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Summary of Observer Data Collected During the 2011/12 Alaska Weathervane Scallop Fishery

by

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and

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July 2014

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

Symbols and Abbreviations

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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)

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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TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES (Continued)

LIST OF APPENDICES

ABSTRACT

Onboard fishery observers have been required on all commercial vessels fishing for weathervane scallops *Patinopecten caurinus* in Alaska waters, excluding Cook Inlet Area, 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 2011/12 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) managed the fishery passively 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, and observers have been required on all vessels fishing for weathervane scallops in all Alaska waters outside Cook Inlet Area[1] since then.

The observer program is designed to collect biological information on scallops and to monitor incidental catch (bycatch) of other commercially important species such as crabs. Observer-collected data aid ADF&G fishery managers in setting preseason guideline harvest levels (GHLs) and are used inseason to monitor fishery performance and bycatch. Detailed information on scallop fishery management including regulations, registration areas, seasons, the federal license limitation program, 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 trained biologists employed by independent companies that provide observers for commercial fisheries off Alaska and the west coast of the United States. Alaska scallop vessel operators pay for observers by contract through these companies. ADF&G coordinates and monitors all scallop observer activities including training, deployments, briefings, debriefings, sampling procedures, data management, and observer certification. All data collected by scallop observers are edited and entered by ADF&G staff into a database maintained at the Kodiak ADF&G office.

This report summarizes data collected by scallop fishery observers during the 2011/12 Alaska statewide scallop fishing season for all areas excluding Cook Inlet Area. Data on the scallop catch and on other species incidentally captured by scallop dredges are presented, as are summaries of logbook data recorded by scallop vessel operators. Tables of historical fishery and

[1] Vessels fishing scallops in Cook Inlet Area are limited to a single dredge with a maximum width of 6 ft and are frequently requested to carry an ADF&G staff observer onboard during fishing. Vessels fishing in all other Alaska waters may deploy two dredges with maximum width 15 ft.

observer program data for each scallop fishing 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 catch per unit effort (CPUE); and Appendix C tables provide estimates of crab and halibut bycatch. Appendix D, located at the end of the report, is a reference table containing terms and definitions that describe scallop fishing operations and scallop fishery data.

METHODS

Scallop fishery observers were trained prior to the 2011/12 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 2011). Observers were deployed on all 2011/12 scallop fishing trips in Alaska except those in Cook Inlet Area (Figure 1).

Alaska scallop vessels fishing outside Cook Inlet Area utilize either one or two New Bedford style dredges (Figure 2) with a maximum width of 15 ft per dredge. During fishing operations, the dredge or dredges are deployed over the vessel's side, lowered to the bottom, towed along the bottom to capture scallops, hauled back to the vessel, and landed aboard, where the dredge contents are emptied on deck. Together, these steps constitute what is referred to as one haul. Whenever a haul was sampled during the season, observers examined the contents of a single dredge regardless of the number of dredges deployed during the haul.

OBSERVER SAMPLING

Observer-collected data summarized in this report were obtained through scallop catch sampling and haul composition sampling described in detail below. All scallop vessels fishing during the 2011/12 season continued fishing operations 24 hours per day except during travel or inclement weather. To obtain representative samples, observers were instructed to sample throughout the day and to make the decision to sample a haul prior to viewing dredge contents.

Scallop Catch Sampling

Scallop observers' catch sampling goal for the 2011/12 season was a single dredge from 5 separate hauls on each full day of fishing. When sampling a haul, observers monitored vessel crew as they sorted the sampled dredge's contents on deck, ensuring that no items were discarded and counting the number of baskets of retained scallops removed to the shucking area. Any Pacific halibut *Hippoglossus stenolepis* present were measured and released as soon as possible. Observers obtained 3 full baskets of retained scallops from the crew (if catch was sufficient) to calculate average retained scallop basket weight. Scallops in the first weighed basket were also counted to provide estimates of average retained scallop weight.

After the crew removed all retained scallops from deck, observers collected and weighed the remaining discarded scallops. One basket of discarded scallops was subsampled to determine the proportions of intact and broken scallops. Twenty scallops were randomly selected from both the retained scallop catch and the intact discarded scallop catch (if catch was sufficient) for scallop shell height (SH) measurements (Figure 3). Top valves of two of these scallops were 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 individuals of each species were counted. Samples of up to 10 each of 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 were recorded, and carapace length (king and hair crabs) or width (Tanner, Dungeness, snow, and *C.* hybrid crabs) was measured with Vernier calipers and recorded to the nearest millimeter.

Haul Composition Sampling

From one sampled haul each day, observers documented all dredge contents by weight through haul composition sampling. First, lengths of any halibut caught in the sampled dredge 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. Remaining dredge contents were then divided into natural debris (e.g., kelp, wood, or rocks) or manmade 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. Total weight of live scallops was estimated by counting the total number of filled baskets and multiplying by average weight determined from 3 baskets. Weight of halibut was estimated by converting length measurements to weight using tables developed by the International Pacific Halibut Commission.

Observers occasionally subsampled dredge contents to estimate haul composition weight when large volumes of a single species or type of debris were encountered in the sample. This was accomplished by collecting all animals, animal parts, or debris in baskets, weighing 3 baskets with spring scales to obtain average basket weight, then multiplying the count of baskets filled by average basket weight.

SCALLOP SHELL AGING

Scallop age was determined from scallops collected by observers from the retained catch during scallop catch sampling. ADF&G staff at the Kodiak office examined the surface of the top valve of each shell under a microscope using sharply angled illumination (raking light) that produced shadows highlighting circuli, the layers of new shell material along the shell edge. This method allowed trained technicians 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 ADF&G shell aging methods and results from aging of observer-collected scallop shells are contained in a separate report (Spafard and Rosenkranz *In prep*).

VESSEL OPERATOR LOGBOOKS

Scallop vessel operators were required to complete logbooks supplied by ADF&G that provided detailed information on each haul. Observers marked which hauls were sampled in the logbook and performed regular checks to assure that 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 was on and off bottom, average

speed, number and width of dredges fished, gear performance, number of baskets of retained scallops, estimated round weight of retained scallops, and number of king crab caught.

ESTIMATION OF BYCATCH AND DISCARDED SCALLOP CATCH

The number of Pacific halibut and Tanner, snow, and Dungeness crabs incidentally captured during scallop fishing as well as weight of scallops discarded were estimated by summing daily estimates for each vessel in each area or district fished. To calculate daily estimates, rates observed during observer sampling (number or weight per sampled dredge hour) on each vessel each day were expanded to account for total dredge hours fished,

$$\hat{X}_{vd} = \frac{x}{t} \cdot T, \tag{1}$$

where

$\hat{X}_{vd}$ = estimated number of crab or halibut incidentally caught or weight of scallops discarded during the vessel-day,

x = number crab or halibut counted or weight of discarded scallops from dredges sampled during the vessel-day,

t = sampled dredge hours during vessel-day,

T = total dredge hours fished during vessel-day.

When no sampling occurred during a vessel-day, estimates for the specific vessel-day were obtained by multiplying total dredge-hours fished by overall bycatch or discard rates (number or weight per dredge-hour) for the same vessel in the same registration area or district during the season. Estimated weight of discarded intact and broken scallops was calculated using the proportion of intact and broken discarded scallop weight recorded by observers during scallop catch sampling. Confidence intervals of 95% for all bycatch and scallop discard estimates were calculated using percentile-method bootstrapping (Barnhart et al. 1996).

Estimated weight of incidentally caught Tanner and snow crabs were obtained by multiplying numerical estimates described above by average crab weight from each area. Crab sex and carapace width (CW) measurements collected by observers during catch sampling were combined with allometric CW–weight relationships developed by NOAA Fisheries (Foy and Armistead 2013) to determine average weight for each area.

SCALLOP SHELL HEIGHT FREQUENCY DISTRIBUTIONS

Histograms depicting estimated scallop shell height (SH) distribution 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 for each fishing area or district were constructed to facilitate comparison of changes in SH distributions over time.

RESULTS AND DISCUSSION

OBSERVER SAMPLING EFFORT

Four vessels participated in the 2011/12 statewide scallop fishery between July 1, 2011, and November 15, 2011 (Table 1). Four observers deployed during the season sampled on 294 of 338 total vessel-days on which fishing occurred (Table 1). Days without sampling were due to rough sea conditions, observer illness, or limited effort during vessel transit.

Observer sampling effort was proportional to fishing effort, with the largest number of hauls and the most sampling in Yakutat District followed by Kodiak Shelikof District (Table 1). Overall, 1,229 or 20% of hauls recorded in vessel operator logbooks were sampled by observers during the 2011/12 season (Table 1).

FISHERY CATCH AND EFFORT

A total of 445,731 lb of weathervane scallop meat was harvested in Alaska waters outside Cook Inlet during the 2011/12 season (Table 2). The highest levels of catch and effort occurred in Yakutat District with 156,463 lb scallop meat landed and Kodiak Shelikof District with 136,491 lb. The exploratory Kodiak Southwest District fishery was opened with a 25,000 lb GHL (Table 2) while the Alaska Peninsula Area (Figure 1) remained closed to promote stock rebuilding.

Scallop harvest totals were close to 2011/12 GHLs in most management units with the exception of Yakutat District 16 and Dutch Harbor Area (Table 2). Fishing was halted in Yakutat District 16 after 54 hauls due to low catches of marketable-sized scallops. Dutch Harbor Area's 10,000 lb GHL was evenly split between Bering Sea and Pacific Ocean waters; CPUE was high in the Bering Sea portion of the Dutch Harbor Area but extremely low on the Pacific Ocean side, causing the sole vessel participating to stop fishing before the upper end of the GHL was attained (Table 2).

In Kodiak Northeast District, the GHL specification limited harvest from statistical area 525702 to 20,000 lb, but fishing was closed in the statistical area by ADF&G due to conservation concerns when CPUE dropped to 40 lb meat per dredge-hour with about 15,000 lb landed. Another 5,000 lb of the Kodiak Northeast District GHL was slotted for harvest from an exploratory area to the north of normal scallop fishing grounds that saw limited effort and low catch rates. These factors led to harvest of 61,209 lb of the 70,000 lb GHL for the district (Table 2).

Scallop fishery CPUE for the 2011/12 season ranged from a high of 73 lb meat per dredge-hour in the Dutch Harbor Area to 31 lb meat per dredge-hour in Yakutat District 16 (Table 2, Figure 4). Statewide scallop CPUE for the season was 46 lb meat per dredge-hour (Table 2), down slightly from 49 lb meat per dredge-hour observed during the 2010/11 season (Rosenkranz and Spafard 2011).

Scallop fishing depths for 2011/12 ranged from 30 to 100 fathoms (fa) (Table 3), with 85% of hauls made in depths 40–60 fa. Statewide average depth fished during the season was 50 fa, close to averages from recent seasons (Rosenkranz and Spafard 2011; Rosenkranz and Spafard 2013).

Distance towed and area fished during the 2011/12 scallop season (Table 3) corresponded to fishing effort, with the highest values recorded in Yakutat District followed by Kodiak Shelikof District (Tables 2–3). Average tow duration during the season was 50 minutes with average speed 4.8 nmi; assuming use of two 15 ft dredges, this produced an average tow that swept 0.02 nmi^2 or 6.9 hectares.

DISCARDED SCALLOP CATCH

Estimated weight of whole scallops discarded during the 2011/12 season in all areas excluding Cook Inlet was 873,523 lb (Table 4), or 13.6% of the total whole weight catch. This was a reduction from estimates of 18.7% for 2010/11 (Rosenkranz and Spafard 2013) and 18.8% for 2009/10 (Rosenkranz and Spafard 2011). The largest share of discards came from Yakutat District, with an estimate of 583,399 lb, or 19.8% of the total Yakutat District catch. In other areas, discard percentages were lower, amounting to 12.6% of total whole weight landed in Kodiak Northeast District, 8.2% in Kodiak Shelikof District, and 7.6% or less for all other areas (Table 4). In general, scallops were discarded due to small size or because they were broken, making shucking difficult.

SCALLOP SHELL HEIGHT AND AGE DISTRIBUTIONS

Observers measured SH (Figure 3) of over 45,000 retained and discarded scallops captured in sampled dredges during the 2011/12 season (Table 5). Average retained scallop SH was highest in Kodiak Southwest District at 161 mm and lowest in Yakutat District 16 at 124 mm (Table 5). Average discarded scallop SH ranged from 124 mm in Prince William Sound Area to 94 mm in Kodiak Southwest District. We note that measurements of discarded scallops were made on intact discards only, which were typically discarded due to their small size.

ADF&G research on age and growth of weathervane scallops (Spafard and Rosenkranz *In prep*), as well as seminal studies dating back to the 1960s (e.g., Haynes and Hitz 1971), have shown that eastern Gulf of Alaska scallops from populations targeted in Yakutat and Prince William Sound fisheries grow more slowly and attain lower asymptotic sizes than Kodiak scallops. These geographic differences in growth tend to produce SH histograms with different appearances, as illustrated in Figures 5–10. SH histograms for Yakutat District, Yakutat District 16, and Prince William Sound Area (Figures 5–7) displayed unimodal shapes due to growth that slowed rapidly when scallops reached maturity at age 4–5 years with SH in the range 95–110 mm. In contrast, plots for Kodiak's Northeast and Shelikof Districts (Figures 8–9) included a wider range of scallop sizes, and in some years they were bimodal due to faster growth, entry of young scallops to the exploited population, and larger asymptotic sizes. Using data combined across years, average SH of scallops with estimated age 4 years was 105 mm for Yakutat District compared with 127 mm for Kodiak Shelikof District (Spafard and Rosenkranz *In prep*).

SH histograms from the exploratory Kodiak Southwest District fishery (Figure 10) showed that scallops 150–170 mm SH produced most of the 2011/12 harvest, with a wider range of scallop sizes observed in the inaugural 2009/10 fishery. SH distributions from scallops harvested in the Dutch Harbor and Bering Sea Areas (Figures 11–12) were also dominated by large individuals, with average retained SH in the 2011/12 Bering Sea Area fishery 159 mm (Table 5).

Estimated age distributions of retained scallops were plotted in histograms (Figures 13–16) for areas and/or districts where sample sizes (number of shells aged) were sufficient. In Yakutat District (Figure 13), scallops of many different ages were present in retained catches, with

scallops aged 6–12 y comprising the bulk of the 2011/12 harvest. Smaller proportions of older scallops were present in samples from Kodiak Northeast District (Figure 14) and Kodiak Shelikof District (Figure 15), where 5- and 6-year-old scallops were an important component of the 2011/12 retained catch. In the Bering Sea Area (Figure 16), large proportions of older scallops were common in most seasons, and for 2011/12, scallops aged 12-y and older accounted for 87% of retained shells aged.

BYCATCH

Bycatch Estimates

An estimated 100,355 Tanner crab, 166 Dungeness crab, and 1,336 halibut were discarded by vessels fishing for scallops during the 2011/12 season (Table 6, Figure 17). Additionally, 14 red king crab were caught in Kodiak Southwest District, and 135 red king crab and 13,073 snow crab and snow crab × Tanner crab hybrids were incidentally caught in the Bering Sea Area Q scallop fishery.

Tanner crab bycatch for the season was highest in Kodiak Northeast District, Kodiak Shelikof District, and the Bering Sea Area, which each tallied estimates over 22,000 crab (Table 6). Highest Tanner crab bycatch rate was in Kodiak Northeast District at over 30 crab per dredge-hour (Table 6, Figure 17), followed by the Bering Sea Area and Kodiak Southwest District, each with rates 20–25 crab per dredge-hour. No Tanner crab were sampled by observers during the 2011/12 Prince William Sound Area scallop fishery, leading to an estimate of zero Tanner crab incidentally caught in the fishery.

Few Dungeness crab were found in sampled dredges during the 2011/12 season, with estimates of 150 Dungeness crab incidentally captured in the Yakutat District fishery and 17 in Kodiak Shelikof District (Table 6). Estimated halibut bycatch ranged from a high of 551 individuals in the Yakutat District fishery to 16 in Dutch Harbor Area, with no halibut encountered in sampled dredges from the Yakutat District 16 and Prince William Sound fisheries (Table 6).

Size Distributions and Weight of Incidentally Caught Tanner and Snow Crabs

Observer measurements of Tanner and snow crabs incidentally caught in the 2011/12 scallop fishery showed that Yakutat District and Kodiak Shelikof District Tanner crab bycatch was primarily composed of crab less than 40 mm CW (Figure 18) that amounted to an estimated 162 lb in Yakutat District and 3,128 lb in Kodiak Shelikof District (Table 7). Crab size distributions for other areas (Figure 18) included larger-sized Tanner and snow crabs, with males up to 130 mm CW caught in the Kodiak Northeast District, Kodiak Southwest District, and Bering Sea Area fisheries.

The highest crab bycatch by weight was taken in the Bering Sea Area, with estimates of 14,687 lb Tanner crab and 11,630 lb combined snow crab and snow crab × Tanner crab hybrids (Table 7). As has been observed in previous seasons (e.g., Rosenkranz 2010, Rosenkranz and Spafard 2013), very few female snow crab were encountered by observers during the 2011/12 Bering Sea Area scallop fishery (Figure 18).

Tanner Crab and Halibut Mortality

Observers examined 4,848 incidentally caught Tanner crab, snow crab, and snow crab × Tanner crab hybrids during the 2011/12 season and classified 40% 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 also sampled 44 halibut during the season and reported that 16% were dead (Table 8).

HAUL COMPOSITION

Results from haul composition sampling (Tables 9–16) documented scallop dredge contents from each fishing area during the 2011/12 season. Weathervane scallops, empty scallop and other bivalve shells, and natural debris were common dredge contents in all areas (Table 16). Another common bycatch species was sunflower sea stars, particularly in Kodiak Northeast District (12.0%, Table 11) and the Dutch Harbor Area (9.3%, Table 14). Skates, flatfish such as arrowtooth flounder *Atheresthes stomias*, and basket stars *Gorgonocephalus eucnemis*, which composed almost 10% of the weight of sampled hauls in Kodiak Southwest District (Table 13), were also frequently found in sampled dredges. Overall, 78.0% of sampled dredge weight for the season was weathervane scallops, 7.5% shells/debris, and 3.4% skates, which were the top three items (Table 16).

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TABLES AND FIGURES

Table 1.–Observer program statistics by management area from the 2011/12 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	8/4/2011	2/12/2012	3	144	132	2,703	518
Yakutat District 16	9/1/2011	10/11/2011	3	4	3	51	7
Prince William Sound Area	7/31/2011	8/5/2011	1	6	5	94	21
Kodiak Northeast District	7/1/2011	8/29/2011	4	44	35	699	147
Kodiak Shelikof District	7/10/2011	8/23/2011	4	91	82	1,660	376
Kodiak Southwest District	8/8/2011	8/26/2011	1	16	13	311	56
Dutch Harbor Area	9/11/2011	9/14/2011	1	4	3	60	14
Bering Sea Area	9/15/2011	9/27/2011	2	29	21	626	90
Statewide Total	7/1/2011	2/12/2012	4	338	294	6,204	1,229

[a] Cumulative number vessel days with at least one haul.
[b] Cumulative number vessel days with at least one sampled haul.

Table 2.–Fishery statistics by management area from the 2011/12 weathervane scallop fishing season.

Area/District	GHL[a] (lb meat)	Retained catch (lb meat)	Retained catch (est. lb whole)	Dredge hours	CPUE[b]	Discarded scallops (est. lb whole)
Yakutat District	160,000	156,463	2,360,038	4,598	34	583,399
Yakutat District 16	25,000	1,777	20,580	57	31	3,076
Prince William Sound Area	8,400	8,836	138,789	167	53	11,469
Kodiak Northeast District	70,000	61,209	667,008	986	62	95,885
Kodiak Shelikof District	135,000	136,491	1,437,780	2,437	56	128,448
Kodiak Southwest District	25,000	25,110	348,142	455	55	17,842
Dutch Harbor Area	10,000	5,570	45,513	77	73	2,567
Bering Sea Area	50,000	50,275	529,235	984	51	30,837
Statewide Total	483,400	445,731	5,547,086	8,760	46	873,523

[a] Guideline harvest level, catch target set prior to season.
[b] Catch per unit effort in lb meat per dredge-hour.

Table 3.–Depth-range fished, distance towed, and area dredged by management area during the 2011/12 weathervane scallop fishing season.

Area/District	Depths fished (fathom)			Distance towed (nmi)	Area dredged (nmi^2)[a]
	Minimum	Maximum	Average		
Yakutat District	30	61	47	11,066	55
Yakutat District 16	34	50	42	140	< 1
Prince William Sound Area	40	55	44	400	2
Kodiak Northeast District	40	80	55	2,768	11
Kodiak Shelikof District	37	100	55	7,087	27
Kodiak Southwest District	34	53	42	1,108	5
Dutch Harbor Area	32	49	45	191	< 1
Bering Sea Area	51	59	53	2,395	12
Statewide Total	30	100	50	25,155	114

[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 of discarded scallops and percentages of intact and broken scallops discarded by management area during the 2011/12 weathervane scallop fishing season.

Area/District	Weight discarded scallops (lb whole)			Estimated percentage[b]		
	Estimate	Lower bound[a]	Upper bound[a]	Intact	Broken	Total
Yakutat District	583,399	505,016	638,075	11.8	8.0	19.8
Yakutat District 16	3,076	2,258	3,823	6.5	10.7	17.2
Prince William Sound Area	11,469	10,252	12,246	1.4	6.2	7.6
Kodiak Northeast District	95,885	70,155	134,528	6.8	5.7	12.6
Kodiak Shelikof District	128,448	104,437	152,503	6.1	2.1	8.2
Kodiak Southwest District	17,842	12,809	20,861	0.8	4.1	4.9
Dutch Harbor Area	2,567	726	4,059	1.7	3.6	5.3
Bering Sea Area	30,837	28,231	33,840	2.0	3.5	5.5
Statewide Total	873,523	733,884	999,935	8.0	5.6	13.6

[a] Bounds from bootstrapped 95% confidence intervals.

[b] Percentage of total scallop catch (retained whole lb plus discarded whole lb).

Table 5.–Average scallop shell height and sample size by management area from the 2011/12 weathervane scallop fishing season.

	Retained catch		Discarded catch	
Area/District	Average SH (mm)	Sample size	Average SH (mm)	Sample size
Yakutat District	126	10,219	96	10,084
Yakutat District 16	124	140	103	134
Prince William Sound Area	139	420	124	318
Kodiak Northeast District	144	2,739	111	2,019
Kodiak Shelikof District	140	7,380	103	6,634
Kodiak Southwest District	161	1,091	94	760
Dutch Harbor Area	147	240	114	149
Bering Sea Area	159	1,780	112	1,456
Statewide Total	137	24,009	101	21,554

Table 6.–Estimated number of crab and halibut incidentally caught by management area during the 2011/12 weathervane scallop fishing season.

	Tanner crab			Dungeness crab			Halibut		
Area/District	Est. number	Lower 95% CI[a]	Upper 95% CI[a]	Est. number	Lower 95% CI	Upper 95% CI	Est. number	Lower 95% CI	Upper 95% CI
Yakutat District	11,558	7,395	13,993	150	29	278	551	247	854
Yakutat District 16	53	36	63	0			0		
Prince William Sound Area	0			0			0		
Kodiak Northeast District	29,185	18,464	39,445	0			397	212	590
Kodiak Shelikof District	27,684	18,314	39,978	17	3	41	295	128	453
Kodiak Southwest District	8,894	5,998	13,601	0			56	10	90
Dutch Harbor Area	617	115	812	0			16	4	34
Bering Sea Area[b]	22,363	17,835	28,985	0			21	1	75
Statewide Total	100,355	68,160	136,879	166	32	318	1,336	602	2,095

[a] 95% confidence intervals from bootstrapping.

[b] An estimated 13,073 snow crab and snow crab × Tanner crab hybrids (95% confidence interval 12,148–14,861) and 135 red king crab were also incidentally caught in the Bering Sea.

Table 7.–Sample sizes, average size and weight, and estimated total weight of Tanner and snow crabs incidentally caught during the 2011/12 scallop season. Estimated numbers crab caught are in Table 6.

	Number crab measured		Average carapace width (mm)		Average	Estimated total
Area/District	males	females	males	females	weight (g)	weight (lb)[b]
Yakutat District	342	295	24	25	6.4	162
Yakutat District 16	1	3	27	24	4.8	< 1
Prince William Sound Area	0	0				0
Kodiak Northeast District	261	442	55	66	101.4	6,518
Kodiak Shelikof District	728	666	44	39	51.3	3,128
Kodiak Southwest District	176	222	86	68	191.0	3,742
Dutch Harbor Area	15	40	68	70	106.0	144
Bering Sea Area Tanner	369	439	111	83	298.2	14,687
Bering Sea Area Snow[a]	766	15	95	82	403.9	11,630

[a] Includes snow crab and hybrid snow × Tanner crab.

[b] Calculated by average weight × estimated number crab from Table 7.

Table 8.–Release condition of Tanner crabs and halibut sampled by observers during the 2011/12 scallop fishery.

	Tanner crab			Halibut		
Area/District	Number dead	Number alive	Percentage dead	Number dead	Number alive	Percentage dead
Yakutat District	332	335	50	7	37	16
Yakutat District 16	5	0	100	0	0	
Prince William Sound Area	0	0		0	0	
Kodiak Northeast District	331	515	39	13	20	39
Kodiak Shelikof District	631	768	45	9	21	30
Kodiak Southwest District	143	251	36	0	4	0
Dutch Harbor Area	6	38	14	0	1	0
Bering Sea Area[a]	481	1,012	32	1	1	50
Statewide Total	1,929	2,919	40	7	37	16

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

Table 9.–Top 20 dredge contents by weight from haul composition sampling during the 2011/12 Yakutat District weathervane scallop fishery.

Rank	Common name	Scientific name	Percentage weight
1	weathervane scallop	*Patinopecten caurinus*	78.6
2	empty bivalve shells		5.4
3	sunflower sea star	*Pycnopodia helianthoides*	3.9
4	natural debris		2.1
5	big skate	*Raja binoculata*	1.4
6	sand sea star	*Luidia foliolata*	1.2
7	notched brittlestar	*Ophiura sarsi*	1.0
8	longnose skate	*Raja rhina*	1.0
9	basket star	*Gorgonocephalus eucnemis*	0.7
10	sea anemone, unidentified	Order *Actiniaria*	0.6
11	spiny dogfish shark	*Squalus acanthias*	0.5
12	empty gastropod shells		0.4
13	big skate egg case	*Raja binoculata* egg case	0.4
14	arrowtooth flounder	*Atheresthes stomias*	0.3
15	English sole	*Parophrys vetulus*	0.3
16	lingcod	*Ophiodon elongatus*	0.2
17	Aleutian skate	*Bathyraja aleutica*	0.2
18	longnose skate egg case	*Raja rhina* egg case	0.1
19	Greenland halibut	*Reinhardtius hippoglossoides*	0.1
20	*Bathyraja* sp. egg case	*Bathyraja sp.* egg case	0.1

Table 10.–Top 20 dredge contents by weight from haul composition sampling during the 2011/12 Prince William Sound Area weathervane scallop fishery.

Rank	Common name	Scientific name	Percentage weight
1	weathervane scallop	*Patinopecten caurinus*	92.5
2	empty bivalve shells		1.9
3	arrowtooth flounder	*Atheresthes stomias*	1.3
4	natural debris		1.1
5	sunflower sea star	*Pycnopodia helianthoides*	0.9
6	Alaska skate	*Bathyraja parmifera*	0.6
7	Dover sole	*Microstomus pacificus*	0.3
8	sand sea star	*Luidia foliolata*	0.3
9	box crab	*Lopholithodes foraminatus*	0.2
10	flathead sole	*Hippoglossoides elassodon*	0.1
11	*Bathyraja* sp. egg case	*Bathyraja* sp. egg case	0.1
12	bristle worm	*Aphrodita negligens*	0.1
13	*Halipteris* sea whip	*Halipteris* sp.	0.1
14	barnacle, unidentified	Order *Thoracica*	0.1
15	notched brittlestar	*Ophiura sarsi*	0.1
16	snail eggs	gastropod eggs	0.1
17	empty gastropod shells		< 0.1
18	Alaskan hermit crab	*Pagurus ochotensis*	< 0.1
19	common mud star	*Ctenodiscus crispatus*	< 0.1
20	vermilion sea star	*Mediaster aequalis*	< 0.1

Table 11.–Top 20 dredge contents by weight from haul composition sampling during the 2011/12 Kodiak Northeast District weathervane scallop fishery.

Rank	Common name	Scientific name	Percentage weight
1	weathervane scallop	*Patinopecten caurinus*	72.3
2	sunflower sea star	*Pycnopodia helianthoides*	12.0
3	empty bivalve shells		4.5
4	natural debris		2.0
5	sea anemone unidentified	Order *Actiniaria*	1.2
6	longnose skate	*Raja rhina*	0.8
7	Aleutian skate	*Bathyraja aleutica*	0.8
8	arrowtooth flounder	*Atheresthes stomias*	0.7
9	Tanner crab	*Chionoecetes bairdi*	0.7
10	Pacific cod	*Gadus macrocephalus*	0.4
11	flathead sole	*Hippoglossoides elassodon*	0.4
12	Alaska skate	*Bathyraja parmifera*	0.3
13	Pacific halibut	*Hippoglossus stenolepis*	0.3
14	giant octopus	*Octopus dofleini*	0.3
15	rex sole	*Glyptocephalus zachirus*	0.2
16	notched brittlestar	*Ophiura sarsi*	0.2
17	Bering skate	*Bathyraja interrupta*	0.2
18	butter sole	*Isopsetta isolepis*	0.2
19	basket star	*Gorgonocephalus eucnemis*	0.2
20	sea whip, unidentified	Order *Pennatulacea*	0.2

Table 12.–Top 20 dredge contents by weight from haul composition sampling during the 2011/12 Kodiak Shelikof District weathervane scallop fishery.

Rank	Common name	Scientific name	Percentage weight
1	weathervane scallop	*Patinopecten caurinus*	77.0
2	natural debris		5.0
3	empty bivalve shells		5.0
4	sunflower sea star	*Pycnopodia helianthoides*	3.6
5	Aleutian skate	*Bathyraja aleutica*	1.4
6	longnose skate	*Raja rhina*	1.1
7	Alaska skate	*Bathyraja parmifera*	0.9
8	arrowtooth flounder	*Atheresthes stomias*	0.9
9	sea anemone, unidentified	*Order Actiniaria*	0.6
10	Bering skate	*Bathyraja interrupta*	0.5
11	big skate	*Raja binoculata*	0.4
12	hairy triton (or Oregon triton)	*Fusitriton oregonensis*	0.4
13	flathead sole	*Hippoglossoides elassodon*	0.4
14	Alaska plaice	*Pleuronectes quadrituberculatus*	0.4
15	Tanner crab	*Chionoecetes bairdi*	0.2
16	empty gastropod shells		0.2
17	Pacific cod	*Gadus macrocephalus*	0.2
18	Pacific halibut	*Hippoglossus stenolepis*	0.2
19	Pacific lyre crab	*Hyas lyratus*	0.1
20	Aleutian hermit crab	*Pagurus aleuticus*	0.1

Table 13.–Top 20 dredge contents by weight from haul composition sampling during the 2011/12 Kodiak Southwest District weathervane scallop fishery.

Rank	Common name	Scientific name	Percentage weight
1	weathervane scallop	*Patinopecten caurinus*	80.8
2	basket star	*Gorgonocephalus eucnemis*	9.6
3	big skate	*Raja binoculata*	3.0
4	Tanner crab	*Chionoecetes bairdi*	1.2
5	empty bivalve shells		1.0
6	natural debris		0.8
7	flathead sole	*Hippoglossoides elassodon*	0.7
8	Aleutian skate	*Bathyraja aleutica*	0.5
9	arrowtooth flounder	*Atheresthes stomias*	0.4
10	rex sole	*Glyptocephalus zachirus*	0.4
11	green sea urchin	*Strongylocentrotus droebachiensis*	0.4
12	sea whip, unidentified	Order *Pennatulacea*	0.3
13	longnose skate	*Raja rhina*	0.3
14	left-hand whelk	*Pyrulofusus harpa*	0.2
15	empty gastropod shells		0.1
16	lyre whelk	*Neptunea lyrata*	0.1
17	Pacific cod	*Gadus macrocephalus*	< 0.1
18	sponge, unidentified	Phylum *Porifera*	< 0.1
19	sweet sea potato	*Molpadia intermedia*	< 0.1
20	Alaskan hermit crab	*Pagurus ochotensis*	< 0.1

Table 14.–Dredge contents by weight from haul composition sampling during the 2011/12 Dutch Harbor Area weathervane scallop fishery.

Rank	Common name	Scientific name	Percentage weight
1	weathervane scallop	*Patinopecten caurinus*	72.7
2	sunflower sea star	*Pycnopodia helianthoides*	9.3
3	southern rock sole	*Lepidopsetta bilineata*	5.4
4	natural debris		2.4
5	Aleutian skate	*Bathyraja aleutica*	1.3
6	empty bivalve shells		1.1
7	hair crab	*Erimacrus isenbeckii*	0.7
8	green sea urchin	*Strongylocentrotus droebachiensis*	0.6
9	bigmouth sculpin	*Hemitripterus bolini*	0.6
10	longnose skate	*Raja rhina*	0.4
11	Pacific cod	*Gadus macrocephalus*	0.4
12	blackspined sea star	*Lethasterias nanimensis*	0.4
13	Greenland halibut	*Reinhardtius hippoglossoides*	0.4
14	notched brittlestar	*Ophiura sarsi*	0.4
15	arrowtooth flounder	*Atheresthes stomias*	0.3
16	Tanner crab	*Chionoecetes bairdi*	0.2
17	sea anemone, unidentified	Order *Actiniaria*	0.2
18	Pacific lyre crab	*Hyas lyratus*	0.2
19	*Chlamys* scallop	*Chlamys* sp.	0.2
20	mottled sea star	*Evasterias troschelii*	0.2

Table 15.–Top 20 dredge contents by weight from haul composition sampling during the 2011/12 Bering Sea Area weathervane scallop fishery.

Rank	Common name	Scientific name	Percentage weight
1	weathervane scallop	*Patinopecten caurinus*	87.1
2	Tanner crab	*Chionoecetes bairdi*	1.9
3	Snow crab and *C.* hybrids	*Chionoecetes* sp.	1.5
4	flathead sole	*Hippoglossoides elassodon*	1.4
5	empty bivalve shells		1.2
6	arrowtooth flounder	*Atheresthes stomias*	1.1
7	Alaska skate	*Bathyraja parmifera*	0.8
8	sea whip, unidentified	Order *Pennatulacea*	0.7
9	natural debris		0.5
10	tree sponge	*Mycale loveni*	0.5
11	Pacific cod	*Gadus macrocephalus*	0.3
12	butter sole	*Isopsetta isolepis*	0.3
13	smoothstem seawhip	*Virgularia* sp.	0.3
14	empty gastropod shells		0.2
15	red king crab	*Paralithodes camtschaticus*	0.2
16	Aleutian skate	*Bathyraja aleutica*	0.2
17	*Halipteris* sea whip	*Halipteris* sp.	0.2
18	lyre whelk	*Neptunea lyrata*	0.2
19	sea anemone, unidentified	Order *Actiniaria*	0.1
20	hairy triton	*Fusitriton oregonensis*	0.1

Table 16.–Comparison of haul composition sampling results (percent weight) between fishing areas by taxonomic group for the 2011/12 weathervane scallop fishery.

Area/District	weathervane scallops	shells/ debris shab	sea stars	skates[a]	flatfish	basket/ brittle stars	*Chionoecetes* crabs[b]
Yakutat District	78.6	7.5	5.2	3.4	1.1	0.7	0.1
Prince William Sound Area	92.5	3.1	1.2	0.7	1.8	0.0	0.0
Kodiak Northeast District	72.6	6.5	12.6	2.3	2.1	0.2	0.7
Kodiak Shelikof District	77.1	10.1	3.7	4.5	2.0	0.0	0.2
Kodiak Southwest District	80.8	1.8	0.0	3.8	1.5	9.6	1.2
Dutch Harbor Area	72.7	3.5	10.4	1.8	6.3	0.1	0.2
Bering Sea Area	87.1	1.8	0.0	1.0	3.0	0.1	3.4
Statewide Total	78.0	7.5	5.3	3.4	1.7	0.7	0.4

[a] Includes all skate species and skate egg cases.

[b] Includes snow crab, Tanner crab, and snow crab × Tanner crab hybrids.

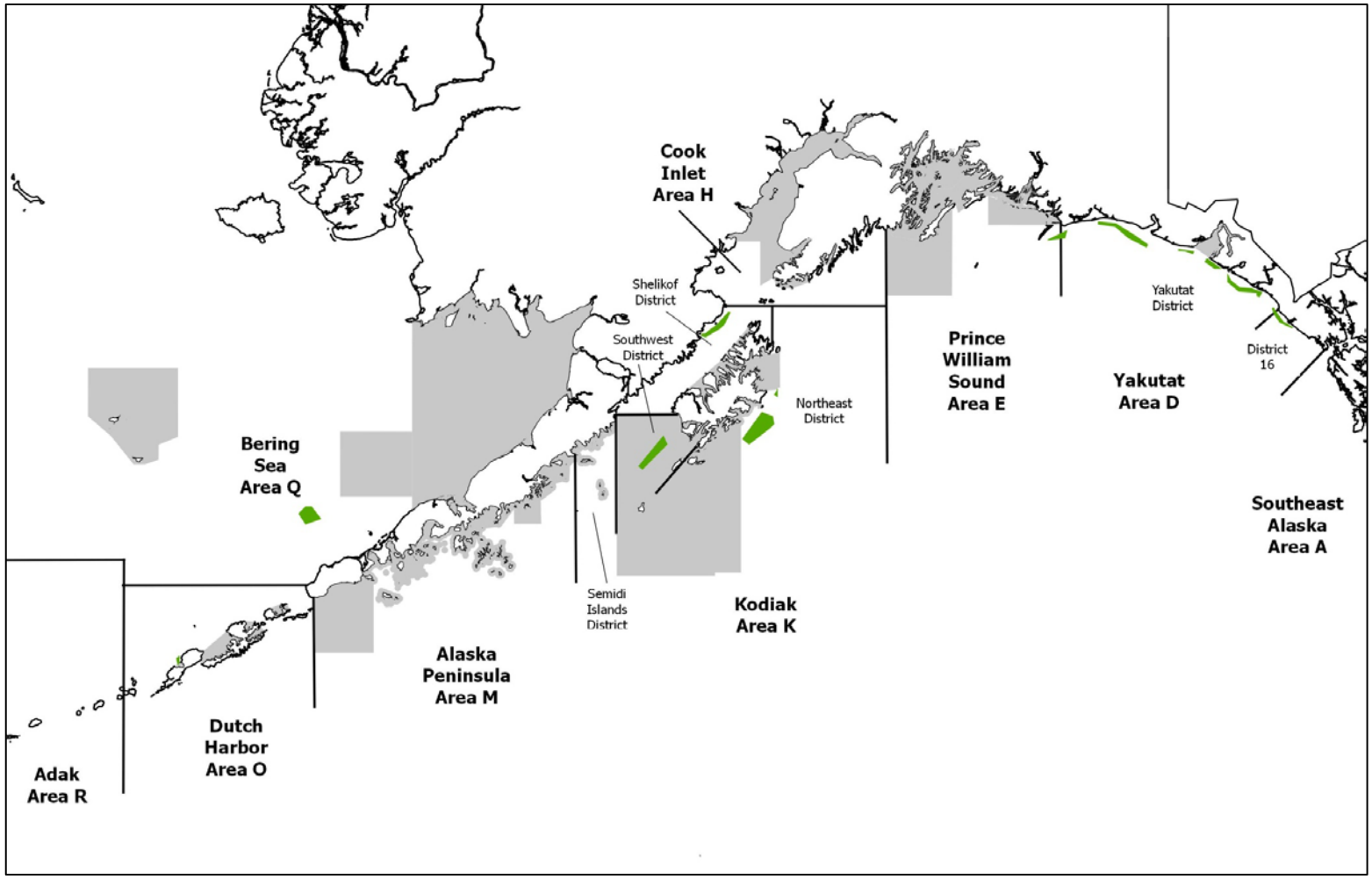

Figure 1.–Map showing Alaska scallop fishery registration areas. General areas of effort during the 2011/12 season are overlaid by green polygons, and grey shaded areas denote waters closed to scallop fishing, although an exploratory fishery was opened in Kodiak Southwest District during the season.

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

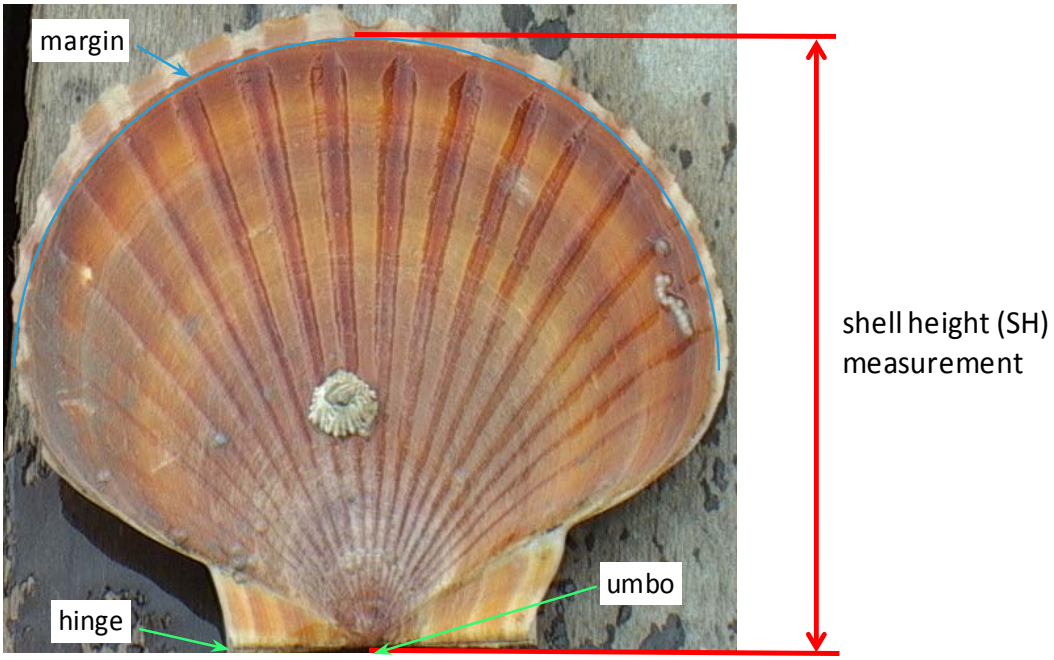

Figure 3.–Annotated photograph of weathervane scallop showing orientation of shell height measurement on upper (left) valve.

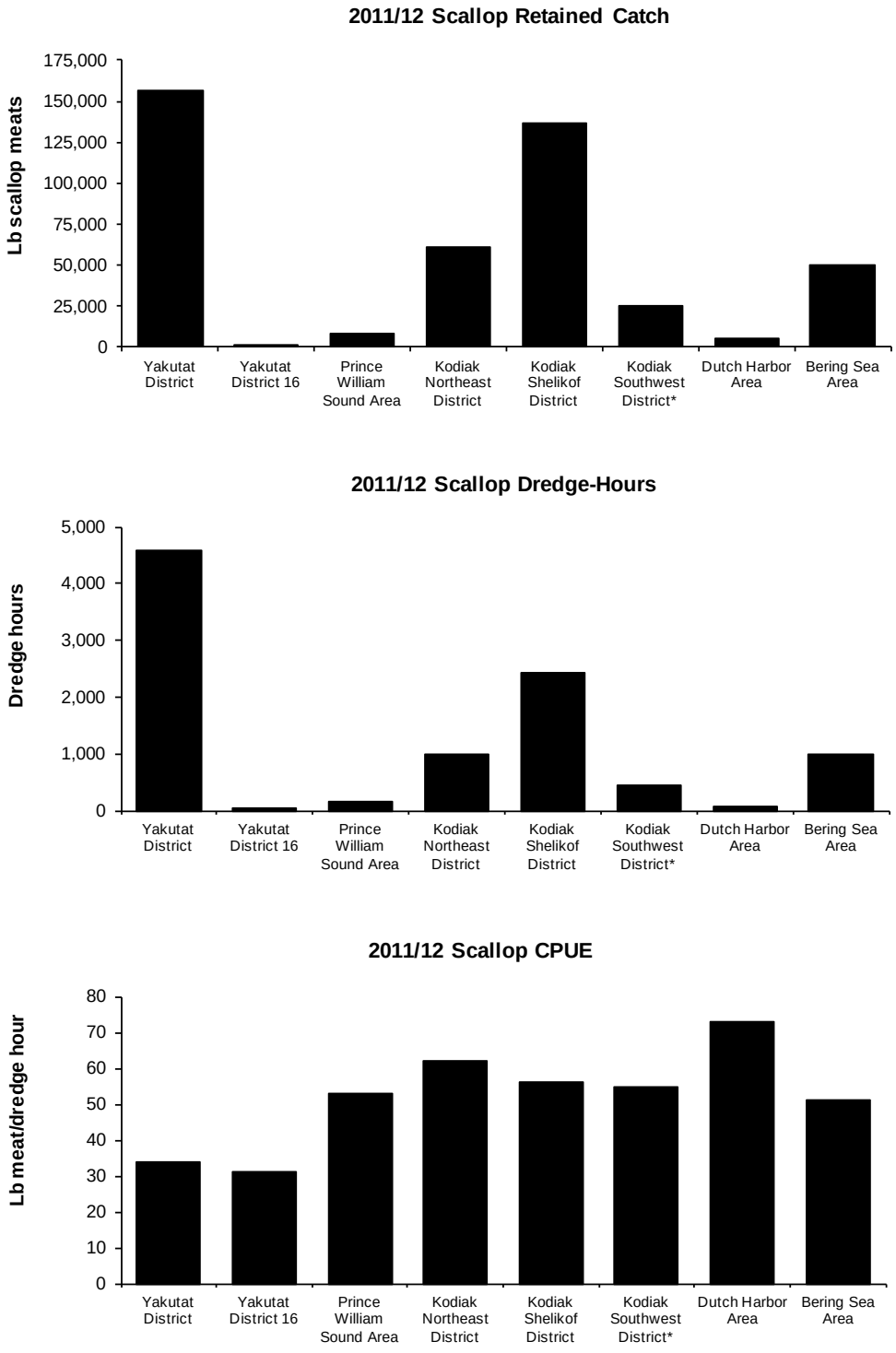

Figure 4.–Retained scallop catch (top), dredge hours (center), and CPUE (bottom) by management area during the 2011/12 statewide weathervane scallop fishery.

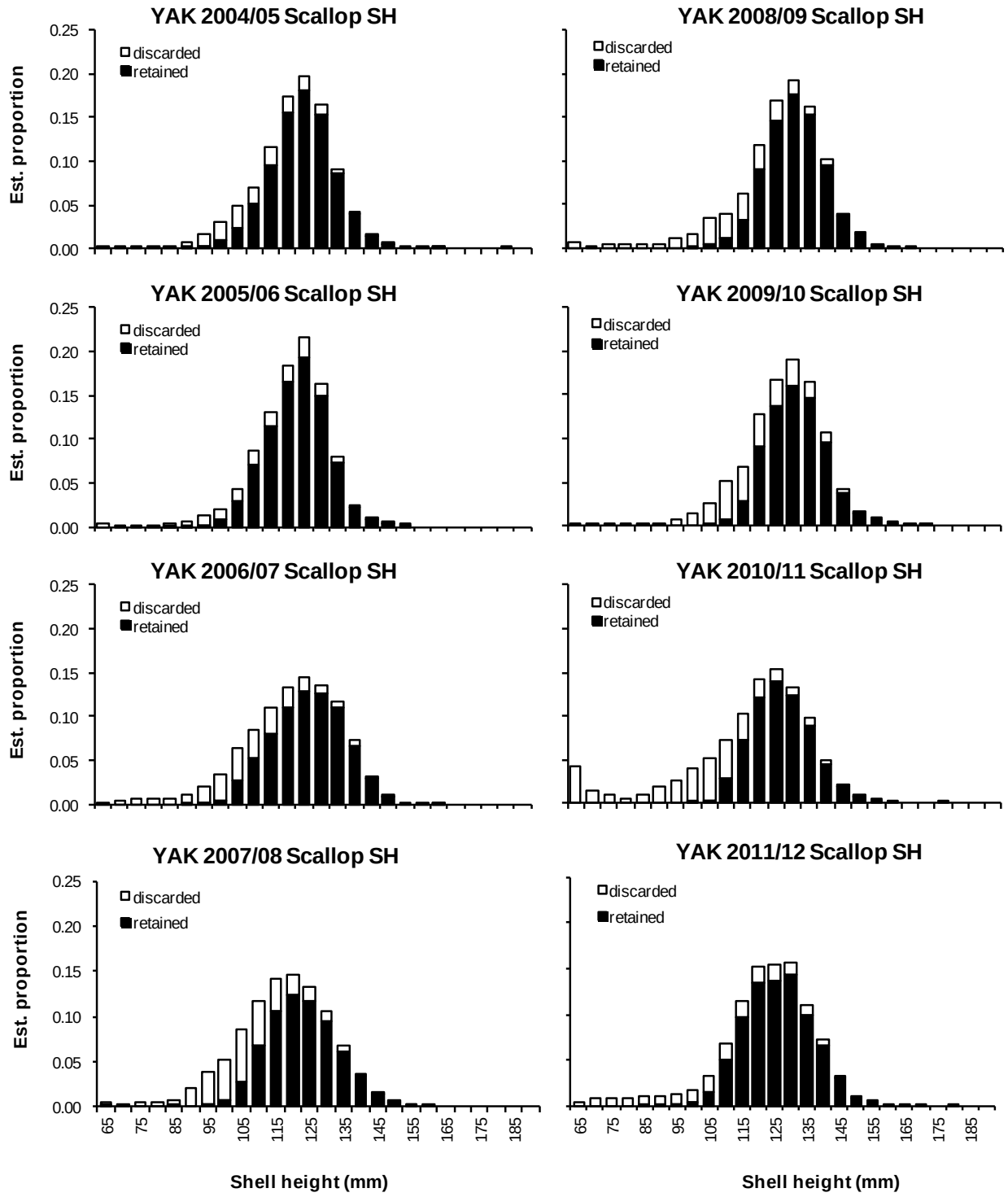

Figure 5.–Estimated scallop shell height distributions from resampling observer measurements from 2004/05–2011/12 Yakutat District (YAK) fishing seasons.

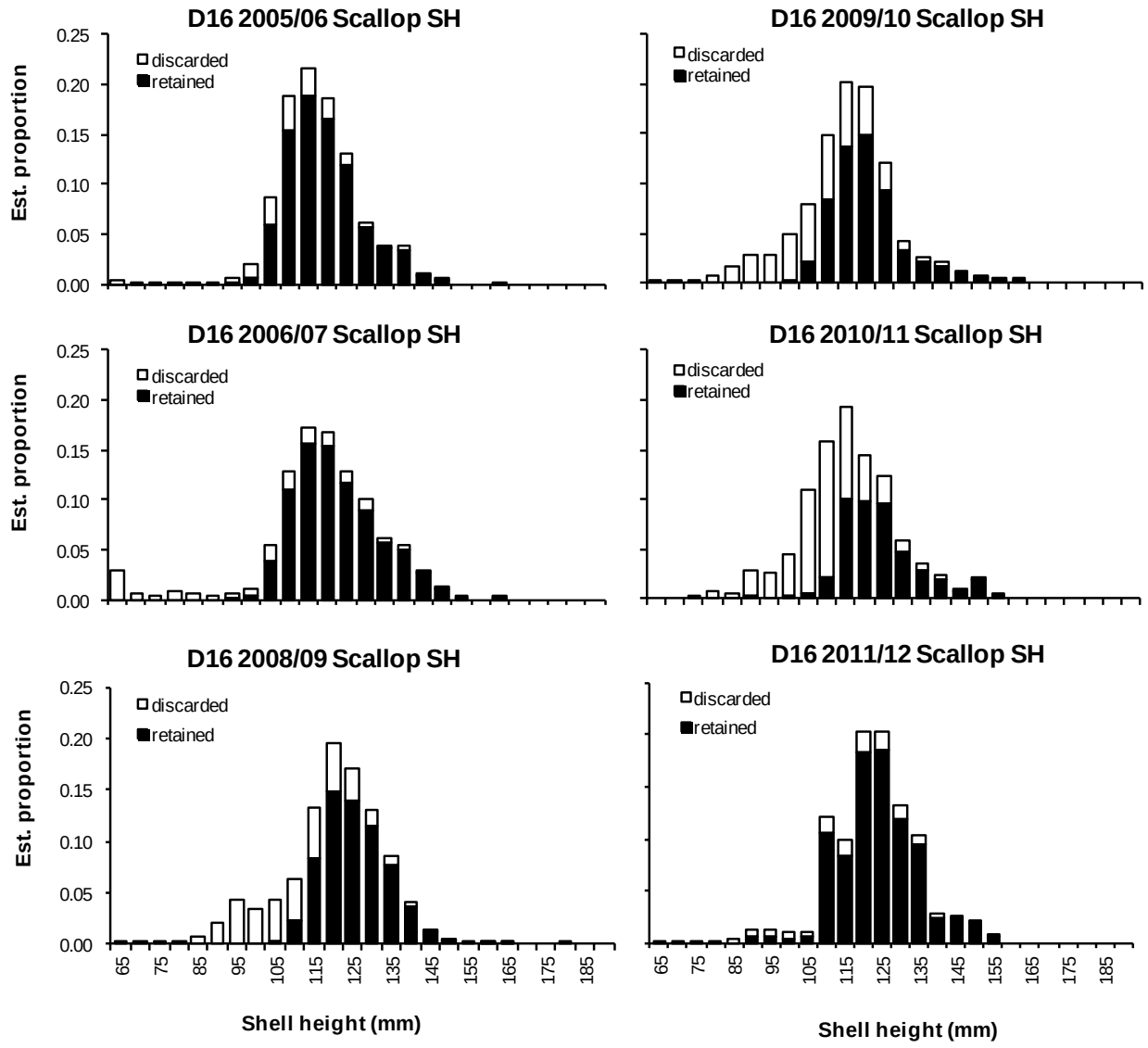

Figure 6.–Estimated scallop shell height distributions from resampling observer measurements collected during the 2005/06–2011/12 Yakutat District 16 (D16) fishing seasons. No plot was constructed for the 2007/08 season due to insufficient sample size.

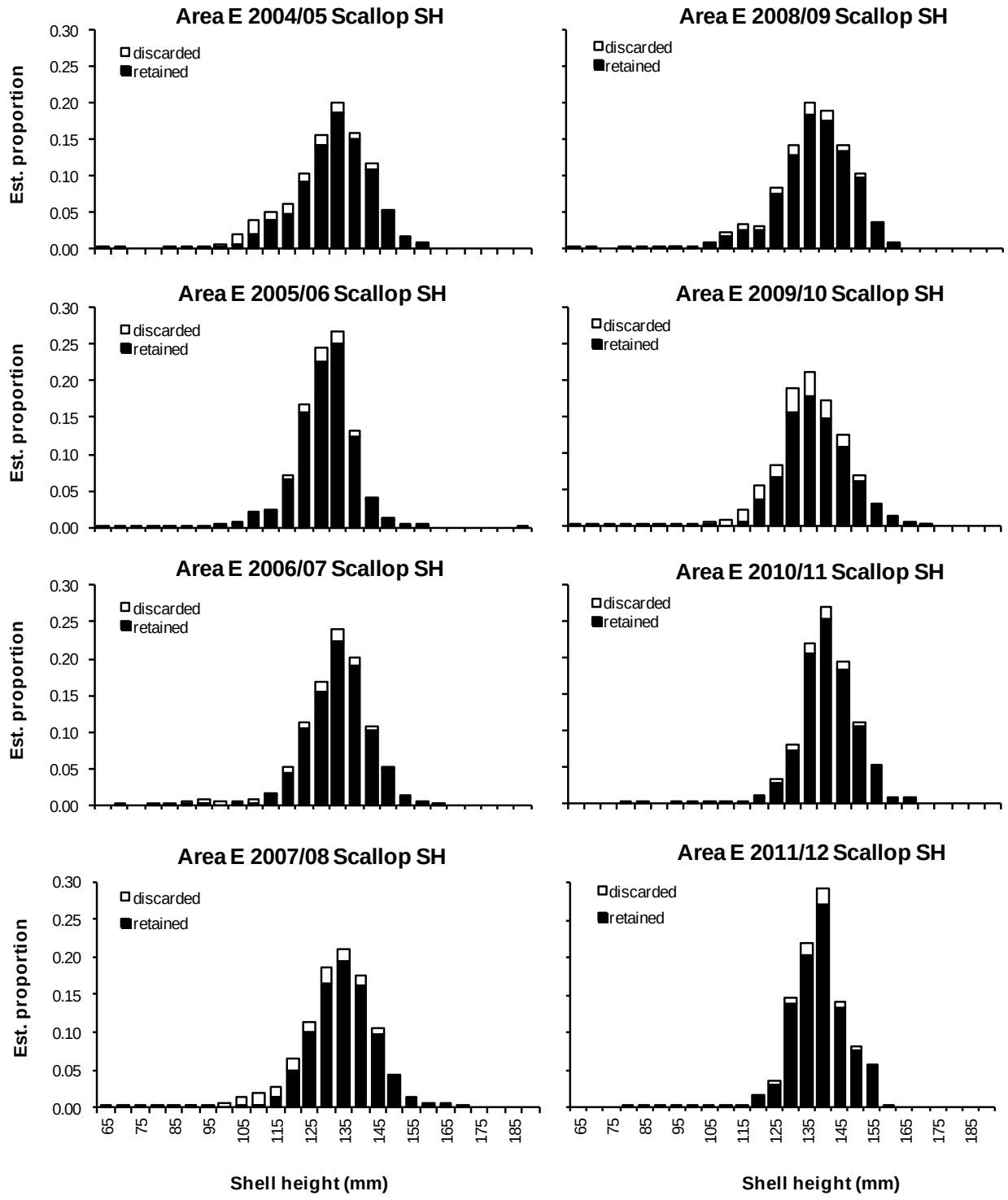

Figure 7.–Estimated scallop shell height distributions from 2004/05–2011/12 Prince William Sound Area (Area E) fishing seasons.

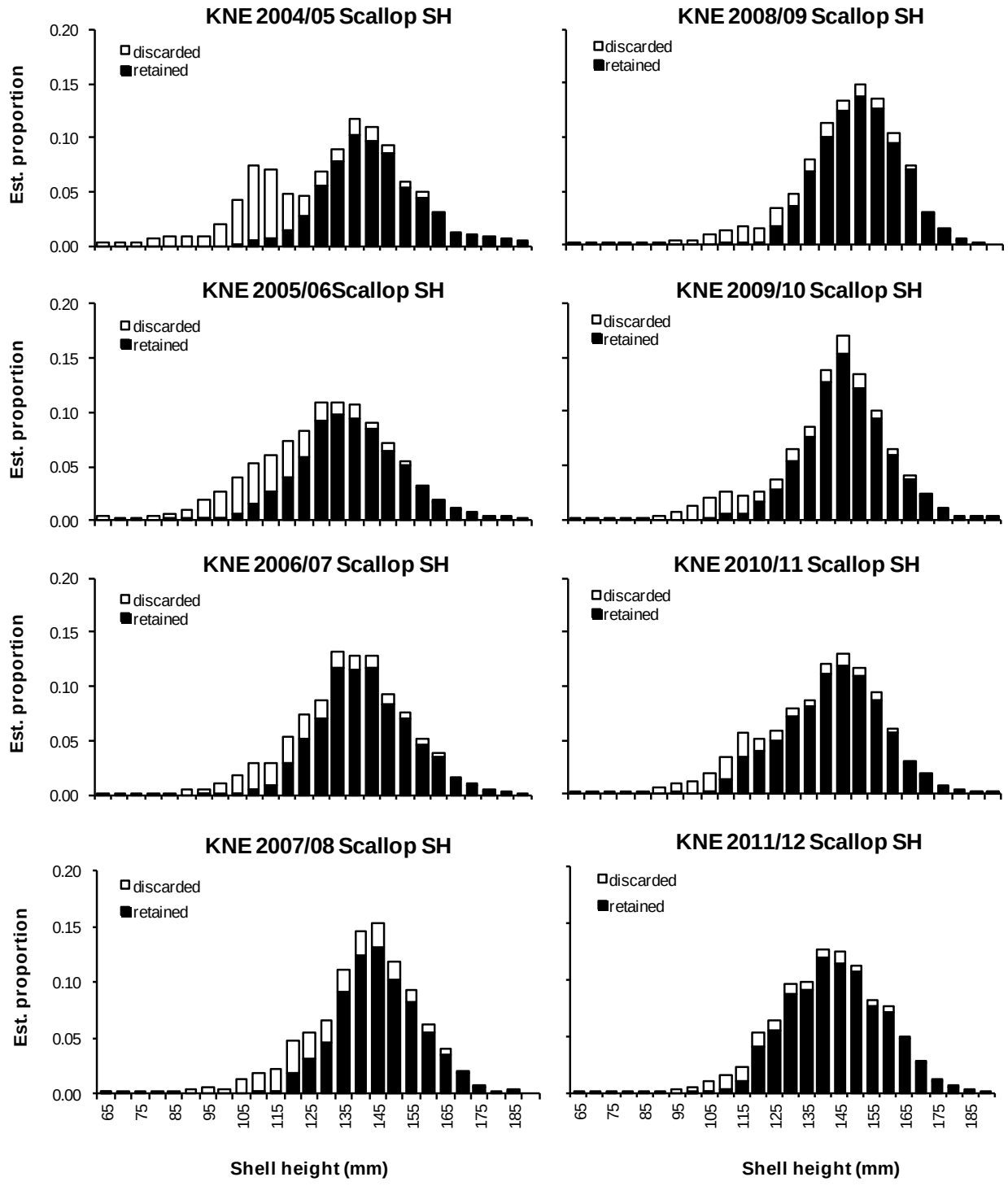

Figure 8.–Estimated scallop shell height distributions from 2004/05–2011/12 Kodiak Northeast District (KNE) fishing seasons.

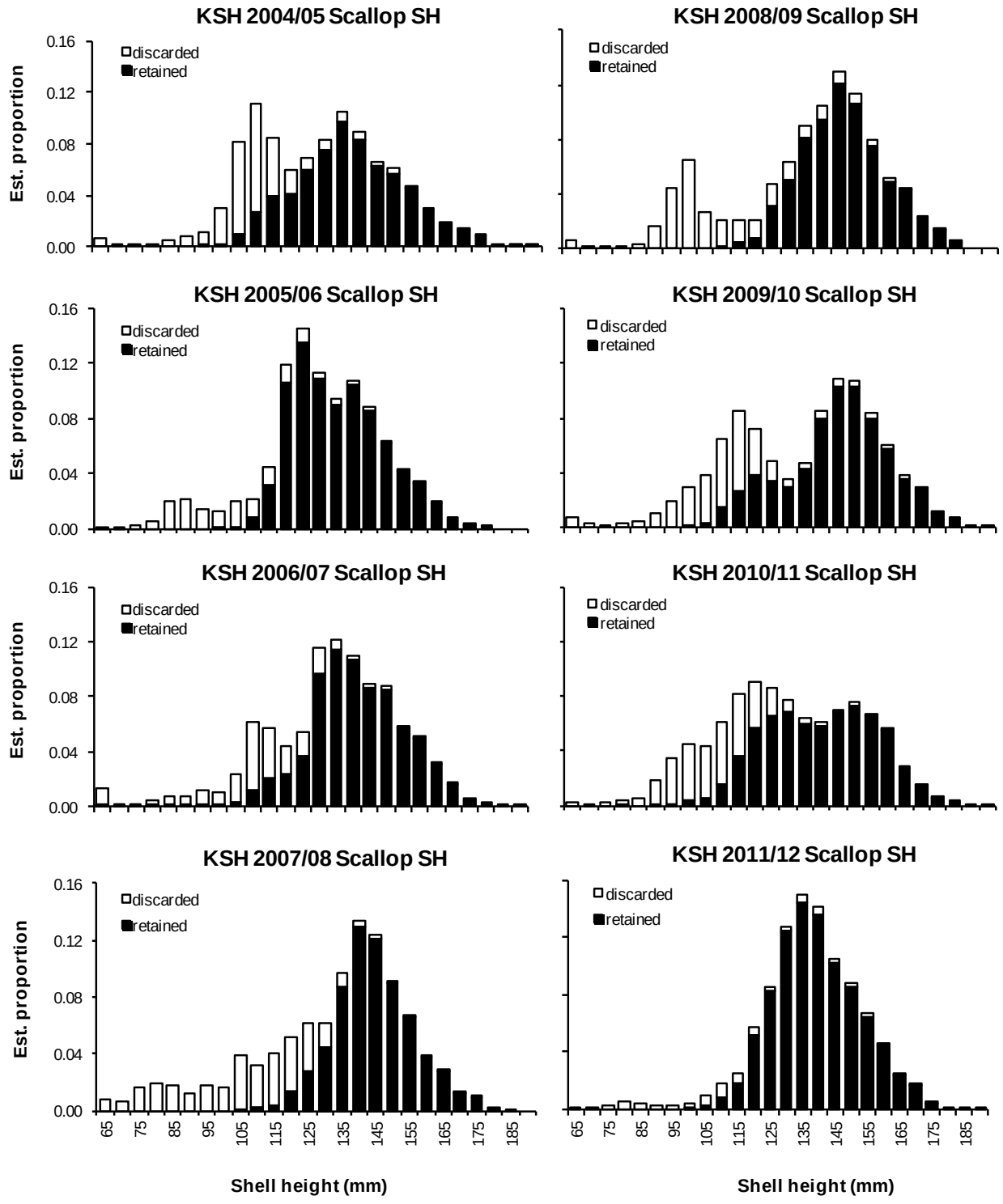

Figure 9.–Estimated scallop shell height distributions from 2004/05–2011/12 Kodiak Shelikof District (KSH) fishing seasons.

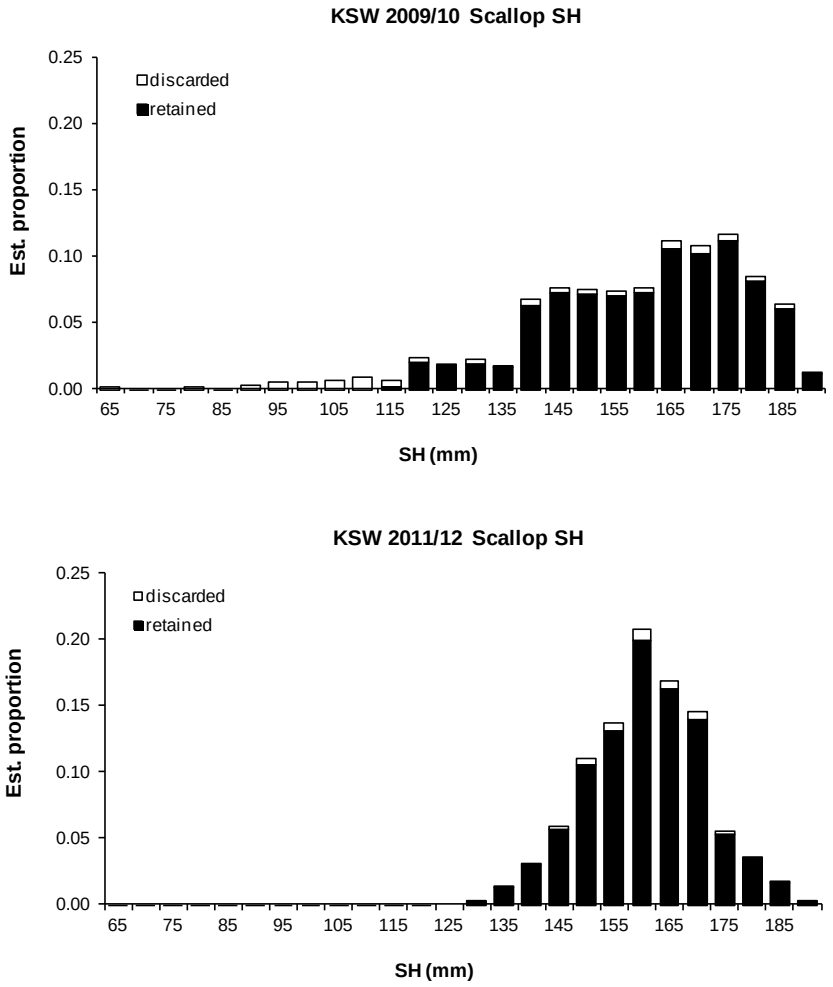

Figure 10.–Estimated scallop shell height distributions from the exploratory 2009/10 and 2011/12 Kodiak Southwest District (KSW) fishing seasons.

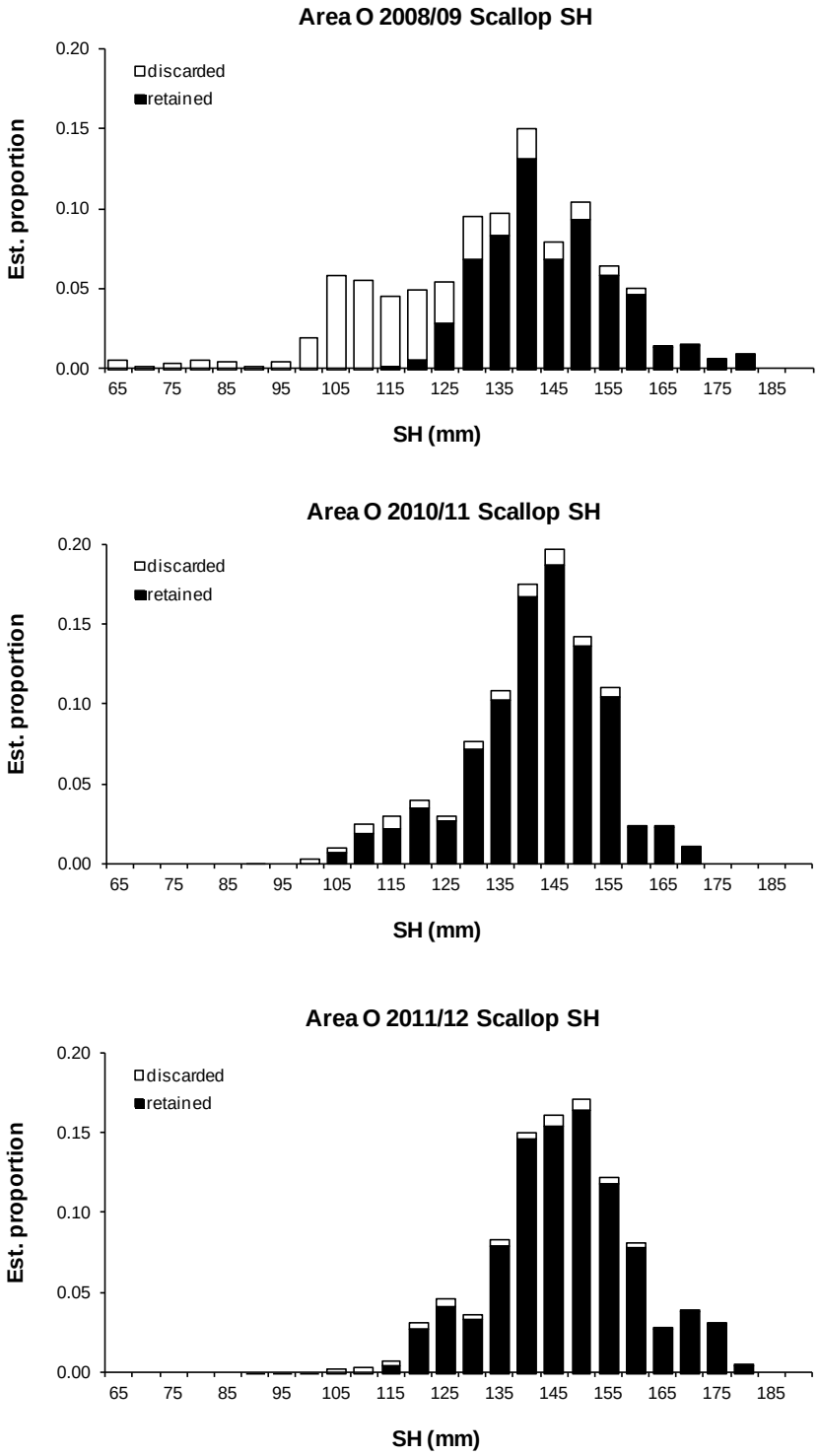

Figure 11.–Estimated scallop shell height distributions from the 2008/09–2011/12 seasons for Dutch Harbor Area. No 2009/10 plot was constructed due to insufficient sample size.

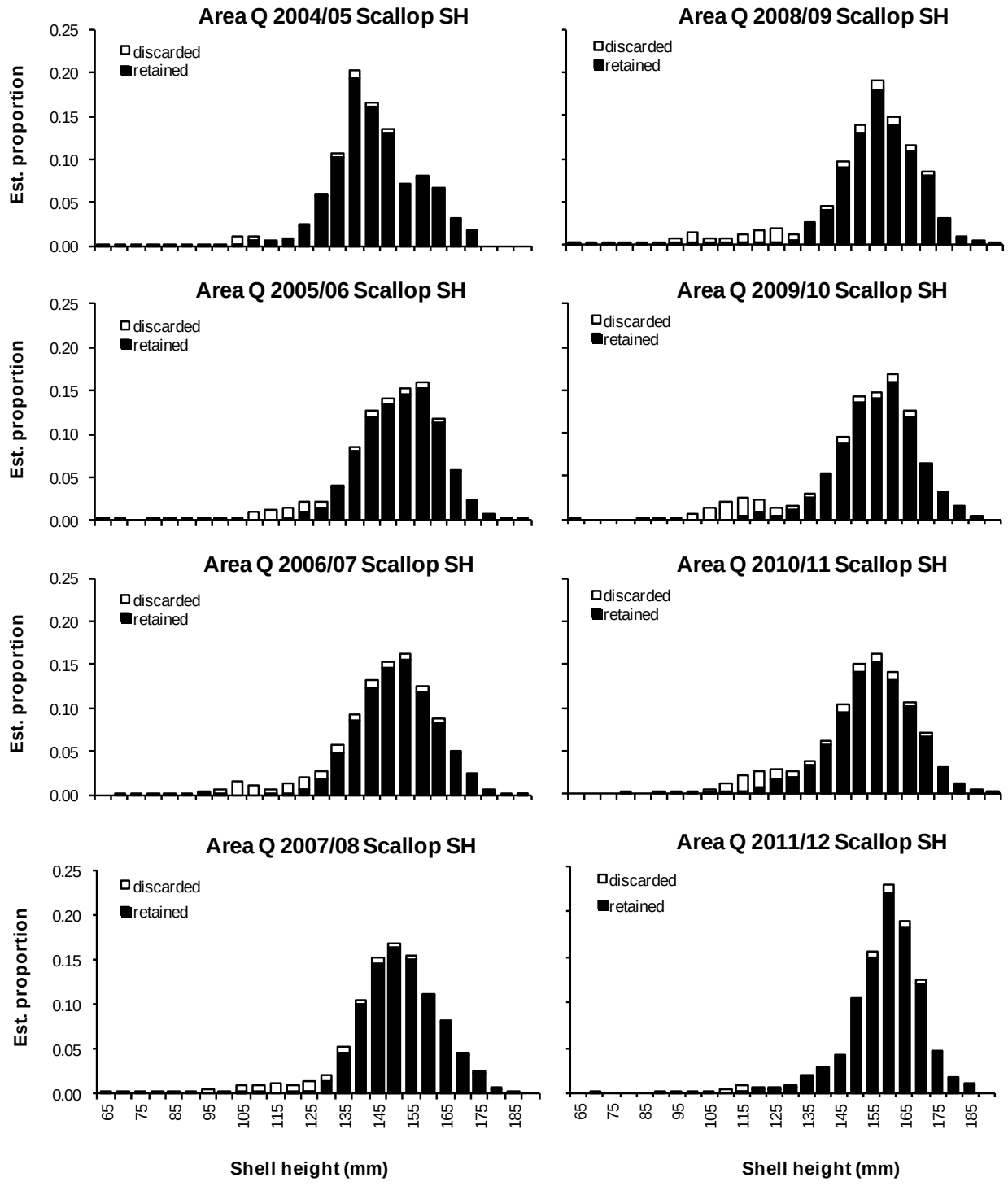

Figure 12.–Estimated scallop shell height distributions for the 2004/05–2011/12 Bering Sea Area (Area Q) fishing seasons.

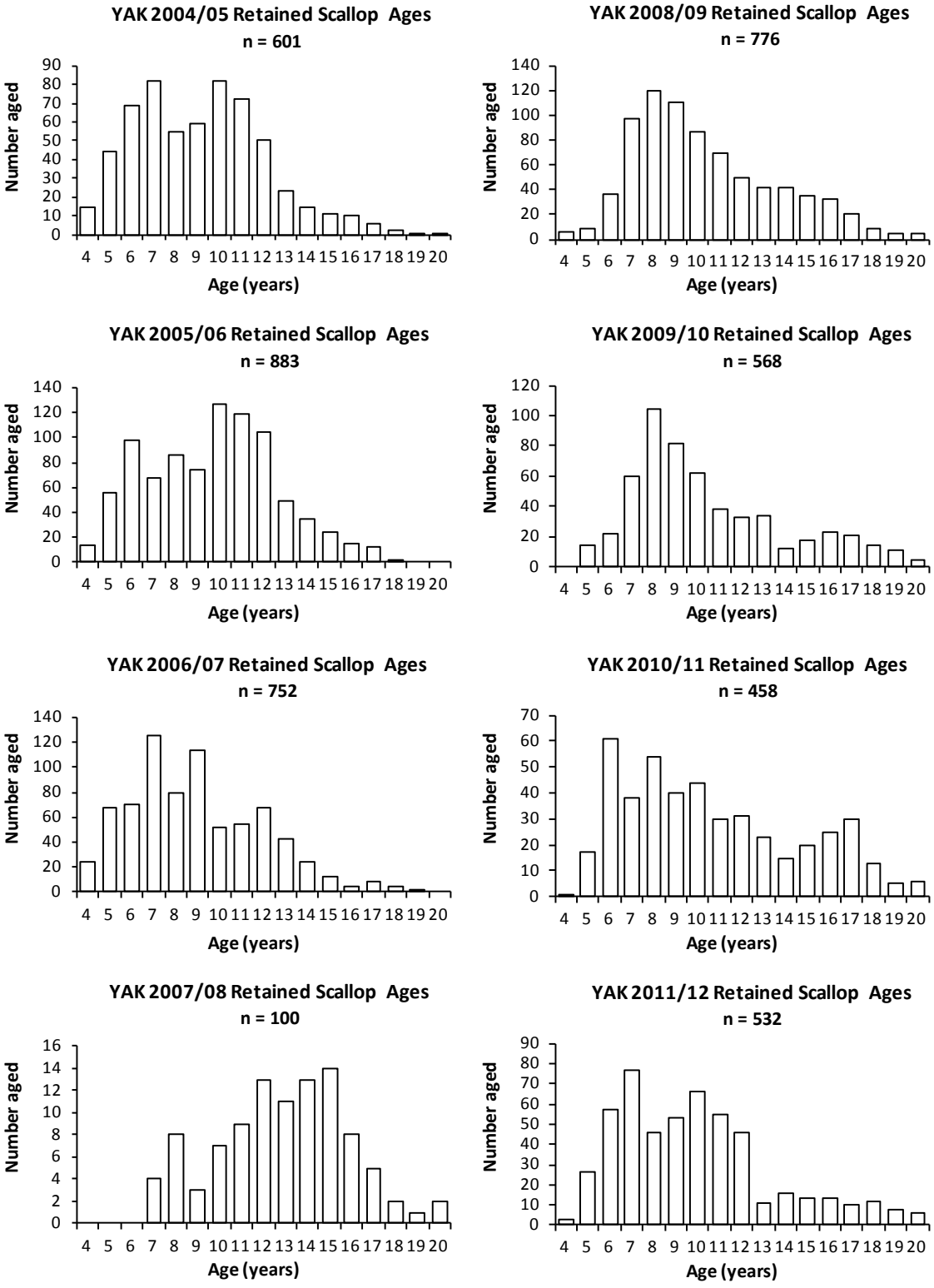

Figure 13.–Estimated retained scallop age distributions from the 2004/05–2011/12 Yakutat District (YAK) fishing seasons.

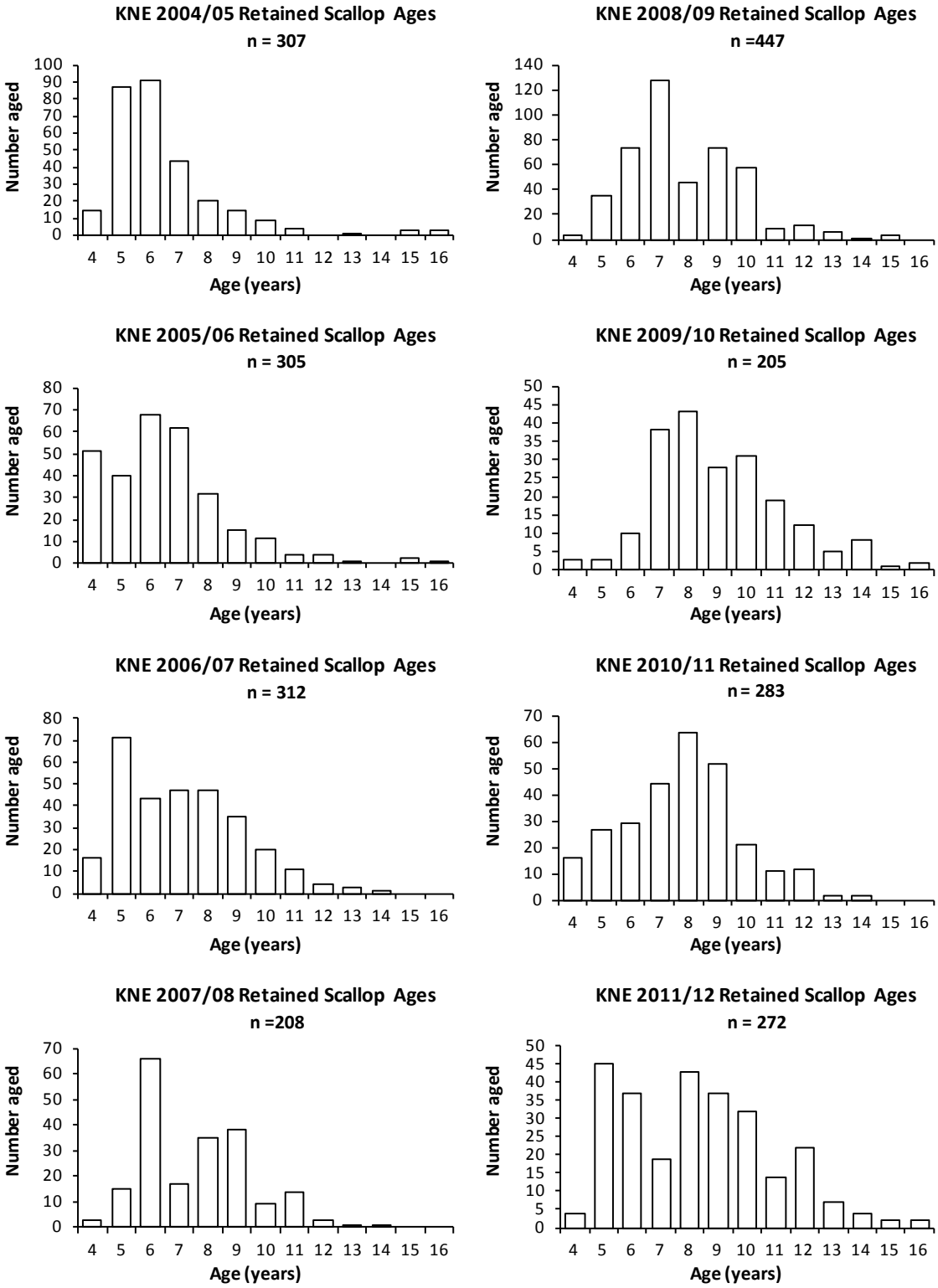

Figure 14.–Estimated retained scallop age distributions from the 2004/05–2011/12 Kodiak Northeast District (KNE) fishing seasons.

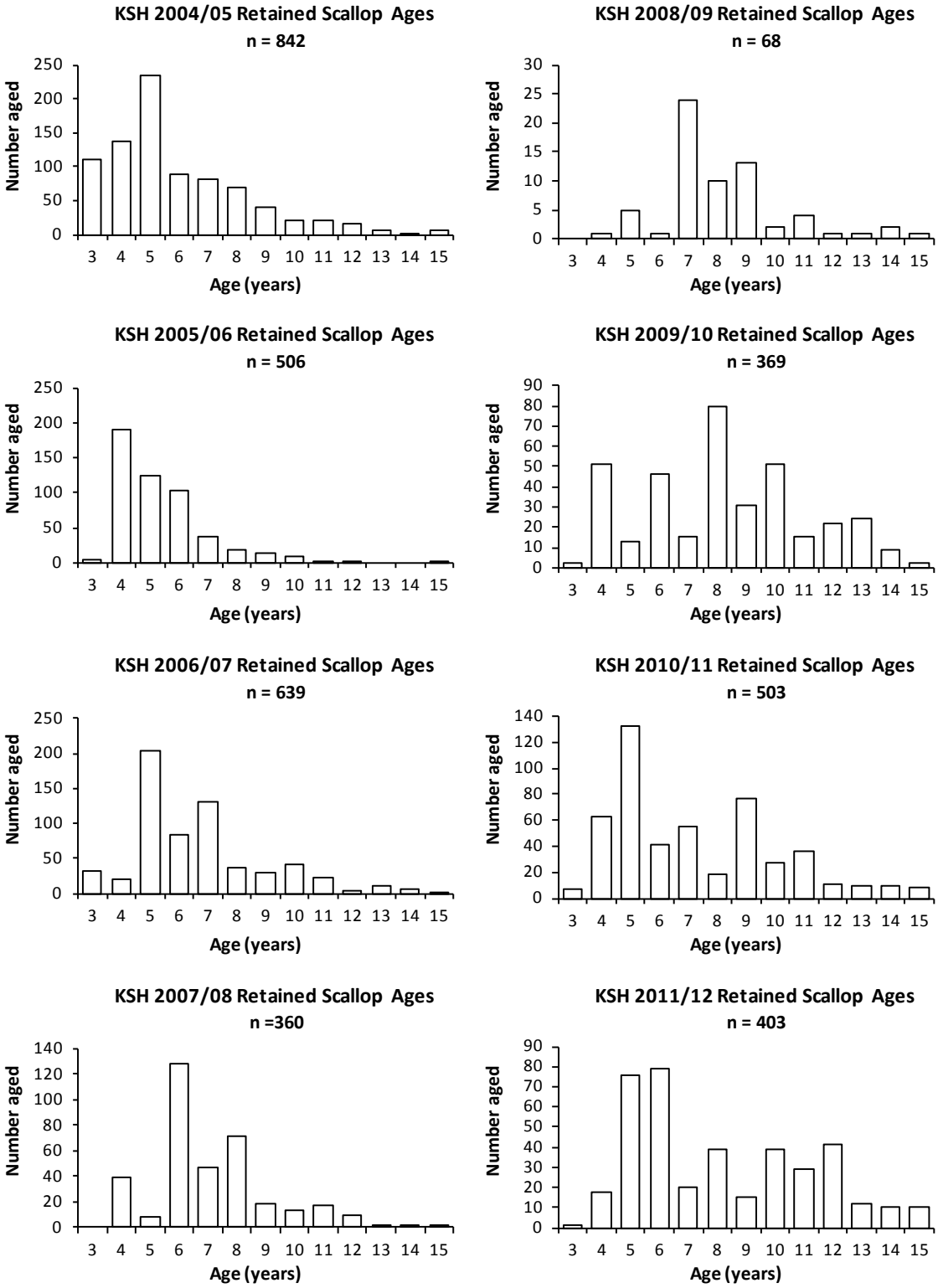

Figure 15.–Estimated retained scallop age distributions from the 2004/05–2011/12 Kodiak Shelikof District (KSH) fishing seasons.

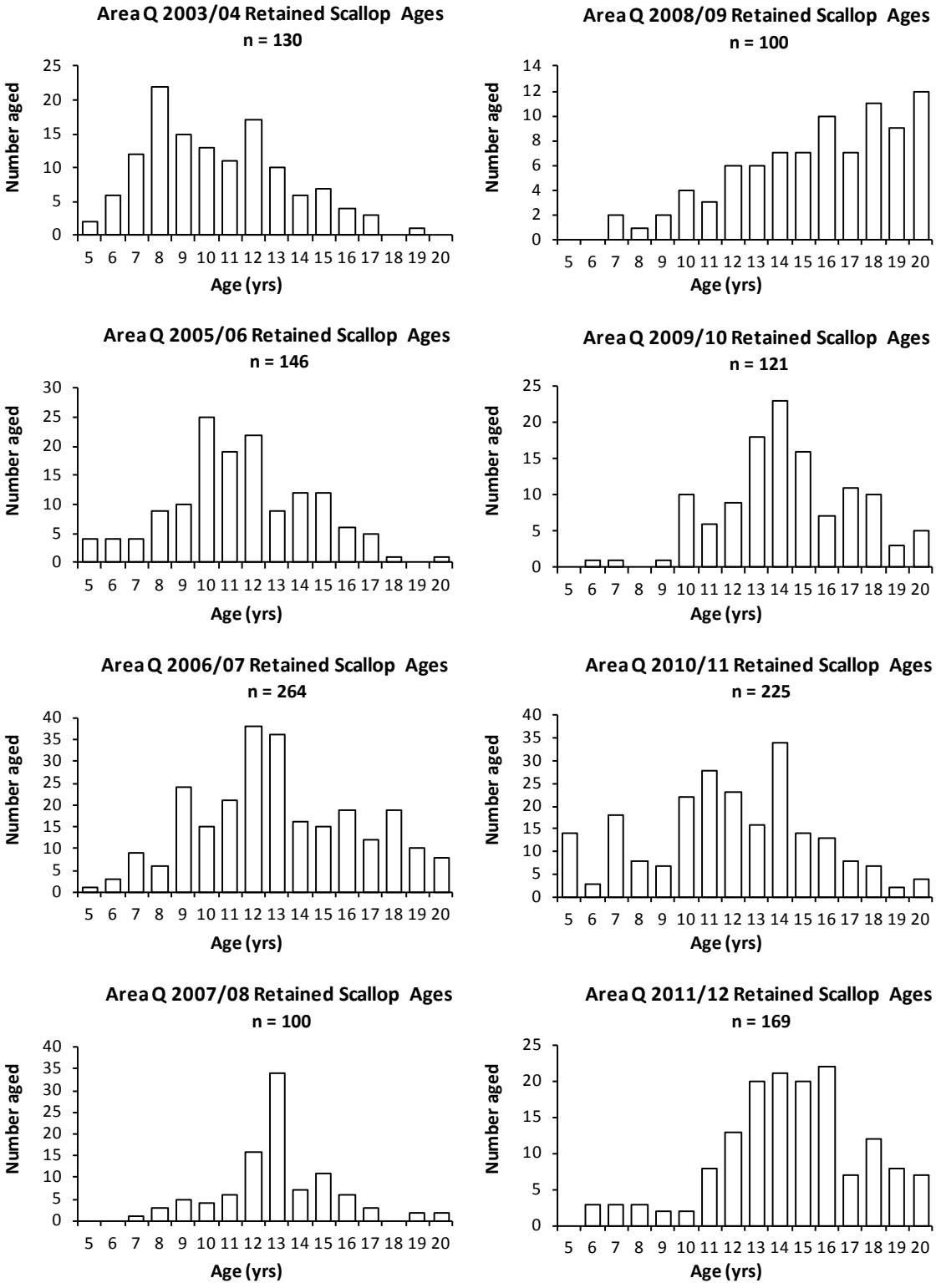

Figure 16.–Estimated retained scallop age distributions from the 2003/04–2011/12 Bering Sea Area (Area Q) fishing seasons. Sample size from the 2004/05 season was not sufficient for plotting.

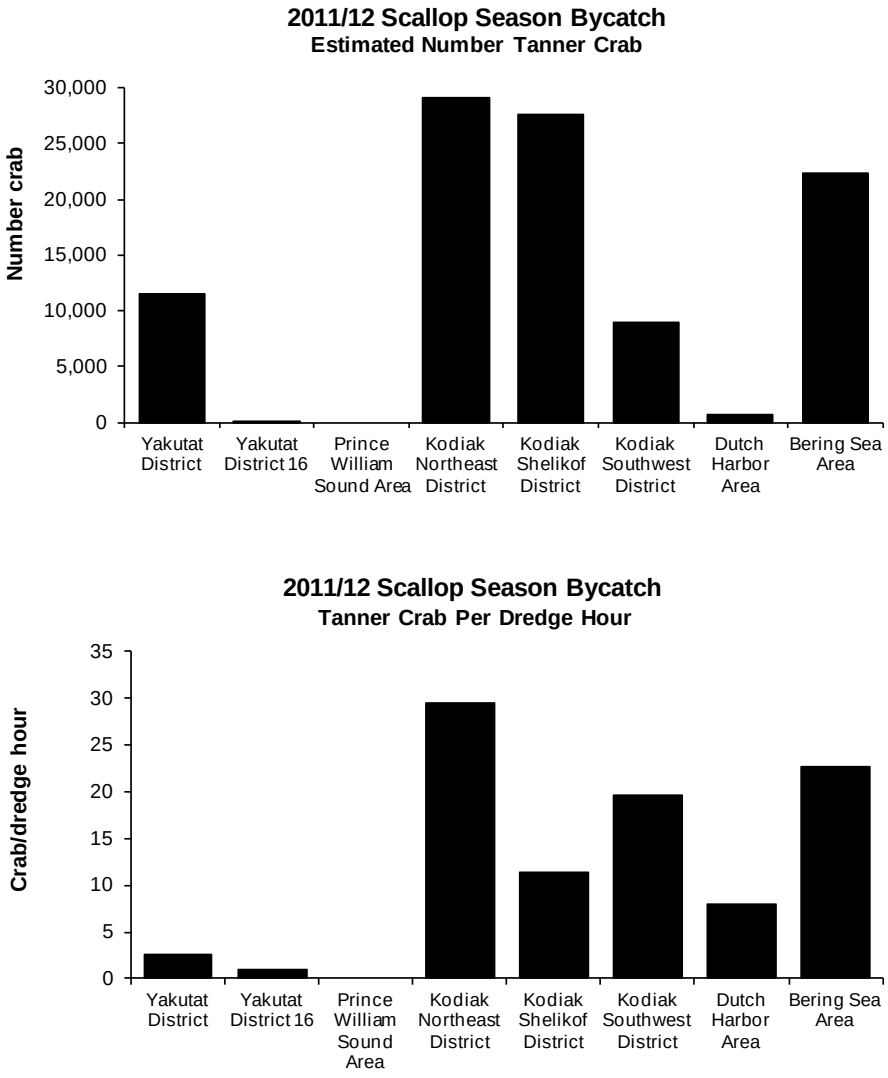

Figure 17.–Estimated Tanner crab bycatch (upper plot) and bycatch rates (lower plot) by management area during the 2011/12 scallop fishing season.

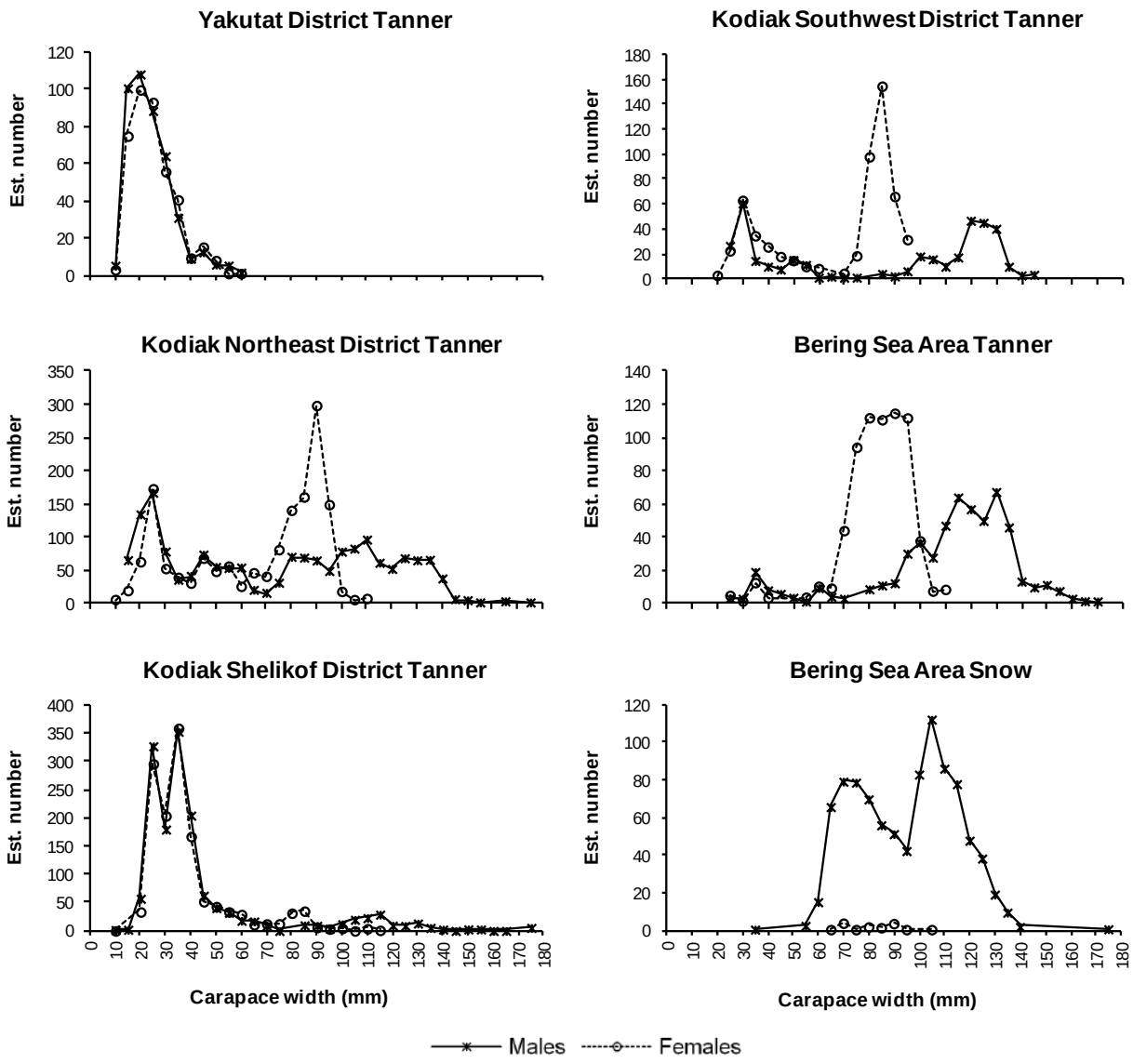

Figure 18.–*Chionoectes* sp. crab carapace width distributions by management area from catch sampling during the 2011/12 scallop fishery. Fourteen Tanner crab with carapace width less than 26 mm were sampled during the Yakutat District 16 fishery and no plot was constructed.

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
2011/12	8/4/2011	2/12/2012	3	144	132	2,703	518

[a] Cumulative number of vessel days with at least one tow.

[b] Cumulative number of vessel days with at least one sampled tow.

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
2011/12	9/1/2011	10/11/2011	3	4	3	51	7

[a] Cumulative number of vessel days with at least one tow.

[b] Cumulative number of vessel days with at least one sampled tow.

Appendix A3.–Historical observer program summary statistics from the Prince William Sound Area 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
2011/12	7/31/2011	8/5/2011	1	6	5	94	21

[a] Cumulative number of vessel days with at least one tow.

[b] Cumulative number of vessel days with at least one sampled tow.

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
2011/12	7/1/2011	8/29/2011	4	44	35	699	147

[a] Cumulative number of vessel days with at least one tow.

[b] Cumulative number of vessel days with at least one sampled tow.

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
2011/12	7/10/2011	8/23/2011	4	91	82	1,660	376

[a] Cumulative number of vessel days with at least one tow.

[b] Cumulative number of vessel days with at least one sampled tow.

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] Cumulative number of vessel days with at least one tow.

[b] Cumulative number of vessel days with at least one sampled tow.

Appendix A7.–Historical observer program summary statistics from the Alaska Peninsula Area. The area was not opened for fishing during the 1995/96, 2001/02, 2002/03, and 2009/10–2011/12 seasons. No effort occurred during the 2003/04–2005/06 and 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	7/25/1993	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] Cumulative number of vessel days with at least one tow.

[b] Cumulative number of vessel days with at least one sampled tow.

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
2011/12	9/11/2011	9/14/2011	1	4	3	60	14

[a] Cumulative number of vessel days with at least one tow.

[b] Cumulative number of vessel days with at least one sampled tow.

Appendix A9.–Historical observer program summary statistics from the Bering Sea Area 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
2011/12	9/15/2011	9/27/2011	2	29	21	626	90

[a] Cumulative number of vessel days with at least one tow.

[b] Cumulative number of vessel days with at least one sampled tow.

APPENDIX B. HISTORICAL ALASKA SCALLOP FISHERY SUMMARY STATISTICS

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

Season	GHL (lb meat)	Retained catch (lb meat)	Retained catch (lb whole)	Dredge hours	CPUE[a]	Estimated scallop discards		
						lb 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
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
2011/12	160,000	156,463	2,360,038	4,598	34	583,399	11.8	8.0

[a] CPUE in lb meat per dredge-hour.

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

[c] Included in yearly GHL.

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

Season	GHL (lb meat)	Retained catch (lb meat)	Retained catch (lb whole)	Dredge hours	CPUE[a]	Estimated scallop discards		
						lb 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
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
2011/12	25,000	1,777	20,580	57	31	3,076	6.5	10.7

[a] CPUE in lb meat per dredge-hour.

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

[c] Included in yearly GHL.

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

Season	GHL (lb meat)	Retained catch (lb meat)	Retained catch (lb whole)	Dredge hours	CPUE[a]	Estimated scallop discards		
						lb 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
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
2011/12	8,400	8,836	138,789	167	53	11,469	1.4	6.2

[a] CPUE in lb meat per dredge-hour.

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

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

Season	GHL (lb meat)	Retained catch (lb meat)	Retained catch (lb whole)	Dredge hours	CPUE[a]	Estimated scallop discards		
						lb 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
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
2011/12	70,000	61,209	667,008	986	62	95,885	6.8	5.7

[a] CPUE in lb meat per dredge-hour.

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

[c] Included in Kodiak Area GHL.

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

Season	GHL (lb meat)	Retained catch (lb meat)	Retained catch (lb whole)	Dredge-hours	CPUE[a]	Estimated scallop discards		
						lb 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
2009/10	170,000	169,877	1,579,723	3,447	49	349,952	13.9	4.2
2010/11	170,000	171,065	1,814,562	3,507	49	423,118	16.2	2.7
2011/12	135,000	136,491	1,437,780	2,437	56	128,448	6.1	2.1

[a] CPUE in lb meat per dredge-hour.

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

[c] Included in Kodiak Area GHL.

Appendix B6.–Historical scallop fishery summary statistics from Kodiak Semidi Island District. 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 (lb meat)	Retained catch (lb meat)	Retained catch (lb whole)	Dredge-hours	CPUE[a]	Estimated scallop discards		
						lb 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 lb meat per dredge-hour.

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

[c] Included in Kodiak Area GHL.

Appendix B7.–Historical scallop fishery summary statistics from Alaska Peninsula Area. Fishing was not opened during the 1995/96, 2001/02, 2002/03, and 2009/10–2011/12 seasons. No effort occurred during the 2003/04–2005/06, and 2007/08 seasons.

Season	GHL (lb meat)	Retained catch (lb meat)	Retained catch (lb whole)	Dredge hours	CPUE[a]	Estimated scallop discards		
						lb 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 lb meat per dredge-hour.

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

Appendix B8.–Historical scallop fishery summary statistics from Dutch Harbor Area. 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 (lb meat)	Retained catch (lb meat)	Retained catch (lb whole)	Dredge hours	CPUE[a]	Estimated scallop discards		
						lb 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
2009/10	10,000	8,445	55,361	104	81	2,082	0.7	2.9
2010/11	10,000	5,642	5,642	83	68	3,237	2.4	4.5
2011/12	10,000	5,570	45,513	77	73	2,567	1.7	3.6

[a] CPUE in lb meat per dredge-hour.

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

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

Season	GHL (lb meat)	Retained catch (lb meat)	Retained catch (lb whole)	Dredge hours	CPUE[a]	Estimated scallop discards		
						lb 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
2009/10	50,000	48,855	568,454	1,270	38	57,984	4.7	4.5
2010/11	50,000	50,099	459,759	972	52	73,178	7.4	5.5
2011/12	50,000	50,275	529,235	984	51	30,837	2.0	3.5

[a] CPUE in lb meat per dredge-hour.

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

APPENDIX C. HISTORICAL ALASKA SCALLOP FISHERY BYCATCH STATISTICS

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

Season	Estimated crab bycatch (number animals)				Lb scallop 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
2011/12	11,558	0	150	551	14

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

[b] NA = not applicable.

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

Season	Estimated crab bycatch (number animals)				Lb scallop 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
2011/12	53	0	0	0	33

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

[b] NA = not applicable.

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

Season	Tanner crab bycatch limit	Estimated crab bycatch (number animals)				Lb scallop mea 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
2011/12	1,643	0	0	0	0	NA

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

[b] NA = not applicable.

Appendix C4.–Historical bycatch statistics from the Kodiak Northeast District scallop fishery.

Season	Crab bycatch limits		Estimated crab bycatch (number animals)				Lb scallop meat per Tanner[a]
	Tanner	King	Tanner	King	Dungeness	Halibut	
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
2011/12	147,956	8	29,185	0	0	397	2

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

[b] NA = not applicable.

Appendix C5.–Historical bycatch statistics from the Kodiak Shelikof District scallop fishery.

	Crab bycatch limits		Estimated crab bycatch (number animals)				Lb scallop 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
2011/12	27,636	134	27,684	0	17	295	5

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

[b] NA = not applicable.

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 crab bycatch (number animals)				Lb scallop 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.

[b] NA = not applicable.

Appendix C7.–Historical bycatch statistics from the Alaska Peninsula Area scallop fishery.

	Crab bycatch limits		Estimated crab bycatch (number animals)				Lb scallop 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 crab bycatch (number animals)				Lb scallop 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
2011/12	10,000	10	617	0	0	16	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.

	Crab bycatch limits			Estimated crab bycatch (number animals)				Lb scallop meat
Season	Tanner	King	Snow	Tanner	King	Snow	Halibut	per 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	106	36,786	0	2
2010/11	130,000	500	300,000	60,537	33	18,823	10	2
2011/12	65,000	500	300,000	22,363	135	13,073	21	2

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

[b] NA = not applicable.

APPENDIX D. TERMS COMMONLY USED IN THE ALASKA SCALLOP FISHERY

Appendix D1.–Commonly used terms, acronyms, and corresponding definitions related to scallops and the scallop fishery that are used in this report.

bycatch	Non-target species and debris incidentally caught in dredges while fishing for scallops.
clapper	Empty scallop shell connected at the hinge
CPUE	Catch per unit effort; fishery performance statistic expressed in retained pounds of meat per dredge hour (lbs meat/dredge-hr).
CW	Carapace width; size measurement for *Chionoecetes* spp. and Dungeness 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 in diameter steel rings–see Figure 2.
dredge-hour	Scallop fishery effort unit; one 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, and then retrieved and landed aboard the vessel.
manmade debris	Plastics, fishing gear, metals, etc.
meat	Scallop adductor muscle, a dominant feature of the scallop body highly prized as a food source.
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 pounds of scallop meats, while estimates of scallop discards are in round weight.
SH	Scallop shell height measured in mm (see Figure 3).
shab	Unsorted bits and pieces of natural debris caught in dredges that cannot be classified to a precise taxonomic level.
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.