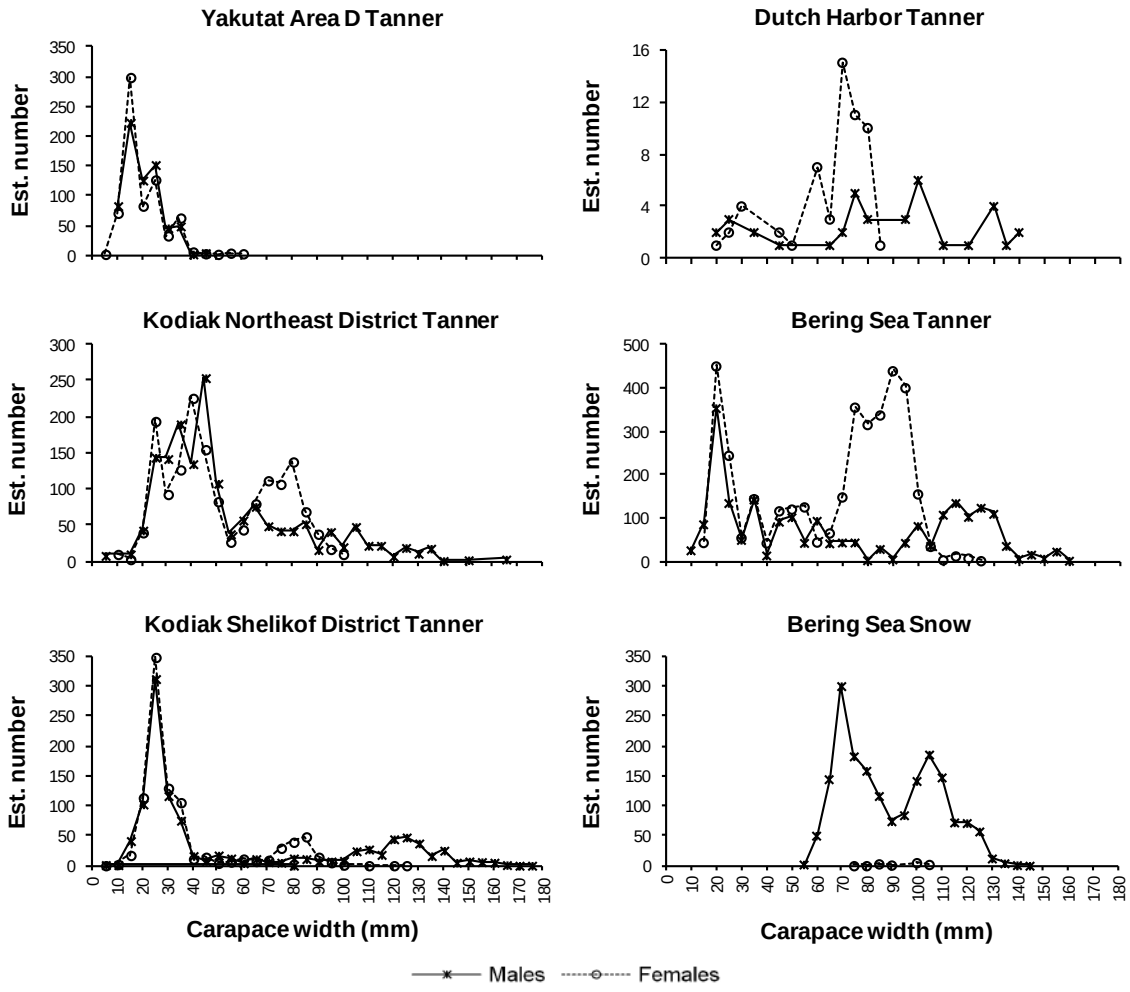

Figure 16.–Tanner and snow crab carapace width distributions from catch sampling during the 2010/11 statewide weathervane scallop fishery.

APPENDIX A. HISTORICAL ALASKA SCALLOP OBSERVER PROGRAM SUMMARY STATISTICS

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

Season	Start of fishing	End of fishing	Number vessels	Fishing days[a]	Observed days[b]	Number hauls	Number hauls sampled
1993	7/1/1993	7/11/1993	8	77	75	1,160	466
1994	1/10/1994	1/20/1994	11	88	83	1,295	496
1994	7/1/1994	7/12/1994	4	60	60	801	375
1995	1/10/1995	2/14/1995	10	166	134	2,597	496
1996	1/10/1996	1/25/1996	3	47	43	706	178
1996	8/1/1996	9/4/1996	3	82	80	1,396	471
1997	1/10/1997	2/19/1997	4	144	129	1,958	589
1998/99	7/1/1998	10/5/1998	8	160	148	2,193	863
1999/2000	7/1/1999	9/21/1999	3	132	123	1,720	722
2000/01	7/1/2000	2/14/2001	3	170	134	2,111	558
2001/02	7/7/2001	2/15/2002	2	86	81	1,096	327
2002/03	7/2/2002	8/29/2002	2	83	77	1,243	343
2003/04	8/10/2003	2/8/2004	2	105	85	1,716	386
2004/05	9/1/2004	2/15/2005	2	88	74	1,194	335
2005/06	8/5/2005	1/25/2006	2	162	137	2,585	590
2006/07	7/11/2006	10/24/2006	2	92	84	1,533	398
2007/08	8/14/2007	2/13/2008	2	92	84	1,416	386
2008/09	7/11/2008	8/29/2008	3	115	94	1,825	420
2009/10	7/1/2009	9/25/2009	2	83	71	2,580	412
2010/11	8/9/2010	11/8/2010	3	119	108	2,020	436

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

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

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]	Number hauls	Number hauls sampled
1993	7/17/1993	7/25/1993	1	9	9	193	28
1994	1/20/1994	1/20/1994	7	7	7	160	48
1994	7/13/1994	7/16/1994	1	4	3	81	22
1995	1/10/1995	2/13/1995	6	42	35	599	135
1996	1/15/1996	1/20/1996	1	6	5	105	9
1996	8/4/1996	11/28/1996	2	23	21	449	105
1997	1/21/1997	2/21/1997	3	27	14	299	83
1998/99	7/1/1998	10/6/1998	6	33	24	359	131
1999/2000	7/28/1999	9/26/1999	2	23	16	291	78
2000/01	9/17/2000	2/14/2001	4	29	23	244	83
2001/02	7/10/2001	10/8/2001	2	21	17	193	58
2002/03	7/1/2002	7/9/2002	2	6	4	55	12
2003/04	8/30/2003	2/8/2004	2	3	1	12	3
2004/05	9/3/2004	2/15/2005	2	18	18	111	40
2005/06	10/11/2005	1/30/2006	2	16	15	197	55
2006/07	8/19/2006	9/13/2006	2	12	11	160	48
2007/08	8/15/2007	11/27/2007	2	4	2	8	3
2008/09	7/18/2008	8/29/2008	2	22	17	237	81
2009/10	7/4/2009	9/2/2009	2	17	16	299	48
2010/11	9/10/2010	9/12/2010	1	3	3	54	13

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

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

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]	Number hauls	Number hauls sampled
1993	7/15/1993	7/19/1993	7	29	27	379	182
1995	1/10/1995	1/26/1995	2	21	21	244	90
1997	1/12/1997	1/19/1997	1	8	7	99	42
1998/99	7/1/1998	7/4/1998	2	8	8	104	29
1999/2000	7/1/1999	7/4/1999	2	8	6	65	22
2000/01	7/6/2000	8/2/2000	3	30	28	201	81
2001/02	1/22/2002	2/11/2002	1	21	16	138	37
2002/03	7/28/2002	2/15/2003	2	17	16	150	57
2003/04	12/11/2003	1/24/2004	1	15	13	114	26
2004/05	8/21/2004	11/2/2004	2	28	26	336	94
2005/06	7/1/2005	8/22/2005	3	56	51	549	212
2006/07	7/2/2006	7/11/2006	2	15	15	173	71
2007/08	7/7/2007	8/11/2007	2	20	20	240	80
2008/09	7/5/2008	7/15/2008	1	11	9	160	54
2009/10	9/19/2009	10/6/2009	2	17	10	279	40
2010/11	8/18/2010	8/22/2010	1	5	5	101	24

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

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

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]	Number hauls	Number hauls sampled
1993/94	7/11/1993	11/24/1993	10	272	237	4,099	1,393
1994/95	8/20/1994	11/11/1994	11	80	67	986	335
1996/97	10/31/1996	12/12/1996	3	29	19	319	84
1997/98	8/10/1997	12/8/1997	3	94	86	1,417	432
1998/99	7/6/1998	10/2/1998	4	89	80	1,331	457
1999/2000	7/1/1999	9/9/1999	3	40	38	673	203
2000/01	8/19/2000	9/26/2000	4	40	37	556	174
2001/02	8/8/2001	1/18/2002	3	45	39	591	188
2002/03	8/20/2002	2/10/2003	2	46	42	725	189
2003/04	7/18/2003	11/15/2003	2	42	40	684	197
2004/05	7/5/2004	8/9/2004	2	42	42	662	190
2005/06	7/7/2005	1/17/2006	3	63	53	881	218
2006/07	9/7/2006	12/2/2006	2	42	40	688	178
2007/08	9/29/2007	2/3/2008	2	47	37	671	131
2008/09	7/8/2008	10/12/2008	3	59	53	797	236
2009/10	9/17/2009	11/28/2009	1	47	33	625	116
2010/11	8/7/2010	8/29/2010	3	40	34	618	144

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

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

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]	Number hauls	Number hauls sampled
1993/94	7/1/1993	8/5/1993	5	82	80	1,693	497
1994/95	7/1/1994	10/25/1994	11	265	257	5,259	1,599
1996/97	8/28/1996	10/18/1996	4	104	99	1,939	621
1997/98	7/1/1997	8/10/1997	4	153	150	3,047	934
1998/99	7/9/1998	8/21/1998	8	121	112	2,111	663
1999/2000	7/3/1999	9/6/1999	6	117	111	2,012	686
2000/01	7/3/2000	10/2/2000	5	90	81	1,424	449
2001/02	7/3/2001	12/8/2001	4	103	97	1,830	522
2002/03	7/3/2002	2/9/2003	3	115	110	2,071	493
2003/04	8/11/2003	1/13/2004	2	95	88	1,722	452
2004/05	7/27/2004	12/9/2004	2	100	96	1,793	459
2005/06	7/1/2005	12/11/2005	2	70	65	1,218	296
2006/07	7/5/2006	9/7/2006	3	73	72	1,283	357
2007/08	7/2/2007	11/29/2007	3	105	101	1,736	534
2008/09	7/1/2008	7/12/2008	2	13	11	179	44
2009/10	7/1/2009	11/9/2009	3	92	74	1,921	408
2010/11	7/1/2010	8/6/2010	4	114	111	2,218	509

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

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

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]	Number hauls	Number hauls sampled
1993	11/5/1993	12/11/1993	3	27	26	531	159
1994	1/26/1994	2/11/1994	6	48	44	745	245
1994	7/18/1994	10/31/1994	2	10	10	190	58
1996/97	10/19/1996	12/1/1996	3	37	32	625	186
1997/98	11/26/1997	12/9/1997	1	14	14	254	64
1998/99	8/22/1998	9/25/1998	2	5	5	68	25
1999/2000	7/21/1999	9/17/1999	1	4	1	29	7

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

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

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, 2002/03, 2009/10, and 2010/11 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]	Number hauls	Number hauls sampled
1993/94	7/25/1993	10/21/1993	8	75	69	957	374
1994/95	7/7/1994	9/21/1994	7	80	75	1,115	383
1996/97	10/21/1996	10/30/1996	2	13	12	177	52
1997/98	8/13/1997	2/10/1998	4	68	64	1,050	353
1998/99	8/28/1998	9/19/1998	4	48	46	681	253
1999/2000	8/23/1999	10/6/1999	5	73	65	1,099	379
2000/01	7/11/2000	8/28/2000	3	14	9	188	47
2006/07	10/26/2006	12/8/2006	2	7	5	73	21
2008/09	9/5/2008	9/12/2008	1	8	8	114	30

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

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

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]	Number hauls	Number hauls sampled
1993/94	7/2/1993	9/16/1993	3	38	26	535	84
1994/95	7/23/1994	8/20/1994	3	6	6	57	1
1995/96	7/11/1995	9/9/1995	1	38	35	747	172
1997/98	8/18/1997	8/25/1997	1	8	8	110	27
1998/99	9/6/1998	11/12/1998	4	37	34	464	189
1999/2000	9/17/1999	9/30/1999	1	13	10	166	54
2002/03	10/10/2002	10/17/2002	1	8	7	114	32
2008/09	9/15/2008	9/27/2008	1	13	12	179	53
2009/10	10/24/2009	10/31/2009	1	7	3	77	14
2010/11	9/30/2010	10/3/2010	1	4	3	53	13

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

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

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]	Number hauls	Number hauls sampled
1993/94	7/28/1993	9/5/1993	9	172	166	3,326	1,029
1994/95	7/1/1994	9/7/1994	8	312	304	6,508	1,954
1996/97	8/1/1996	10/16/1996	1	63	54	951	235
1997/98	7/2/1997	8/11/1997	2	66	64	1,280	307
1998/99	7/16/1998	9/4/1998	4	73	64	1,178	321
1999/2000	7/1/1999	8/30/1999	2	94	76	1,514	488
2000/01	7/1/2000	8/23/2000	3	91	87	1,564	506
2001/02	7/1/2001	10/30/2001	3	84	82	1,401	435
2002/03	9/8/2002	1/2/2003	2	61	56	1,010	247
2003/04	7/2/2003	2/15/2004	2	28	26	517	151
2004/05	7/3/2004	7/9/2004	1	7	7	145	38
2005/06	12/18/2005	1/9/2006	1	21	18	303	84
2006/07	10/31/2006	12/13/2006	1	36	33	583	150
2007/08	9/10/2007	12/17/2007	2	33	31	540	142
2008/09	8/18/2008	9/15/2008	1	29	28	642	123
2009/10	11/3/2009	1/18/2010	1	41	22	726	70
2010/11	9/15/2010	10/19/2010	2	32	27	597	115

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

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

APPENDIX B. HISTORICAL ALASKA SCALLOP FISHERY SUMMARY STATISTICS

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

Season	GHL	Retained catch (meat lbs)	Retained catch (round lbs)	Dredge hours	Retained CPUE[a]	Estimated scallop discards		
						round lbs	% 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
2009/10	160,000	158,056	2,193,282	3,919	40	622,055	11.7	10.4
2010/11	160,000	156,984	2,053,781	3,495	45	578,494	17.5	4.4

[a] CPUE for retained catch in lbs meat/dredge hr.

[b] Rounded percentage of retained round lbs plus discarded round lbs.

[c] Included in yearly GHL.

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

Season	GHL	Retained catch (meat lbs)	Retained catch (round lbs)	Dredge hours	Retained CPUE[a]	Estimated scallop discards		
						round lbs	% 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
2009/10	25,000	11,637	185,089	437	27	104,634	15.2	20.9
2010/11	25,000	3,062	31,845	83	37	28,033	29.3	17.5

[a] CPUE for retained catch in lbs meat/dredge hr.

[b] Rounded percentage of retained round lbs plus discarded round lbs.

[c] Included in yearly GHL.

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

Season	GHL	Retained catch (meat lbs)	Retained catch (round lbs)	Dredge hours	Retained CPUE[a]	Estimated scallop discards		
						round lbs	% 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
2009/10	20,000	18,711	279,800	419	45	59,010	0.2	17.2
2010/11	8,400	8,452	130,075	161	52	9,378	1.2	5.5

[a] CPUE for retained catch in lbs meat/dredge hr.

[b] Rounded percentage of retained round lbs plus discarded round lbs.

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

Season	GHL	Retained catch (meat lbs)	Retained catch (round lbs)	Dredge hours	Retained CPUE[a]	Estimated scallop discards		
						round lbs	% 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
2009/10	75,000	73,320	786,978	1,210	61	121,021	5.5	7.8
2010/11	65,000	64,465	646,674	1,015	64	85,890	5.3	6.5

[a] CPUE for retained catch in lbs meat/dredge hr.

[b] Rounded percentage of retained round lbs plus discarded round 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	Retained catch (meat lbs)	Retained catch (round lbs)	Dredge hours	Retained CPUE[a]	Estimated scallop discards		
						round lbs	% 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
2009/10	170,000	169,877	1,579,723	3,447	49	349,952	13.9	4.2
2010/11	170,000	171,065	1,815,512	3,507	49	423,118	16.2	2.7

[a] CPUE for retained catch in lbs meat/dredge hr.

[b] Rounded percentage of retained round lbs plus discarded round 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	Retained catch (meat lbs)	Retained catch (round lbs)	Dredge hours	Retained CPUE[a]	Estimated scallop discards		
						round lbs	% 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 for retained catch in lbs meat/dredge hr.

[b] Rounded percentage of retained round lbs plus discarded round 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, 2002/03, 2009/10, and 2010/11 seasons. No effort occurred during the 2003/04–2005/06, and 2007/08 seasons.

Season	GHL	Retained catch (meat lbs)	Retained catch (round lbs)	Dredge hours	Retained CPUE[a]	Estimated scallop discards		
						round lbs	% 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 for retained catch in lbs meat/dredge hr.

[b] Rounded percentage of retained round lbs plus discarded round 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	Retained catch (meat lbs)	Retained catch (round lbs)	Dredge hours	Retained CPUE[a]	Estimated scallop discards		
						round lbs	% 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
2009/10	10,000	8,445	55,361	104	81	2,082	0.7	2.9
2010/11	10,000	5,642	43,835	83	68	3,237	2.4	4.5

[a] CPUE for retained catch in lbs meat/dredge hr.

[b] Rounded percentage of retained round lbs plus discarded round 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	Retained catch (meat lbs)	Retained catch (round lbs)	Dredge hours	Retained CPUE[a]	Estimated scallop discards		
						round lbs	% 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
2009/10	50,000	48,855	568,454	1,270	38	57,984	4.7	4.5
2010/11	50,000	50,099	494,725	972	52	73,178	7.4	5.5

[a] CPUE for retained catch in lbs meat/dredge hr.

[b] Rounded percentage of retained round lbs plus discarded round 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.

Season	Estimated bycatch (number animals)				Pounds meat per Tanner[a]
	Tanner	King	Dungeness	Halibut	
1993	1,700	40	351	99	83
1994	1,767	0	10	129	90
1994	603	0	169	522	157
1995	3,751	0	2,379	1,361	65
1996	2,591	0	2,320	237	21
1996	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
2009/10	11,609	0	0	530	14
2010/11	14,707	0	24	135	11

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

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)				Pounds meat per Tanner[a]
	Tanner	King	Dungeness	Halibut	
1993	NA	NA	NA	NA	NA
1994	10	0	4	48	1,330
1994	0	0	11	236	NA
1995	469	0	93	719	71
1996	39	0	140	108	207
1996	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
2009/10	1,009	0	23	123	12
2010/11	92	0	0	17	33

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

Appendix C3.–Historical bycatch statistics from the Prince William Sound Area scallop fishery.

Season	Tanner crab bycatch limit	Estimated bycatch (number animals)				Pounds 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
2009/10	1,643	316	0	0	34	59
2010/11	1,643	28	0	0	0	302

[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.

	Crab bycatch limits		Estimated bycatch (number animals)				Pounds 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
2009/10	217,000	7	38,411	0	0	223	2
2010/11	169,925	13	20,808	0	0	749	3

[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.

	Crab bycatch limits		Estimated bycatch (number animals)				Pounds 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
2009/10	25,000	96	18,589	0	88	252	10
2010/11	26,400	7	19,126	0	805	450	9

[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)				Pounds 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.

	Crab bycatch limits		Estimated bycatch (number animals)				Pounds 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.

	Crab bycatch limits		Estimated bycatch (number animals)				Pounds 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
2009/10	10,000	10	26	0	0	0	325
2010/11	10,000	10	901	0	0	50	6

[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.

	Crab bycatch limits			Estimated bycatch (number animals)				Pounds 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	24	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
2009/10	260,000	500	300,000	27,430	107	36,786	0	2
2010/11	130,000	500	300,000	60,537	26	18,823	10	<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.–Definitions of terms and acronyms used in this report.

bycatch	Non-target species and other items incidentally caught in dredges while fishing for scallops.
clapper	Empty scallop shell connected at the hinge; left (top) and right (bottom) valves are separated by crew during shucking.
CPUE	Catch per unit effort; fishery performance statistic expressed in retained pounds meat per dredge hour (lbs meat/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	Scallop fishing gear consisting of a rigid metal frame with an attached bag constructed of 4" diameter steel rings–see Figure 2.
dredge-hr	Fishery effort unit; one scallop dredge of a given size towed on bottom for one hour.
GHL	Guideline harvest level; target scallop catch set prior to fishing for a given area that may be modified by fishery managers during season.
haul	Time period during which the dredge or dredges are set over the vessel's side, towed along the bottom, then retrieved and landed aboard the vessel.
man-made debris	Plastics, fishing gear, metals, etc.
natural debris	Kelp, wood, rocks, etc.
observer	Onboard scallop fishery observer.
retained scallop catch	Whole scallops caught in dredge and removed from deck by vessel crew for shucking.
round weight	Total weight of scallop including shell, meat, and all body parts. GHLs are specified in lbs scallop meats, while estimates of scallop discards are estimated in round weight.
SH	Scallop shell height measured in mm illustrated in Figure 3.
shucking	Process of removing adductor muscle (scallop meat) from shell and viscera.
vessel-day	Midnight to midnight 24 hour time period for a specific vessel.