

Fishery Management Report No. 16-29

Cook Inlet Area Groundfish Management Report, 2012–2015

by

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Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



Symbols and Abbreviations

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Weights and measures (metric)		General		Mathematics, statistics	
centimeter	cm	Alaska Administrative Code	AAC	<i>all standard mathematical signs, symbols and abbreviations</i>	
deciliter	dL	all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.	alternate hypothesis	H_A
gram	g	all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.	base of natural logarithm	e
hectare	ha	at	@	catch per unit effort	CPUE
kilogram	kg	compass directions:		coefficient of variation	CV
kilometer	km	east	E	common test statistics	(F, t, χ^2 , etc.)
liter	L	north	N	confidence interval	CI
meter	m	south	S	correlation coefficient	
milliliter	mL	west	W	(multiple)	R
millimeter	mm	copyright	©	correlation coefficient (simple)	r
		corporate suffixes:		covariance	cov
Weights and measures (English)		Company	Co.	degree (angular)	$^\circ$
cubic feet per second	ft ³ /s	Corporation	Corp.	degrees of freedom	df
foot	ft	Incorporated	Inc.	expected value	E
gallon	gal	Limited	Ltd.	greater than	>
inch	in	District of Columbia	D.C.	greater than or equal to	\geq
mile	mi	et alii (and others)	et al.	harvest per unit effort	HPUE
nautical mile	nmi	et cetera (and so forth)	etc.	less than	<
ounce	oz	exempli gratia	e.g.	less than or equal to	\leq
pound	lb	(for example)		logarithm (natural)	ln
quart	qt	Federal Information Code	FIC	logarithm (base 10)	log
yard	yd	id est (that is)	i.e.	logarithm (specify base)	log ₂ , etc.
		latitude or longitude	lat or long	minute (angular)	'
Time and temperature		monetary symbols (U.S.)	\$, ¢	not significant	NS
day	d	months (tables and figures): first three letters	Jan, ..., Dec	null hypothesis	H_0
degrees Celsius	°C	registered trademark	®	percent	%
degrees Fahrenheit	°F	trademark	™	probability	P
degrees kelvin	K	United States (adjective)	U.S.	probability of a type I error (rejection of the null hypothesis when true)	α
hour	h	United States of America (noun)	USA	probability of a type II error (acceptance of the null hypothesis when false)	β
minute	min	U.S.C.	United States Code	second (angular)	"
second	s	U.S. state	use two-letter abbreviations (e.g., AK, WA)	standard deviation	SD
Physics and chemistry				standard error	SE
all atomic symbols				variance	
alternating current	AC			population sample	Var
ampere	A			sample	var
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				

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**COOK INLET AREA
GROUNDFISH MANAGEMENT REPORT, 2012–2015**

by

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ABSTRACT

The Alaska Department of Fish and Game (ADF&G), Division of Commercial Fisheries, manages all commercial groundfish fisheries within the Cook Inlet Area (Registration Area H), defined as territorial waters from the shoreline to 3 nautical miles (nmi) offshore located west of Cape Fairfield and north of the latitude of Cape Douglas. The area is divided into the Cook Inlet and North Gulf districts. Additionally, ADF&G has management authority for lingcod *Ophiodon elongatus*, black rockfish *Sebastes melanops*, and dark rockfish *S. ciliatus* in waters of the exclusive economic zone (EEZ) located adjacent to the Cook Inlet Area from 3 nmi offshore. This report summarizes annual harvests and exvessel values for commercial groundfish fisheries during 1988–2015, management changes for 2012–2015, and recent regulatory changes based upon Alaska Board of Fisheries actions. Important groundfish fisheries are discussed in specific sections of this report. During 2015, Cook Inlet Area commercial groundfish harvests totaled 5.8 million lb and generated an estimated exvessel value of \$2.2 million, the second largest harvest since 1999 and the third highest value to date. Pacific cod *Gadus macrocephalus* has contributed the greatest economic yield since 1990 and, in 2015, exvessel value was nearly \$2 million, the third highest value to date from the second largest harvest of nearly 5.5 million lb. Sablefish *Anoplopoma fimbria* has generated the second highest annual exvessel value since 2000 due to a high dockside price per pound, although 2015 marked the lowest harvest since 1995 and the lowest value since 1998. Rockfish harvest doubled in 2015 from 2014, after 10 years of low harvests, while lingcod harvest dropped to the lowest level since 1989. Walleye pollock *Theragra chalcogramma* harvest increased to the highest levels since 2004 due to more jig participation in 2013 and a commissioner's permit seine fishery implemented in 2014.

Key words: Cook Inlet, Area H, commercial fisheries, groundfish, harvest, management, exvessel value, lingcod, *Ophiodon elongates*, black rockfish, *Sebastes melanops*, dark rockfish, *Sebastes ciliatus*, Pacific cod, *Gadus macrocephalus*, sablefish, *Anoplopoma fimbria*, walleye pollock, *Theragra chalcogramma*, yelloweye rockfish *Sebastes ruberrimus*, state waters, parallel, Annual Management Report AMR

INTRODUCTION

The Alaska Department of Fish and Game (ADF&G) Division of Commercial Fisheries manages all commercial groundfish fisheries within the territorial waters of the Cook Inlet Management Area (Registration Area H), which are defined as those waters from the shoreline to 3 nautical miles (nmi) offshore (5 AAC 39.975). Under state regulation 5 AAC 39.975 Definitions (21), groundfish are defined as all marine finfish except halibut, osmerids, herring, and salmonids. For territorial waters, the Alaska Board of Fisheries (BOF) establishes management regulations and ADF&G uses its emergency order (EO) authority to make adjustments to fishing time and area. The BOF schedules regular meetings for area groundfish on a triennial basis. Except for lingcod *Ophiodon elongatus*, black rockfish *Sebastes melanops*, blue rockfish *S. mystinus*, and dark rockfish *S. ciliatus*, the National Marine Fisheries Service (NMFS) manages groundfish resources in waters of the exclusive economic zone (EEZ), located from 3 to 200 nmi offshore, under Fishery Management Plans (FMPs) developed by the North Pacific Fishery Management Council (NPFMC). Gulf of Alaska (GOA) waters under federal jurisdiction located adjacent to the Cook Inlet Area are within the Central Gulf of Alaska Regulatory Area (CGOA).

The Cook Inlet Area includes territorial waters west of Cape Fairfield (148°50.25' W long) and north of the latitude of Cape Douglas (58°51.10' N lat) and is divided into 2 districts: Cook Inlet and North Gulf (Figure 1). The Cook Inlet District includes waters of Cook Inlet north of a line from Cape Douglas to Point Adam (59°15.27' N lat) and the North Gulf District comprises the remaining waters of the management area, primarily the waters along the outer Kenai Peninsula. Commercial harvests reported here are representative of the current area definition (since being redefined in 1996).

Within the Cook Inlet Area, directed fisheries occur for several commercially important groundfish, including sablefish *Anoplopoma fimbria*, Pacific cod *Gadus macrocephalus*, walleye

pollock *Gadus chalcogrammus* (previously *Theragra chalcogramma*; Page et al. 2013), lingcod, and pelagic shelf rockfish species (primarily black rockfish). State groundfish regulations also accommodate incidental groundfish bycatch from other directed groundfish, halibut, and salmon and herring gillnet fisheries. Some additional species landed as bycatch to directed groundfish fisheries include Pacific spiny dogfish *Squalus suckleyi* (previously *Squalus acanthias*; Ebert et al. 2010), Pacific sleeper shark *Somniosus pacificus*, salmon shark *Lamna ditropis*, commander squid *Beryteuthis magister*, giant Pacific octopus *Octopus dofleini*, big skate *Raja binoculata*, longnose skate *Raja rhina*, other skates *Bathyraja* spp., shortspine thornyhead *Sebastolobus alascanus*, and numerous rockfishes *Sebastes* spp. Statewide regulations adopted in 1997 prohibited directed commercial fishing for sharks (5 AAC 28.084) and allowed skate fishing of the order *Rajiformes*, only under a commissioner's permit (5 AAC 28.083). However, effective in 2005, the BOF provided for directed spiny dogfish (shark) fishing under the terms of a commissioner's permit. Few flatfish landings have occurred, although numerous species of flatfish make up a significant portion of the groundfish biomass within Cook Inlet waters (Bechtol 2001; Gustafson and Bechtol 2001). For a listing of species encountered in Cook Inlet Area groundfish fisheries, refer to Appendix B1.

Commercial groundfish harvests are primarily monitored inseason through required reporting on ADF&G fish tickets (5 AAC 39.130) with additional information derived from dockside sampling of the commercial catch, fishermen interviews, and logbooks for some fisheries. Fish ticket information is collected both electronically through the eLandings systems, a multi-agency (ADF&G, NMFS, and International Pacific Halibut Commission) harvest accounting program, and through submission of conventional fish tickets. These records are reviewed by staff, entered into the statewide fish ticket database, and archived.

Dockside sampling involves the collection of biological data such as species, size, sex, gonad condition, and groundfish age structures (e.g., otoliths, vertebrae, fin spines, fin rays). Fishermen interviews are used to verify information on harvest location and effort. Prior to 2001, dockside activities occurred opportunistically and contingent upon staff availability. Subsequently, through grant funding under the Alaska Fisheries Information Network (AKFIN), a regional groundfish sampling coordinator and a dedicated fisheries technician were hired, resulting in more consistent biological sampling of the commercial harvest. Statewide reporting requirements specify that all groundfish retained but not delivered for sale, such as harvest that is retained for personal use or used as bait at sea, must be reported on an ADF&G fish ticket. This has helped improve fisheries management through complete and accurate documentation of fisheries removals.

Legal gear types for groundfish fishing in the Cook Inlet Area are longline, pelagic trawl, mechanical jig, hand troll, and pot gear. For area fisheries, if more than 1 gear type is legal, only 1 gear type may be aboard a vessel at a time, with the exception of mechanical jig and hand troll gear, which may be fished at the same time as jig gear, although under separate Commercial Fisheries Entry Commission (CFEC) permit cards. Fishermen operating groundfish gear or groundfish tenders in Cook Inlet Area waters must have an area registration prior to fishing or tendering. Another area regulation establishes a 24 hour delivery requirement following the closure of a directed season. Some open groundfish seasons are established in regulation 5 AAC 28.310. For many species, season openings are specified in regulation as calendar dates with season closures and other adjustments set by EO (Tables 1 and 2). For Pacific cod, the parallel and state-waters seasons established in regulation 5 AAC 28.367 *Cook Inlet Pacific Cod*

Management Plan are opened by EO contingent upon management actions for the Pacific cod fishery in the adjacent federal CGOA. For a miscellaneous groundfish species that is not otherwise specified in regulation, the fishing season is established as a provision of the miscellaneous groundfish commissioner’s permit (5 AAC 28.379), a regulation first effective in 1999.

This report summarizes annual harvests, in pounds and exvessel values (Appendix A1), for commercial groundfish fisheries during 1988–2015; describes management changes for the period 2012–2015; and summarizes recent regulatory changes based upon BOF actions. Important groundfish fisheries are discussed in specific sections of this report.

PACIFIC COD

MANAGEMENT AND REGULATIONS

Current elements of the Cook Inlet Area Pacific cod parallel season include:

- Seasons inside state waters open and close by EO to coincide with the federal seasons in the adjacent CGOA area;
 - Initial seasons for pot, jig, and longline open January 1 and close by gear type to coordinate with federal gear sector closures in CGOA for pot, jig, and hook-and-line (HAL; vessels less than 50 ft, vessels more than or equal to 50 ft) announced by NMFS;
 - Parallel seasons may open and close by EO with federal “B” seasons and also unscheduled openings and closures in the CGOA; parallel seasons typically open with regulatory “B” season: June 10 for jig and September 1 for pot and longline;
 - Harvest accrues to federal total allowable catch (TAC);
- Non-exclusive groundfish area vessel registration (gear-specific) required;
- Adopt federal Vessel Monitoring System (VMS) requirements inside state waters (jig exempt).

Current elements of the Cook Inlet Area Pacific cod state-waters season include:

- Season opens by EO 24 hours following closure of the initial federal season in the CGOA area by NMFS;
- Exclusive area registration: vessel may not register for more than 1 exclusive Pacific cod registration area during a state-waters season;
- Guideline harvest level (GHL) calculated as 3.75% of the CGOA estimated total allowable harvest;
- GHL allocated 85% to pot gear and 15% to jig gear;
- Harvest cap of 25% of the GHL on vessels longer than 58 feet and fishing pot gear;
- Legal gear is no more than 60 pots with a buoy tag requirement or up to 5 mechanical jigging machines, maximum of 30 hooks per line;

- If the jig allocation is not achieved by September 1, the remainder of the allocation becomes available to all legal gear; and
- Gear limits and the exclusive area registration requirement may be relaxed after October 30; if ADF&G considers the action necessary to achieve the GHL.

REGULATION DEVELOPMENT

Historically, the Cook Inlet commercial Pacific cod fishery was managed by EO to coincide with seasons in the adjacent federal CGOA. First implemented in 1997, the *Cook Inlet Pacific Cod Management Plan* (5 AAC 28.367; “Plan”) defines 2 seasons, a “parallel season” and a “state-waters season.” Similar to historical management, the parallel season was set by EO to coincide with the federal CGOA fishery for Pacific cod with respect to season dates and allowable gear types, provided those gear types were legal in state waters, and was further guided by statewide regulation 5 AAC 28.087 regarding Steller Sea Lions (SSL) protection measures and use of VMS. Harvest during the parallel season accounts towards the federal TAC. The state-waters season occurs after the initial parallel season and is managed for a separate GHL, which is a percentage of the estimated total allowable harvest for the federal CGOA by state regulation. Total allowable harvest is equivalent to acceptable biological catch (ABC) in NMFS documents; ABC is the term used herein. The Plan originally set the GHL at 2.25% of the ABC, with step-up provisions to 3% and then to a maximum of 3.75%. The Plan also initially allocated 50% of the GHL each to pot and jig gear. Jig gear includes mechanical jig and hand troll gear.

Since adoption in 1997, the state-waters Pacific cod season, which was designed to provide additional Pacific cod fishing opportunities to local vessels using pot and jig gear, has been modified numerous times. The Plan originally specified a state-waters season that opened 7 days following closure of the parallel season, and closed each time the federal CGOA directed Pacific cod season, and concurrent parallel season, reopened.

For the state-waters season, there was a pot closure period of April 7 to June 15 that addressed an industry concern of reduced quality for post-spawn Pacific cod product. Although the product quality concerns meant to be addressed by the pot closure period were not realized, the closure period was retained, but reduced to May 1 through June 15 by BOF action in 1999. The closure was retained due to user interest in ensuring a fishing season for Pacific cod in the fall, while providing an additional 3 weeks of pot fishing time in April. In 2000, a 7-day closure between the parallel and state-waters seasons, intended to ensure separation of the fisheries and facilitate accurate seasonal catch accounting, was reduced to 24 hours and the Plan was further modified to enable the state-waters season to remain open despite subsequent federal CGOA openings, which would have normally resulted in additional parallel seasons. However, in the Cook Inlet Area, parallel seasons have typically continued to be coordinated with federal CGOA seasons, although Plan modifications do allow more flexibility if needed.

Statewide regulations for groundfish pots specify tunnel eye openings with perimeters of 36 inches or less (5 AAC 28.050 (e)) and a biodegradable escape mechanism as described in 5 AAC 39.145. Area regulations specify localized closures to groundfish pots in portions of Kachemak Bay and Kamishak Bay (5 AAC 28.350) to protect depressed king crab *Paralithodes platypus* stocks and rebuilding Tanner crab *Chionoecetes bairdi* stocks (Bechtol et al. 2002; Figure 2). The Kachemak Bay pot closure regulation, partially defined by a depth contour, was amended in 2002 and defined by latitude and longitude coordinates. Limited onboard observer data from

vessels using pot gear in Kachemak Bay and data from ADF&G surveys suggest this closure area achieves the goal of protecting crab in critical habitat.

In 2001, the BOF recognized NMFS fishing gear closures for Pacific cod in critical habitat around the haulouts and rookeries of endangered SSL by giving the commissioner EO authority to adopt the federal closures surrounding these areas. As a result, fishing with longline or pot gear within 10 nmi of Sugarloaf Island (within the Barren Islands group) and Outer Pye Island has been closed annually since 2001 via EO (Figure 3).

Beginning in 2002, the BOF also adopted the federal VMS requirement for parallel Pacific cod fisheries. This action was adopted to provide more precise location information in support of fishery enforcement efforts and protection for essential fish habitat and areas of particular concern.

Due to attainment of the 2003 GHF, and consistent with the Plan, beginning in 2004, the state-waters Pacific cod allocation increased from 2.25% to 3.00% of the federal CGOA ABC. During the 2004 meeting cycle, the BOF adopted several regulatory changes to the Pacific cod state-waters season that became effective during 2005. These changes included increasing the percent calculation for the GHF from 3.00% to 3.75%, setting a harvest cap of 25% of the GHF for vessels greater than 58 feet in overall length, and establishing new gear allocations that changed from 50% each to 75% for pot and 25% for jig gear. At a special 2011 Pacific cod BOF meeting, the BOF amended Pacific cod management plans in order to coordinate with new federal gear sector allocations that were to be implemented in 2012. These regulatory changes allowed for staggered parallel and state-waters seasons by gear type. The BOF also adopted new allocations for the Cook Inlet Area GHF of 85% for pot gear and 15% for jig gear, with a step-up provision where the jig allocation will increase by 5% the following year, if 90% of the jig allocation is reached in a given year, up to a maximum of 25%. Additionally, the BOF eliminated the May 1 to June 15 pot closure.

FISHERY OVERVIEW: THE LAST 4 YEARS, AFTER SECTOR SPLITS

In 2012, federal gear sector splits were implemented that changed the Pacific cod fishery by allocating available harvest by gear type in the federal fishery, and, consequently, to longline, pots, and jig gear in the parallel fishery. As described above, BOF adopted new regulations effective in 2012 to coordinate the parallel season with the federal season and adjust the state-waters seasons accordingly to follow parallel seasons that now had staggered closures by gear type. State groundfish fisheries managers track federal closures and issue EOs as needed in order to prosecute state fisheries in compliance with these new regulations (Tables 1, 2, and 3).

The parallel Pacific cod fishery in Cook Inlet Area has been dominated by longline harvest. Since 1999, the highest harvest occurred during the last 4 years, peaking in 2015 at 1.7 million lb (Table 4). Increased longline participation in recent years was directly related to federal gear sector splits. Vessels have remained in the Cook Inlet Area to fish the parallel season instead of moving to another area. Longline vessels are now able to fish their separate allocations versus competing against other gear types for the same quota, because it was prior to gear sector splits. Processors in Seward followed suit by opening earlier in the year during the initial parallel season to accommodate participating longline vessels. Prior to gear sector splits, processors waited to open until the commercial halibut season. Vessels fishing with pot gear in the parallel fishery harvested approximately 350,000 lb to nearly 1 million lb in the past 4 years. Annually, participation by jig gear has been low with a spike of 32,260 lb in 2014; the highest harvest since

1998. Combined participation from all gear types in the last 4 years has averaged 55 vessels with 199 landings and total harvest ranging from just over 1 million lb (2014) to 2.1 million lb (2015).

Since federal gear sector splits were implemented in 2012, the parallel longline fishery has generally lasted a couple months, closing sometime in March (Table 3). The only exception was in 2015 when the parallel longline season was open all year, except during the federal regulatory closure from June 10 until September 1, between “A” and “B” seasons. The parallel pot season followed the same annual pattern for the past 4 years, closing in mid-February and opening again on September 1 through December 31, concurrent with the federal “B” season. The jig season has been more variable, although the overall effect has been a longer parallel jig season. In 2012 and 2015, the parallel jig season closed in early March and opened back up on June 10 in conjunction with the federal “B” season. However, in 2013 and 2014, the parallel jig season remained open the entire calendar year. This was primarily due to the federal CGOA jig sector allocation increasing in 2013 by 1% of the total CGOA Pacific cod TAC due to a step-up provision that was triggered after 90% of the jig TAC allocation was achieved in 2012. The CGOA jig allocation stepped back down in 2015 after less than 90% of the jig TAC allocation was harvested for 2 consecutive years, in 2013 and 2014.

The state-waters Pacific cod fishery GHL is calculated as 3.75% of the federal CGOA ABC and has ranged from 4.1 to 5.1 million lb during the last 4 years (Tables 5 and 6). The GHL is allocated 85% to vessels using pot gear and 15% to jig gear. Vessels using pot gear during this period harvested between 2.8 million lb (2013) and 4.0 million lb (2012). Effort by vessels using pot gear ranged from 8 vessels in 2014 to 13 vessels in 2012 and 2013. The state-waters season for jig gear did not open in 2013 and 2014 due to the parallel jig season remaining open the entire calendar year, and therefore harvest and effort was zero during those 2 years. For the 2 years the state-waters jig season opened since federal gear sector splits, harvest was 192,847 lb in 2012 and 70,639 lb in 2015. The effect of federal gear sector splits has been a shorter or no state-waters jig season. For vessels using jig gear, effort was 27 vessels in 2012 and 7 vessels in 2015; as noted there was no effort in 2013 and 2014 due to the state-waters jig season not being prosecuted.

For the state-waters season, pot and jig seasons open 24 hours after the close of the parallel season. Since 2012, the state-waters pot season has opened in mid-February (Table 3). Vessels longer than 58 feet are capped at 25% of the total GHL, and the number of participants has been 3 vessels or less, resulting in a variety of season lengths for this group of participants. For the smaller vessel participants, less than or equal to 58 feet, between 2012 and 2015, the season ranged from 1.5 months to staying open until September 1 when the parallel “B” season opened. Participants using jig gear did not have a state-waters season in 2013 and 2014, and in 2012 and 2015 the state-waters season was open until the parallel “B” season opened on June 10. In 2012, the state-waters jig fishery was opened again on June 29 through December 31 following the parallel jig season closure.

Longline is a legal gear type for the parallel Pacific cod fishery in the Cook Inlet Area. Since 2012, the majority of total effort and harvest occurred in the North Gulf District (NGD; Table 7). For the past 4 years, harvest in the NGD averaged nearly 1.2 million lb and approximately 500,000 lb in the Cook Inlet District (CID). Since 2012 in the state-waters season, total average harvest in the 2 districts was closer to 1.8 million lb in the NGD and 1.5 million lb in the CID (Table 8).

Pacific cod fisheries generate the greatest economic contribution from Cook Inlet Area groundfish fisheries. The estimated exvessel value for Pacific cod fisheries in 2012 was the highest on record at over \$2.4 million and 2015 produced the third highest exvessel value at nearly \$2.0 million (Appendices A1 and A2).

FISHERY OVERVIEW: THE EARLY YEARS

The Cook Inlet Pacific Cod Management Plan (5 AAC 28.367), implemented in 1997, first established the parallel season and the state-waters seasons. Prior to 1997, the Cook Inlet Area commercial Pacific cod fishery was managed via EO to coincide with federal seasons in the adjacent CGOA, in the same manner the parallel season has been managed, and for reporting, this historical season is also considered the parallel season. Parallel season harvest from all gear types were combined and accounted to a single federal CGOA TAC until federal gear sector splits were implemented in 2012. Parallel seasons historically spanned January 1 to approximately mid-March and more recently, have ranged from 1 to 2 months in duration (Table 3). The state-waters fishery was apportioned a percentage of the federal CGOA ABC for the GHL when it was established in 1997.

Parallel season annual harvest and effort from 1988–1996 ranged from 36,846 lb from 21 landings by 9 vessels in 1989 to 5,441,421 lb from 868 landings by 190 vessels in 1992 (Table 4). The parallel season harvest first exceeded 1.0 million lb in 1991 and averaged 3.3 million lb annually during 1991–2000 (Figure 4). Historically, the majority of the parallel harvest came from longline gear in the NGD. However, the 1990s expansion of the pot fishery shifted the largest component of parallel Pacific cod harvest to the CID in 2001 for the first time since 1990 (Table 4; Figure 4), and it comprised the larger portion of the harvest in 2003–2006 and in 2011. Pot gear has taken the larger portion of the parallel season harvest in those years and also in 2010, and took the highest percentage, 93% of the parallel harvest, in 2004. However, longline gear overtook pot gear as the dominant gear from 2007 through 2009, taking the highest percentage of the parallel harvest, 84%, in 2009, before shifting back to pot gear as the dominant gear type in 2010 and 2011, and prior to federal gear sector splits being implemented in 2012. After 2000, parallel fishery harvests through 2011 totaled less than 1.0 million lb annually, primarily due to a shift to the Kodiak Area by the local longline fleet. Harvest by vessels using jig gear has not played a major role in the parallel fishery, although jig harvest has been significant in some years in the state-waters fishery (Tables 4 and 5).

In 1997, the first year of the state-waters fishery, vessels using jig gear harvested 561,947 lb, the highest harvest to date, and was 67% of the total harvest and 22% of the GHL. In 2003, jig gear harvested 429,684 lb, nearly 30% of both total harvest and the GHL. Although vessels using jig gear have performed well in some years during the state-waters season, harvests have often been relatively low, and jig gear has rarely achieved higher than 10% of the GHL in most years and has never achieved its allocation (Table 6). However, with the highest GHL for the period set at over 4.4 million lb in 2011, vessels using jig gear harvested nearly 0.5 million lb, or 11% of the GHL, the largest harvest since 1997.

From 1997 through 2011, annual harvest by vessels using pot gear during the state-waters fishery averaged 1.7 million lb. The highest harvest (3.9 million lb) and GHL for the period occurred in 2011. Vessels using pot gear typically achieved their allocation, although the CI state-waters Pacific cod fishery GHL has only been achieved in 2003 (Table 5; Figure 5).

During the parallel season, harvest was more dispersed throughout the NGD, primarily attributable to participation by longline vessels delivering in Seward, whereas effort during the state-waters season was dominated by pot vessels fishing out of Homer (Figures 6 and 7).

RESEARCH

Although ADF&G has only limited data on spring Pacific cod distributions in the Cook Inlet Area (Bechtol 2001), studies from other areas suggested that Pacific cod undertake a seasonal migration beginning in the fall to aggregate in major spawning areas over winter, then disperse to summer feeding grounds following spawning (Shimada and Kimura 1994). This was supported by observations during the commercial Pacific cod fishery in the Cook Inlet Area, where catch rates increased over winter and generally peaked during February and March, then tended to slow down by late April.

HARVEST MONITORING

Dockside sampling of Pacific cod and fishermen interviews were conducted during the Cook Inlet parallel and state-waters seasons. Information collected by dockside samplers included fishing location and effort as well as fish length, weight, sex, maturity stage, and age structures.

Pacific cod biological data have been collected since the state-waters season was implemented in 1997, although only length data was recorded the first year of sampling. Average weights of Pacific cod have ranged from 2.9 kg to 3.8 kg, average lengths ranged from 61 cm to 66 cm, and sex ratios ranged from 51% to 60% female (Table 9). Pacific cod size has been on a downward trend in recent years and 2015 had the shortest length since 2005 and the lowest weight since 1999; the small fish size was corroborated by processors. In 2015, 4,466 Pacific cod were sampled for length in the Cook Inlet Area, composed of 1,882 fish from the CID and 2,584 from the NGD. Fish sampled from the NGD have averaged consistently larger than those in the CID historically, and that trend continued in 2015. Cook Inlet District fish averaged 59 cm in fork length, and fish from the North Gulf District averaged 63 cm (Figure 8). Length data, by sex, gear type, month, year, and NMFS area, has been provided to NMFS annually for the CGOA Pacific cod stock assessment beginning in 2014, including all historical data back to 1997.

Otoliths were collected from approximately 25% of the samples. Pacific cod age determination can be problematic and age accuracy has been unresolved in past years (Carlile 2005). Because Pacific cod in the GOA are managed by NMFS using a length, rather than age-structured model, a decision was made to reduce otolith sampling and archive otoliths for future age determination (Russ et al. 2013b). However, recent indications of greater site fidelity in Pacific cod than was previously assumed (Shi et al. 2007) suggested that further analysis and more focused assessment of state-waters Pacific cod may be warranted.

Ancillary information on Pacific cod age, sex, size, and distribution was also collected during the annual trawl surveys in Kachemak and Kamishak bays; survey results were reported in separate reports (Bechtol 2001).

2015 SEASON SUMMARY AND OUTLOOK

The 2015 Cook Inlet Area parallel Pacific cod season opened to all gear types on January 1 (Table 3). The parallel longline season continued through 12:00 noon June 10, the regulatory end to the federal initial season, and then reopened on September 1 through December 15, when the fishery was closed due to achieving their allotted halibut bycatch. The parallel pot season closed

on February 16 and then reopened on September 1 and closed December 31. The parallel jig season closed on March 2 and then reopened on June 10 and closed December 31.

The state-water pot and jig seasons opened 24 hours after the parallel season closures, per regulation. All sized vessels were allowed to fish with pots from February 17 through September 1, when the parallel season reopened (Table 3). The state-waters jig season opened March 3 and continued through June 10, when the parallel season reopened. Basically in 2015, vessels fishing with pot or jig gear had fishing opportunity all year in the Cook Inlet Area, whether in a parallel or state-waters fishery.

In 2015, as with recent years since federal gear sector splits, longline was the dominant gear harvesting Pacific cod, with 1.7 million lb and 81% of the total parallel harvest. Vessels using pot gear harvested 407,494 lb of Pacific cod during the parallel season. Jig harvest was minimal. Total harvest for the parallel fishery was just over 2.1 million lb by 57 vessels from 205 landings (Table 4).

The total harvest for the 2015 state-waters Pacific cod fishery was 3.3 million lb of the 5.1 million lb GHL (Table 5). Longline was not a legal gear type for the state-waters Pacific cod fishery and was dominated by vessels fishing with pot gear. Pot vessels harvested 98% of the total harvest with 11 vessels making 134 landings. Jig fisherman harvested 70,639 lb of Pacific cod with 7 vessels and 31 landings.

Stock assessment conducted by NOAA/NMFS estimated abundance of Pacific cod in the Gulf of Alaska and generated an ABC. The CGOA ABC was reduced nearly 1 million lb from 2015 to 2016, resulting in a 2016 GHL less than 4.1 million lb.

SABLEFISH

MANAGEMENT AND REGULATIONS

Current elements of the Cook Inlet state-waters sablefish fishery include:

- Season opens July 15 and closes December 31 unless closed earlier by EO;
- Sablefish may only be retained during an open directed sablefish fishery on board a vessel that is registered to participate in the Cook Inlet sablefish fishery;
- Registration required;
- GHL is annually adjusted by the percentage of change in the CGOA ABC calculated by NOAA/NMFS from stock assessment;
- Legal gear is longline, pot, or jig gear;
- Mandatory logbook requirement; and
- Trip limit of 3,000 lb (round weight) of sablefish in 2 consecutive days.

Federal regulations allow a federal sablefish IFQ (Individual Fishing Quota) holder to participate in the state-managed sablefish fishery, provided the vessel harvest does not exceed the allotted IFQ shares (state-managed sablefish harvest is deducted from IFQ) and the permit holders comply with both federal IFQ and state regulations, including registration.

REGULATION DEVELOPMENT

The Cook Inlet Area sablefish fishery historically opened and closed on dates concurrent with the sablefish season in adjacent federal waters (Bechtol 1995). Following implementation of the federal sablefish IFQ program in 1995, the Cook Inlet sablefish fishery became 1 of only 2 open-access sablefish fisheries in the state (Sigler et al. 2003). Beginning in 1995, the Cook Inlet fishery opened concurrently with the IFQ sablefish fishery on March 15, and closed by EO based upon harvest and catch rates. In 1997, the GHL was set at the recent 5-year average sablefish harvest of 104,000 lb from the NGD using the pre-1996 district boundaries. The fishery GHL was subsequently adjusted each year in proportion to the percentage annual change in sablefish ABC set by NPFMC for federal waters of the CGOA. The ABC was based on biomass estimates generated from annual surveys conducted by NMFS in the Gulf of Alaska. Because sablefish in the Cook Inlet Area were considered to be part of the Gulf of Alaska stock, adjusting the state GHL proportional to changes in the CGOA ABC was a conservative approach to managing this historical nearshore fishery.

In response to public complaints of harvest being misreported from adjacent federal waters, and testimony suggesting improved sablefish catch rates in nearshore waters later in the year, a public proposal to change the sablefish season opening date to July 15 was considered by the BOF in 1998. Harvest data from 1988 to 1998 indicated the majority of harvest occurred during May and June, supporting the increased catch rate claims discussed at the November 1998 BOF meeting. The BOF adopted the proposal, which was first implemented in 2000.

Although ADF&G adjusted season duration in response to catch rate increases, managing for the annual harvest targets remained problematic. GHLs were exceeded annually from 2000 to 2003 by 35% to 50% (Table 10; Figure 9). In 2004, ADF&G submitted a proposal for an equal quota share that would divide the GHL equally among all registered participants. However, the proposal was amended to limit harvest per vessel to no more than 3,000 pounds of sablefish within 2 consecutive days. This vessel trip limit approach was adopted by the BOF as part of the *Cook Inlet Sablefish Management Plan* (5 AAC 28.360) which also included sablefish fishery-specific registration and a logbook requirement. First implemented during the 2005 season, the trip limit resulted in increased season duration and improved management precision for harvest targets.

FISHERY OVERVIEW: THE LAST 8 YEARS

Over the last 8 years (2008–2015), there has been consistently reduced harvest and participation compared to levels before 2008. The average annual harvest during this 8-year period was 53,698 lb with an average of 9 vessels participating, considerably less than historical harvest and effort (Table 10; Figure 9). In contrast, the number of landings increased during this 8-year period to an average of 44 landings annually, which was similar to pre-2000 levels. This may have been due in part to combined commercial halibut and sablefish fishing trips.

During the last 3 seasons (2013–2015), the number of vessels participating and the total commercial harvest have been the lowest in the fishery since 1990 (Table 10). The number of vessels participating was less than 9, with only 4 vessels in 2015 (tied with 1989 for lowest effort). Harvest followed the same trend with the lowest harvest since 1995 of 31,780 lb occurring in 2015. Average pounds per landing over the last 8 years was also low, ranging from

837 lb per landing in 2009 to 1,748 lb per landing in 2014, with the second lowest of 935 lb per landing in 2015.

NMFS Gulf of Alaska sablefish biomass estimates varied over the last 8 years and affected the corresponding Cook Inlet Area sablefish GHGs (Table 10). The highest GHG was 69,000 lb in 2012 and the lowest GHG was 53,733 lb in 2010. The biomass estimates, and the corresponding ABCs for the CGOA, declined annually from 1994 to 1999 (Sigler et al. 2003), increased from 2000 to 2004, and then declined from 2004 to 2010, with a slight increase in 2011. The Cook Inlet Area sablefish fishery GHG was not achieved during the past 3 seasons (2013–2015).

Fishery season length has varied over the past 8 seasons ranging from 6 days to 166 days, when the fishery was open until the end of the regulatory season, December 31. The past 3 seasons, 2012 through 2015, have been open from July 15 until the end of the calendar and regulatory year (Tables 1 and 2).

Despite declining harvests, due to a high dockside price per pound, the sablefish fishery still generates the second highest economic contribution, after Pacific cod, from Cook Inlet Area commercial groundfish fisheries. However, the estimated exvessel value for 2015 of nearly \$105 thousand was the lowest since 1998 (Appendix A1).

FISHERY OVERVIEW: THE EARLY YEARS

Between 2000 and 2007, the harvest and average pounds per landing were at high levels (Table 10; Figure 9). The harvest ranged from 76,889 lb to 133,435 lb with between 2,136 lb and 8,721 lb per landing. The number of vessels participating during this same period was between 10 and 23 and the landings between 14 and 41.

Pre-2000, the number of vessels participating and the number of landings in the fishery was highest in 1992 with 79 vessels participating and 103 landings.

Cook Inlet sablefish harvests since 1988 have ranged from 2,996 lb in 1989 to 136,260 lb in 1988; effort has ranged from 4 vessels in 1989 (and 2015) to 79 vessels in 1992 (Table 10). The NGD yielded the majority of sablefish harvested whereas annual harvests from the CID rarely exceeded 2,000 lb. In the NGD, waters of Resurrection Bay, Aialik Bay, and in some years Day Harbor were the primary fishing areas. No sablefish were landed from the CID since 1995.

As catch rates increased, season duration steadily declined from 1996 to 2004. The 1996 season lasted 169 days and following the season opening date change to July 15 in 2000, season duration declined further from 11 days in 2000 to the fishery low of 1 day in 2004.

Despite declines in NMFS biomass estimates and corresponding decreases in state fishery GHG from the mid-1990s to early 2000s, catch rates in the Cook Inlet Area sablefish fishery increased from 1995 to 2003, until the 3,000 lb trip limit was implemented in 2005.

RESEARCH

Sablefish have traditionally been thought to form 2 populations based on differences in growth rate, size at maturity, and tagging studies (McDevitt 1990; Saunders et al. 1996; Kimura et al. 1998). The northern population inhabits Alaska and northern British Columbia waters and the southern population inhabits southern British Columbia, Washington, Oregon, and California waters, with mixing of the 2 populations occurring off southwest Vancouver Island and northwest Washington (Hanselman 2015). Significant stock structure among the federal Alaska

population is unlikely given extremely high movement rates throughout their lives (Hanselman et al. 2015; Heifetz and Fujioka 1991; Maloney and Heifetz 1997; Kimura et al. 1998). Mixing between federal stock and Cook Inlet Management Area sablefish is assumed, which is why the GHL is adjusted with the ABC in the CGOA.

HARVEST MONITORING

Logbook data was collected from the sablefish fishery since 2005. In 2016, comprehensive efforts were made to error-check and standardize this data to provide a CPUE (catch per unit effort) for the fishery expressed in pounds per hook. Reported logbook data (Table 11) excludes incomplete or missing data and includes total hooks for all trips combined and corresponding sablefish harvest (excluding unusable trips) with an associated CPUE for 2005–2015. The average CPUE for the time series was 0.24 lb/hook and the CPUE in 2015 was 0.17 lb/hook. The lowest CPUE was 0.12 lb/hook in 2009, which also corresponds to the lowest average pounds per landing of 837 lb for the time series (Tables 10 and 11).

Sablefish biological sampling began consistently in 2000. During 2000–2015, dockside sampling yielded average sablefish lengths ranging from 57 cm to 63 cm and average weights ranging from 2.0 kg to 2.7 kg with the largest sablefish documented in 2005 (Table 12). Sablefish were small in 2015. Sablefish length in 2015 matched the previous low recorded in 2001. Similarly sablefish average weight was the lowest in 2015, matching that recorded in 2010. Percentage of females has been increasing slightly over the past 3 years to 59% female in 2015, although still below the high of 68% that occurred in 2002, the first year sex ratio data was available, and the average for all years of 63%.

OUTLOOK

NOAA/NMFS research and stock assessment of the sablefish stocks in the CGOA and the GOA showed there was limited recruitment. The recommended CGOA sablefish ABCs decreased from 4,176 metric tons (mt) in 2015, to 4,023 mt in 2016, which resulted in a 2016 GHL of 48,000 lb, the lowest since the GHL was first set in 1997, and down from 55,500 lb in 2015.

ROCKFISH

AGGREGATION DEFINITIONS

There are 3 rockfish assemblages: pelagic shelf rockfish (PSR), demersal shelf rockfish (DSR), and slope rockfish. Pelagic shelf rockfish assemblage includes the following: black rockfish *Sebastes melanops*, dusky rockfish *S. variabilis*, dark rockfish *S. ciliates*, yellowtail rockfish *S. flavidus*, widow rockfish *S. entomelas*, and blue rockfish *S. mystimus*. Demersal rockfish assemblage includes the following: canary rockfish *S. pinniger*, china rockfish *S. nebulosus*, copper rockfish *S. caurinus*, quillback rockfish *S. maliger*, rosethorn rockfish *S. helvomaculatus*, tiger rockfish *S. nigrocinctus*, and yelloweye rockfish *S. ruberrimus*. Slope rockfish describes any species of the genus *Sebastes* not specified in either demersal shelf rockfish or pelagic shelf rockfish; thornyhead rockfish *Sebastolobus* spp. are included with this aggregate for harvest accounting in Cook Inlet Area.

MANAGEMENT AND REGULATIONS

Current elements of the *Cook Inlet Rockfish Management Plan* (5 AAC 28.365) include:

- GHL of 150,000 lb for all rockfish species, bycatch and directed harvest combined;
- Mandatory retention of all rockfish;
- 5-day trip limits of 4,000 lb for the North Gulf District and 1,000 lb for the Cook Inlet Districts;
- Rockfish bycatch limits are established by regulation under 5 AAC 28.365 for other groundfish and halibut fisheries and referenced in annual emergency order; and
- Cook Inlet Area directed rockfish fishery for PSR:
 - Season opens on July 1 and closes December 31 unless closed earlier by emergency order;
 - Legal gear is mechanical jigging machines and hand troll;
 - Logbooks are required; and
 - Registration is required.

REGULATION DEVELOPMENT

The *Cook Inlet Rockfish Management Plan* (5 AAC 28.365) was first implemented in 1993, and established the 150,000 lb GHL. From 1993 to 1996, rockfish opened to directed fishing January 1, closed when the 150,000 lb GHL was attained, and remained open as a bycatch-only fishery for the balance of the year. In 1996, due to bycatch harvest levels that exceeded directed fishery removals in some years and a lack of stock abundance information, the BOF adopted a more conservative approach by making the 150,000 lb GHL a harvest cap rather than a “trigger” for opening the bycatch fishery. Management under the harvest cap approach, begun in 1997, proved problematic, because it required ADF&G to anticipate the amount of rockfish bycatch needed for other directed fisheries such as halibut and Pacific cod.

In 1998, the NPFMC amended the pelagic rockfish assemblage, as defined in the federal GOA federal FMP, by removing black and blue rockfishes (DiCosimo et al. 1997). This action, requested by the state to address misreporting problems associated with the fishery, effectively transferred management responsibility for these species in federal waters to the State of Alaska (5 AAC 28.010). Although blue rockfish has not been reported in the Cook Inlet Area, black rockfish is a pelagic species commonly found in the NGD.

Also in 1998, the BOF established a July 1 directed rockfish season opening date and restricted gear for targeting rockfish to mechanical jig or hand troll (hand jig). These measures were adopted to align the directed rockfish season with the lingcod season due to similarities in gear and species habitat requirements and to focus the directed fishery on black rockfish, rather than yelloweye rockfish that are more susceptible to overfishing. However, once these changes became effective, individual jig landings were dominated by yelloweye rockfish, increased in the directed jig rockfish fishery.

By the year 2001, yelloweye rockfish harvest by jig gear surpassed the harvest by longline gear as bycatch to other directed groundfish fisheries. In addition, changes in the species composition of the commercial harvest heightened concern about stock sustainability because DSR, such as yelloweye, require a much longer rebuilding period than PSR if overfishing occurs. In response to the increased DSR harvest from jig gear, ADF&G submitted a proposal in 2004 that was subsequently adopted by the BOF to restrict the directed fishery to PSR species and require

logbooks. The effect of these regulatory changes focused the jig fishery on PSR species and has provided better resolution on harvest location. Also adopted by the BOF in 2004 and effective in 2005 was mandatory retention of rockfish in the Cook Inlet Area. Mandatory retention improved accounting of fishery removals because rockfish caught in deep water suffer barotrauma, which is caused by rapid decompression and expansion of gases in the swim bladder, and therefore experience a high rate of mortality.

Prior to 2004, 2 varieties of dusky rockfish were identified under the name *Sebastes ciliatus*; a dark colored variety that inhabited inshore, shallow waters, and a lighter colored variety that inhabited deeper water offshore. In 2004, these 2 varieties of dusky rockfish were designated as distinct species. The dark colored variety is now recognized as dark rockfish, *Sebastes ciliatus*, and the light colored variety is now recognized as dusky rockfish, *Sebastes variabilis* (Orr and Blackburn 2004). In 2008, dark rockfish were removed from the GOA FMP and management responsibility of that species in federal waters was delegated to the State of Alaska.

In 2010, ADF&G submitted a proposal to adjust and standardize rockfish bycatch allowances to halibut and directed groundfish species and also to define DSR bycatch allowances in the directed PSR jig fishery. This proposal was adopted by the BOF and implemented in 2011. The rockfish bycatch allowances for the Cook Inlet Management Area are 10% to halibut and directed groundfish fisheries, except that the bycatch allowance of DSR is 20% in the directed PSR jig fishery. Prior to 2011, rockfish bycatch allowances in the Cook Inlet Area ranged from 5% to 20% depending on the target species.

FISHERY OVERVIEW: THE LAST 10 YEARS

Over the last 10 years (2006–2015), harvest has shown interesting trends, with DSR being a majority of the total harvest compared to PSR, then switching to PSR becoming more prominent in the harvest. Slope rockfish harvest remains the lowest percentage of the harvest. Total Cook Inlet Area rockfish harvest in 2015 was 140,819 lb, the highest level since 2003.

In 2013, 2014, and 2015, the PSR harvest was high and dominated the rockfish harvest due to more participation in the directed PSR jig fishery. In 2015, the PSR harvest was 82,401 lb, the highest in the last 10 years and represented 59% of total rockfish harvest (Table 13; Figure 10). PSR comprised from 10% in 2009 to 66% of the total rockfish in 2011.

Commercial harvest of DSR was steady over the past 10 years with the second highest historical harvest in 2015 of 54,052 lb (Table 13). Between 2006 and 2014, harvest has ranged from 13,298 lb to 29,585 lb with an average of 23,739 lb.

Finally, during the last 10 years, slope species (including thornyhead rockfishes, *Sebastolobus* spp.), predominantly represented by shortraker *Sebastes borealis* and rougheye *Sebastes aleutianus* rockfish, have made up a record 30% of the total rockfish harvest in 2009 with a low of 3% in 2015 (Table 13). Harvest ranged from 1,664 lb in 2006 to 9,434 lb in 2009.

Jig and longline gear harvest the majority of the commercial rockfish in the Cook Inlet Area (Figure 11). Annually, between 2006 and 2014, total rockfish harvest was less than 71,000 lb (Table 13). In 2015, harvest by both jig and longline gear increased from the previous year. Harvest by jig gear increased almost two-fold from 42,104 lb in 2014 to 81,337 lb in 2015, the highest since 2004 (Table 14). Jig harvest varied considerably over the past 10 years, with a historical low of 4,471 lb occurring in 2009. For longline gear, the harvest increased three-fold from 18,709 lb to 59,265 lb. Longline gear harvest also varied over the last 10 years, ranging

from 14,666 lb in 2006 to 59,265 lb in 2015. Increased longline harvest was due in part to changes in federal management of the Pacific cod fishery and implementation of gear sector allocations in 2012, which resulted in more effort during the parallel Pacific cod fishery in the Cook Inlet Area and in turn increased harvest of rockfish bycatch.

Rockfish harvest has generated the third highest contribution from Cook Inlet Area commercial groundfish fisheries, after Pacific cod and sablefish, since 2009. Estimated exvessel value from all rockfish harvest in 2015 of just over \$83,000 was the highest since 1997, and corresponds to the high harvest level (Appendix A1).

FISHERY OVERVIEW: THE EARLY YEARS

Pelagic shelf rockfish (PSR), particularly black rockfish taken primarily by jig gear, accounted for over 56% of the total harvest in most years through 2005 with harvests exceeding 300,000 lb in 1994 and 1995 (Table 13; Figure 10). A decline in PSR harvest began in 2006, with a historical low of 3,154 lb harvested in 2009 due to low jig effort in the directed pelagic rockfish fishery.

Demersal shelf rockfish (DSR), which are predominantly yelloweye rockfish, and harvested by longline gear, was the second most dominant assemblage and averaged 36% of the annual harvest since 1996. From 2001 to 2003, yelloweye rockfish harvest by jig gear exceeded that harvested by longline gear with 3,063 lb harvested by jig gear in 2003. However, since then jig harvest of DSR species declined significantly, due primarily to the directed fishery being restricted to target PSR since 2005.

Within the Cook Inlet Area, the NGD historically yielded greater than 95% of the commercial rockfish harvest during any given year (Table 15) and also supported active sport and personal use rockfish fisheries, with the exception of a low of 85% in 2008. The rocky, high-relief habitat typical of the NGD was more suitable to nearshore rockfish than the glacial-mud substrate of the CID.

Since 1988, total rockfish harvest and effort in the Cook Inlet Area ranged from 25,388 lb by 45 vessels in 2007 to 502,046 lb by 120 vessels in 1995 with peak harvest years occurring during 1991–1997 (Table 15).

RESEARCH

Between 2001 and 2005, ADF&G conducted a series of research projects to assess black rockfish populations within the NGD¹ (Byerly and Bechtol 2005). One goal of these studies was to develop a standardized approach to index the abundance of black rockfish and associated species in nearshore waters. Initial surveys attempted to estimate local abundances of black rockfish in areas that may serve as long-term survey locations to monitor population trends. Mark-recapture and underwater scuba transects were used to estimate local abundances. Low recapture success and biases detected during scuba transects made these methods unusable. A follow-up study evaluated the use of hydroacoustic counts and mechanical jigging CPUE as low-cost methods to index black rockfish population abundance on a management district scale. Mechanical jigging CPUE was found not to be a predictable index of abundance although

¹ Byerly, M. M., and C. Worton. *Unpublished* (2007). Development of a black rockfish population index [In] Nearshore Marine Research in Alaska (V): Final Comprehensive Progress Report, NOAA Cooperative Agreement NA03NMF4370202. Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau.

hydroacoustic counts showed some promise and continued evaluation of this method may prove to be effective.

In 2005, research was conducted to develop lingcod and DSR estimates using a remotely operated vehicle (ROV; Byerly et al. 2015). The purpose of this survey was to estimate, for the first time, the abundance of lingcod within a section of the NGD in the Cook Inlet Management Area. Chiswell Ridge was selected for this 2005 survey because it was a historically important recreational and commercial harvest area. Lingcod were the focus of this survey but ancillary estimates for DSR were made because both species occupy similar habitats. A closed population was assumed because the Chiswell Ridge was surrounded by relatively deep waters, extending to the lower limit of typical lingcod depth distribution. A neighboring area was also surveyed to compare and investigate variation in density estimates. Strip transects were conducted with a ROV to estimate lingcod and DSR abundance within rocky habitats delineated from multi-beam and side-scan sonar data. Significant differences in lingcod density were detected between study areas. Chiswell Ridge abundance estimates were relatively precise for all species; the coefficient of variation for lingcod was 20%, adult yelloweye rockfish was 15%, and quillback rockfish was 18%.

HARVEST MONITORING

Dockside sampling of PSR harvests began consistently in 1998, and in 2015 the largest number of PSR were sampled due to increased effort in the directed jig fishery and more sampling opportunities. There was a decreasing trend the past 2 years of the percentage of black rockfish in PSR samples, at 70% in 2015 compared to an average of 92% from 1998–2013, with nearly 100% black rockfish in PSR samples in 2005 and 2006; the low was 67% in 2011 (Table 16). The high black rockfish percentages in some years may have been partly due to limited time to collect samples with black rockfish being the priority.

Species composition reported on fish tickets differed somewhat from dockside sampling indices suggesting a systematic underreporting of dusky and dark rockfish in landings of PSR. The majority of sampled PSR come from directed jig landings, which tend to have a higher percentage of other species besides black rockfish and may be contributing to the discrepancy in species composition between reported versus sampled harvest. The highest percentages of dark rockfish (12%) and dusky rockfish (14%) samples occurred in 2015 (Table 16). Average weight of black rockfish ranged from 2.0 kg to 2.6 kg, average length ranged from 47 cm to 53 cm, and average age ranged from 12 years to 21 years (Table 17). In 2015, black rockfish were 50 cm in length and 2.2 kg, similar to historical averages; however, the percent female was 32%, well below the average of 51%.

Harvests of non-pelagic rockfish during this period were predominately bycatch to longline fisheries for halibut, sablefish and Pacific cod, with some harvest occurring in the directed rockfish and lingcod jig fisheries. In 2015, quillback rockfish made up the highest proportion (42%) of the sampled non-pelagic rockfish catch, for the first time surpassing the percentage of yelloweye rockfish sampled, and was followed by yelloweye (34%), roughey (15%), and silvergray (3%) rockfish, with other rockfish species combined making up 6% of the sampled harvest (Table 18).

LINGCOD

MANAGEMENT AND REGULATIONS

Current regulations for commercial lingcod in the Cook Inlet Area include the following:

- Lingcod may only be retained July 1 through December 31;
- Registration required for directed lingcod fishery;
- GHL is 52,500 lb;
- Directed fishing for lingcod is restricted to jig gears (mechanical or hand troll); no more than 5 lines and 30 hooks per line, may be retained as bycatch during other directed fisheries at a 20% level;
- Minimum size limit of 35 inches from the tip of the snout to the tip of the tail; and
- The department has EO authority to close and immediately reopen the fishery with a requirement that all lingcod be delivered with head on and with the vent and external area 1 inch forward of the vent unmutilated so that gender may be determined during dockside sampling.

REGULATION DEVELOPMENT

In the Central Region, the state first exercised its management authority for lingcod in the EEZ in 1995. It is unknown whether subsequent changes in harvest distribution indicated shifts in relative abundance, harvest areas, or harvest reporting.

In 1993, the BOF adopted regulatory season dates of July 1 to December 31 and a minimum size requirement of 35 inches overall or 28 inches measured from the front of the dorsal fin to the tip of the tail. The season dates closed lingcod fishing during the first half of the year to protect spawning and nest-guarding lingcod at a time when they are particularly vulnerable to capture (Vincent-Lang and Bechtol 1992). The minimum legal size was intended to allow sexually mature lingcod to spawn in at least 2 successive years prior to being subjected to harvest removal. From 1997 until 2002, the commercial lingcod fishery was managed for a 35,000 lb GHL that was established in 1997 as 50% of the recent 5-year harvest. ADF&G adopted this conservative approach due to a lack of lingcod abundance and biomass information, and evidence of localized recruitment failures, particularly in Resurrection Bay, during the early 1990s (Vincent-Lang and Bechtol 1992). Since 1993, Resurrection Bay has been closed to lingcod fishing, initially by EO and later by regulation (5 AAC 28.50 (c)), to protect depressed lingcod stocks. The most recent surveys indicated little recruitment had occurred in this area (Bethe and Meyer 2002). Directed fishing for lingcod was restricted to jig gears (mechanical or hand troll) beginning in 1999. Lingcod may be retained as bycatch to other directed fisheries at a 20% level during the open season.

In 2002, ADF&G increased the allowable harvest to 52,500 lb, or 75% of the average harvest during 1992–1996. This increase in the GHL was consistent with the approach applied by NPFMC groundfish plan teams for groundfish stocks in federal waters. Under Amendment 56 adopted by the NPFMC for the *Bering Sea/Aleutian Groundfish Fishery Management Plan*, a fishery is classified as a Tier 6 fishery if the only reliable assessment data are catch history. For a Tier 6 fishery, ABC is defined as 75% of the historical annual average harvest.

During the 2004 meeting on Cook Inlet groundfish, the BOF adopted a regulation giving ADF&G EO authority to require, if necessary, that lingcod be landed with the head on and the

vent intact to allow biological sampling of the catch. This change became effective in 2005 but has not been implemented by EO. Very few lingcod are landed with the head removed and most fishermen are aware of the need to leave the vent intact for sampling purposes.

FISHERY OVERVIEW: THE LAST 10 YEARS

In the Cook Inlet Management Area, lingcod may be retained commercially after July 1 as bycatch to other groundfish fisheries or by directed jig fishing. During the last 10 years, 2006–2015, the total commercial lingcod harvest, including state and federal waters, ranged from 6,742 lb in 2015 to 57,578 lb in 2006 (Table 19). The 2015 harvest was the second lowest on record, following 6 years of low harvest (Figure 12). The harvest was accounted for in state and federal waters for the past 10 years, except for 2006 (34%). The majority of the harvest was taken in state waters, ranging from 52% to 86% (Table 20). The NGD, which supports active commercial and recreational lingcod fisheries, historically accounted for virtually all of the harvest. Lingcod harvest from the CID continues to be low.

Effort for commercial lingcod was primarily by jig gear (mechanical and hand troll). The number of vessels participating in the past 10 years has been consistent, averaging about 33 vessels. In 2007, 50 vessels made 90 landings with a total harvest of 47,093 lb. This was the second highest harvest in the past 10 years and the highest number of vessels and landings for the time series. Interest in the directed lingcod fishery has been low in recent years and the fishery remained opened through the entire regulatory season from 2007 through 2015. Harvest levels were closely monitored to target the GHF. Since the current GHF was developed, it has only been achieved once in 2006, although 80% of the harvest that year was as bycatch to gear other than jig, and the most recent years' harvests have been at very low levels. Harvest levels have not come close to the GHF since 2007.

Corresponding to low harvests in recent years, estimated exvessel values for lingcod harvest have also been declining and the 2015 value of just over \$5,000 was the lowest since 1990 (Appendix A1).

FISHERY OVERVIEW: EARLY YEARS

Historically, the commercial harvest of lingcod ranged from 2,894 lb in 1989 by 10 vessels with 20 landings to a high of 87,370 lb caught in 1993 by 18 vessels with 64 landings (Table 19). Between 1988 and 2005, there were only 5 years when the majority of the fish were not harvested with jig gear (Figure 12). The highest percentages of jig harvest occurred in 1993 and 1994, when 99% of the lingcod harvested were from state waters. Historically, effort has been sporadic and in some years the fishery was open the entire year.

Historically, jig gear has persisted as the dominant gear, accounting for 69% of total harvest since 1988 with the combined longline, pot, and trawl gears accounting for the remainder. Due to confidentiality requirements, these data cannot be presented separately. However, the differences in gear types were attributable to greatly increased harvest by pot gear in certain years, although the majority of historical harvest other than jig gear has been by longline gear.

RESEARCH

Refer to rockfish research section to find ROV information, which includes lingcod.

HARVEST MONITORING

Dockside sampling of lingcod began in 1998, although no samples were collected in 1999. Information collected by dockside samplers included fishing location and effort as well as fish length, sex, gonad condition, and otoliths or fin rays for age determination. Sample data indicate some variability in weight, length, age, and sex ratio. Average weight for lingcod ranged from 13.2 kg to 17.3 kg, average length ranged from 108 to 119 cm, and average age ranged from 13 to 20 years (Table 21). In 2015, lingcod average weight was 13.9 kg and average length was 110 cm, slightly below the averages for the time series. Female lingcod made up the majority of the harvest at 68% in 2015, below the average of 74%. The high percentage of female lingcod was consistent with the minimum legal size of 35 inches (89 cm) total length, because mature female lingcod are significantly larger than male lingcod. External determination of sex was possible on many fish sampled. However, most lingcod were delivered gutted and some with the vent area removed, prohibiting collection of sex and maturity data on some fish, which resulted in reduced sample sizes for those variables in some years. Sample sizes have been decreasing due to reduced effort in both the directed and bycatch lingcod fisheries, with the second lowest sample size of 41 fish in 2015. An experiment comparing ages estimated from otoliths and fin ray sections was conducted in 2001 through 2005 and analysis produced results that were comparable (Russ et al. 2013a). Therefore, the decision was made to switch to collecting otoliths as the preferred age structure for all commercial lingcod age determination in the Central Region beginning in 2006 because significantly less labor was required to process otoliths versus fin rays.

POLLOCK

MANAGEMENT AND REGULATIONS

Walleye pollock may be retained as bycatch under 5 AAC 28.070. *Groundfish Possession and Landing Requirements*. In Cook Inlet Area, an EO is issued annually to set groundfish bycatch limits. Since 2014, this EO allowed permit holders participating in a halibut or directed groundfish fishery, or taken incidentally by drift or set gill net gear fishing for salmon or herring, to retain 20 % pollock round weight as a percentage of the target species harvested, which is the maximum bycatch level allowed under 5 AAC 28.070.

Since mid-1999, directed fishing for pollock has required a commissioner's permit under 5 AAC 28.379 *Permit for Miscellaneous Groundfish*.

REGULATION DEVELOPMENT

Temporal and geographical fishing restrictions associated with SSL protective measures complicated pollock harvesting opportunities beginning in 2000 and effectively closed all of the NGD to pollock trawl fishing. Due to lack of interest, no commissioner's permits were issued through 2003. A single commissioner's permit was issued in 2004 to allow the pelagic trawl harvest of pollock in state waters for 24 hours between 149 and 150 degrees longitude, except within 3 nmi of SSL haulouts, while the season was open in the federal CGOA area. That vessel, in combination with deliveries of incidentally caught pollock by other vessels, resulted in a total 2004 pollock harvest of 342,305 lb. The BOF generated a proposal in 2004 to consider reestablishing the Cook Inlet pollock trawl fishery in the Resurrection Bay area, which was

tabled until October 2006 pending comment from NMFS in regard to SSL protections. The proposal ultimately failed.

Limited deliveries of pollock also occurred under 5 AAC 28.070 (e), requiring vessels fishing groundfish to retain all pollock when a pollock fishery was open, and up to the maximum retainable bycatch levels when closed. Under 5 AAC 28.075, processors are required to accept and utilize at least 15% of fish retained under 5 AAC 28.070 (e). These regulations were intended to encourage improved retention and utilization of pollock and Pacific cod, although regulatory compliance was believed poor. A proposal to clarify 5 AAC 28.070 (e), because the language was confusing and often misinterpreted to allow retention of pollock during an open Pacific cod fishery, was adopted during the 2015/16 BOF cycle.

FISHERY OVERVIEW: THE COMMISSIONER'S PERMIT EXPERIMENTAL FISHERY

The walleye pollock seine Commissioner's Permit experimental fishery opened in the Cook Inlet Area on December 1, 2014. The first permit period was from December 1, 2014, through February 28, 2015. The allowable harvest level was set at 220,000 lb through December 31, 2014, and an additional 220,000 lb was made available from January 1 through February 28, 2015. A trip limit of 10,000 lb, mandatory observers, logbooks, and some closed areas were also part of the permit requirements. During this initial 2014–15 fishing period, a total of 32,318 lb of walleye pollock were harvested. Two vessels participated and made 11 trips with a combined total of 53 purse seine sets.

Another Commissioner's Permit fishery was opened October 1 through December 31, 2015, allowing up to 210,000 lb of walleye pollock to be harvested; GHF was reduced by 10,000 lb from 2014-15 to account for approximately 10,000 lb of harvest in the beginning of the year. The trip limits were eliminated and observers were required to be accommodated upon request, although observers were not deployed on every trip. The same 2 vessels participated between October 7 through December 4, 2015, and the total pollock harvest was 8,469 lb. Nine trips were made with 6 trips observed by Homer groundfish staff. Bycatch included 61 adult Chinook salmon with 2 mortalities; most of these fish were 3 lb or less. During this fishing period, 35 Chinook salmon smolts and 1 adult coho salmon were also caught and were all mortalities.

Herring seine nets fishing at depths of approximately 3 and 6 fathoms were originally used. During the fall 2015 fishing period, both vessels acquired new deeper seine nets which fished at about 8 fathoms. However, these nets had limited success, and 1 vessel redeployed their original shallower net.

All of the pollock were sold for food or bait. Originally the participants were hoping for a niche market but the product did not fit the specifications of that market. Total value of pollock sold in the Cook Inlet Area, based on price per lb reported on fish tickets, was \$3,621 in 2014 and \$3,788 in 2015 (Appendix A1), and included pollock bycatch to other groundfish fisheries.

FISHERY OVERVIEW: THE EARLY YEARS

Walleye pollock seasons in the Cook Inlet Area were historically managed via EO as parallel fisheries with state seasons set to coincide with NMFS actions in the adjacent waters of the federal EEZ. The cumulative reported pollock harvest from area state waters between 1988 and 1995 was 473,201 lb (Table 22; 1989 confidential data omitted). Directed pollock fishing with

pelagic trawls occurred in the NGD during 1996–1999. Annual pollock harvest during these years ranged from approximately 1.9 million lb in 1996 to 9.7 million lb in 1998, with pelagic trawls yielding over 99% of the harvest.

There was minimal harvest after 1999 until a commissioner’s permit was issued in 2004 to allow pelagic trawl harvest as noted under the Regulation Development section. Since 2004, there has been very low harvest until the commissioner’s permit seine fishery was implemented in 2014.

HARVEST MONITORING

Biological sampling of walleye pollock resumed in recent years, after a hiatus from 2005 to 2012, due to increased jig effort in 2013 and implementation of the commissioner’s permit seine pollock fishery in 2014. Information collected by dockside samplers included fishing location and effort as well as fish length, weight, sex, maturity stage and otoliths for age determination.

In 2013, 200 samples were collected from the jig fishery with an average weight of 0.9 kg, an average length of 47 cm, and an average age of 6 years old. Smaller fish were harvested in the seine fishery, with an average weight of 0.6 kg, average length of 42 cm, and an average age of 5 years old in 2015, just slightly smaller with the same average age as fish sampled in 2014. There were a total of 524 pollock sampled in 2014 and 2015 combined with an average sex ratio of 50% compared to 64% females sampled from the 2013 jig fishery (Table 23).

Onboard observers were deployed during the seine fishery, and bycatch was monitored closely due to concerns of incidental catch of Chinook salmon. A total of 106 adult Chinook salmon were caught during 2014 and 2015 combined, with a total of 4 mortalities. In 2015 there was an additional 35 Chinook salmon smolt caught and 1 adult coho salmon; all were mortalities. The majority of bycatch was jellyfish by far, totaling as much as 10,000 lb per set. The next most common bycatch species was Pacific herring *Clupea pallasii*. Herring bycatch ranged from 0–800 herring in a set. Other bycatch included Pacific cod, Pacific tomcod *Microgadus proximus*, Pacific sandfish *Trichodon trichodon*, saffron cod *Eleginus gracilis*, rainbow smelt *Osmerus mordax*, flathead sole *Hippoglossoides elassodon*, northern rock sole *Lepidopsetta polyxystra*, butter sole *Isopsetta isolepis*, starry flounder *Platichthys stellatus*, Alaska plaice *Pleuronectes quadrituberculatus*, sturgeon poacher *Podothecus accipenserinus*, smooth lumpsucker *Aptocyclus ventricosus*, yellow Irish lord *Aptocyclus ventricosus*, Pacific staghorn sculpin *Leptocottus armatus*, unidentified snailfish *Careproctus* spp., searcher *Bathymaster signatus*, kelp greenling *Hexagrammos decagrammus*, prowlfish *Zaprora silenus*, Pacific sand lance *Ammodytes hexapterus*, sablefish (juvenile), and longnose skate.

In years of directed pelagic trawl harvest (1997–1999 and 2004), samples showed average length ranged from 44 cm to 56 cm and average weight ranged from 0.9 kg to 2.3 kg (Table 23). Sex ratio averaged 47% female.

OUTLOOK

The department will continue to issue commissioner’s permits in the future as requested and monitor the harvest.

OTHER GROUND FISH

HISTORICAL BACKGROUND

Assorted species of skates, flatfish, sharks, and other groundfish have been harvested in both directed and bycatch fisheries in the Cook Inlet Area (Table 24). Historically, for any groundfish species that lacked specific regulatory management measures, state waters fishing seasons were set by EO to coincide with NMFS fishing seasons in adjacent federal waters. However, due to the potential for rapidly expanding and uncontrolled fisheries on species for which there was little biological data, the BOF adopted a variety of regulatory measures allowing ADF&G and the BOF to take a precautionary approach toward new or rapidly developing fisheries.

In Cook Inlet Area, an EO has been issued annually since 2014 to set groundfish bycatch limits to other directed groundfish fisheries per 5 AAC 28.070, which provides for a maximum bycatch level of up to 20%, by weight, of the directed groundfish species onboard the vessel.

Among the more pertinent measures adopted by the BOF were:

- 5AAC 28.070 – *Groundfish Possession and Landing Requirements*
- 5 AAC 28.089 – *Guiding Principles for Groundfish Fishery Regulations*
- 5 AAC 39.210 – *Management Plan for High Impact Emerging Fisheries*
- 5 AAC 28.083 – *Permit Requirements for Skates and Rays*
- 5 AAC 28.084 – *Fishing Seasons, Landing Requirements, and Utilization for Sharks*
- 5 AAC 28.379 – *Permit for Miscellaneous Groundfish*

SKATES

Currently, skates in Alaska are managed as bycatch and there is no directed fishery. Most harvest comes from longline gear, much of it as bycatch to other directed groundfish and halibut fisheries and primarily during the months of February to April.

Historically, skates were open to directed fishing with little regulatory oversight beyond general reporting requirements. Effective in May 1998, statewide regulation 5 AAC 28.083 established a commissioner’s permit requirement for directed skate fishing, which may restrict or specify conditions such as depth of fishing, season dates, fishing areas, minimum size limits, gear, and logbooks, as well as other conditions the commissioner finds “necessary for conservation and management purposes.”

Skate harvests in the Cook Inlet Area have been historically higher in the last 4 years, from 2012–2015, because of a developing market. Price per pound for skates has exceeded some of the target harvest and the 2015 exvessel value was the highest on record (Appendix A1). Federal Pacific cod gear sector splits implemented in 2012 was a significant factor in the increased harvest of skates due to more participation by longline vessels in the parallel fishery, with the highest bycatch harvest of skates during that fishery. The highest skate harvest occurred in 2015 with 164,085 lb, with no harvest in some years (Table 24).

The first applications for permits to target skates in Cook Inlet Area were received in 2004. ADF&G issued 9 permits and the harvest totaled 18,728 lb. Permits were valid for 90 days; restricted gear to longline or jig; and required logbooks, 2-hour prior notice of landing, and

agreement to carry an ADF&G observer upon request. Catch reporting by species was required and in 2004 ADF&G's fish ticket reporting system was amended to provide species codes to facilitate reporting of the 2 most commonly harvested skate species, longnose *Raja rhina* and big *Raja binoculata*. Big skates made up approximately 97% of the total harvest.

No commissioner's permits for skates have been issued since 2004 in response to a NMFS action that moved skates to bycatch-only status in federal fisheries due to concern of overfishing and lack of adequate stock assessment. Concern over skate abundance levels determined from the NMFS stock assessment surveys in recent years resulted in a reduction in maximum retainable amounts (MRA) from 20% to 5% for skates in federal directed groundfish fisheries in 2016 reacting to concerns about the skate population stock assessment information and of vessels "topping off" their harvest with maximum allowed bycatch. Additionally, the TAC was achieved for big skate in 2013 through 2015, and big skate was closed to retention in federal waters of the adjacent CGOA. ADF&G closed big skate in state waters of the Cook Inlet Area to mirror this action because there was no GHF set for skate species. The Cook Inlet Area allowable bycatch level of skate species in aggregate had already been reduced from 20% to 15% in 2014 due to conservation concern. Following suit after the recent federal action, ADF&G reduced bycatch levels in Cook Inlet Area from 15% to 5% in 2016.

Stock assessment is conducted by NOAA/NMFS each year and separate ABCs are generated for big skate, longnose skate, and "other" skates. All GOA skates are managed under Tier 5, where the ABC and overfishing levels (OFL) are based on survey biomass estimates and mortality rate. The gulfwide ABC for big skate increased from 2015 to 2016 from 3,255 mt to 3,814 mt. The longnose ABC remained the same from 2015 to 2016 of about 3,200 mt.

SHARKS

Annual shark harvests from the Cook Inlet Area have ranged from no reported landings to 6,594 lb in 1999 (Table 24). In 1997, the BOF closed directed shark fishing and permitted retention of shark bycatch. Little new biological information has become available since the 1997 BOF actions. Data that might be used to develop a state management plan, such as stock structure, biomass and abundance levels, existing fishing mortality, and ecological linkages, are still lacking. High annual variability of sharks in ADF&G surveys is consistent with current literature, which confirms most shark species are highly migratory (Weng et al. 2008; McFarlane and King 2003). Effective in 2005, after adoption by the BOF in 2004, a new regulation allowed a directed spiny dogfish fishery via commissioner's permit. A single commissioner's permit was issued in 2006 since the regulation took effect. There has been no reported harvest of sharks in 10 of the last 12 years, although in 2006 harvest was close to the level in 1999. Because retention of sharks has been minimal as allowed under current commercial regulations in recent years, interest in shark fisheries in 2006 does not appear related to increased market demand, but instead to reducing hook competition with other, more valuable, target species.

There has been no harvest of sharks reported since 2006; however, incidental captures of shark species may approach nuisance levels, particularly spiny dogfish. Discarded catch rates are poorly documented, although anecdotal information suggests rates may be high, at least in some areas and at some times. Cook Inlet Area shark bycatch, composed primarily of spiny dogfish as evidenced by reported at-sea discards on fish tickets, was comparatively high 2000–2010, averaging about 21 thousand lb annually, in relation to low levels reported 2011–2014 averaging

about 3,500 lb. However there was a large increase in reported at-sea discards of sharks in 2015 of 32,393 lb, the highest level since 2004 (Table 25).

Similar to skates, allowable bycatch level of shark species in aggregate was reduced from 20% to 15% by EO in 2014 due to lack of stock assessment information.

2015 SEASON SUMMARY

In 2015, the majority of other groundfish harvested as bycatch was skates at close to 100% and, since 2004, more than 90% of the total harvest was composed of skates. Skate harvest has been trending upwards since 2012, and the 2015 skate harvest of 164,085 lb was the highest on record. Harvest of skates may decrease in 2016 due to the reduction in the bycatch limit from 15% to 5% of the directed harvest. There was zero harvest of sharks reported in 2015, with no harvest reported since 2006.

HARVEST MONITORING

There is currently no sampling effort on skates in the Cook Inlet Area. The most recent dockside sampling of skates in CI occurred in 2004, the last year that there was directed effort. Information collected by dockside samplers included fish length, sex, weight, and vertebrae for age determination. Age structures were shipped to the NMFS age lab in Seattle; final age estimates have not been received to date. Preliminary analysis indicated commercially harvested skates from the Cook Inlet Area ranged from 8 to 22 years in age (Gburski et al. 2007). Species composition of the directed skate harvest sample was 93% big skate and 7% longnose skate. Female skates made up 73% of the harvest sampled. Big and longnose skates averaged 144 cm ($n = 115$) and 115 cm ($n = 9$) total length, respectively.

Samples of spiny dogfish were collected in 2005 and 2006, in response to BOF actions to allow a commissioner's permit fishery. Length, weight, sex, and age structures were collected from spiny dogfish in those years. Spiny dogfish averaged 4.3 kg ($n = 65$) with an average age of 22 years ($n = 41$) in 2005 (sampled fish caught as bycatch in salmon set gillnets), and in 2006 had an average weight of 4.1 kg ($n = 247$) and average age of 25 years ($n = 243$).

AT-SEA DISCARDS

At-sea discards reported by vessels fishing in Cook Inlet Area waters ranged from 18 lb in 1989 to 138,793 lb in 1996 (Table 25). Between 1988 and 2015 at-sea discards combined, sharks made up the largest component (31%) with skates (25%) and flatfish (22%) making up the next largest components. As noted in the above section, there was a significant increase in reported at-sea discards of sharks at 32,393 lb, the highest level since 2004. Most reported discards come from NMFS and International Pacific Halibut Commission survey cruises, with a smaller proportion coming from vessels carrying observers. Reporting of at-sea discards is somewhat dependent upon factors such as location and timing of fishery, changes to fishing technology, market conditions, and requirements of vessel operator. However, based on relative catch abundances observed in ADF&G surveys, actual discard rates are much higher than reported (Bechtol 2001; Gustafson and Bechtol 2001).

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TABLES AND FIGURES

Table 1.–Emergency orders issued for commercial groundfish fisheries in the Cook Inlet Area, 2014 and 2015.

Emergency Order Number	Effective Date	Explanation
2015		
2-GF-H-01-15	1/1/2015	Set Cook Inlet groundfish bycatch limits
2-GF-H-02-15	1/1/2015	Opened parallel Pacific cod season
2-GF-H-03-15	2/11/2015	Closed retention of big skate as bycatch, followed NMFS closure in CGOA
2-GF-H-04-15	2/16/2015	Closed parallel Pacific cod pot season and opened state-waters Pacific cod pot seasons
2-GF-H-05-15	3/2/2015	Closed parallel Pacific cod jig and opened state-waters Pacific cod jig seasons
2-GF-H-06-15	6/10/2015	Closed parallel Pacific cod longline and state-waters Pacific cod jig seasons; opened parallel Pacific cod jig season
2-GF-H-07-15	7/15/2015	Opened sablefish season at 12:00 pm.
2-GF-H-08-15	9/1/2015	Closed state-waters Pacific cod season to pot gear and opened parallel Pacific cod season to pot and longline gear
2-GF-H-09-15	12/15/2015	Closed parallel Pacific cod season to longline gear
2014		
2-GF-H-01-14	1/1/2014	Set Cook Inlet groundfish bycatch limits
2-GF-H-02-14	1/1/2014	Opened parallel Pacific cod season.
2-GF-H-03-14	2/6/2014	Closed retention of big skate as bycatch, followed NMFS closure in CGOA
2-GF-H-04-14	2/13/2014	Closed parallel Pacific cod pot season and opened state-waters Pacific cod pot season
2-GF-H-05-14	3/3/2014	Closed state-waters Pacific cod season to pot vessels greater than 58 feet
2-GF-H-06-14	3/11/2014	Closed parallel Pacific cod season to longline gear for vessels less than 50 feet
2-GF-H-07-14	3/15/2014	Closed parallel Pacific cod season to longline gear for vessels greater than or equal to 50 feet
2-GF-H-08-14	7/15/2014	Opened sablefish season at 12:00 pm.
2-GF-H-09-14	9/1/2014	Closed state-waters Pacific cod season to pot gear; opened a parallel Pacific cod season to pot and longline gear
2-GF-H-10-14	11/10/2014	Closed parallel Pacific cod season to pot gear and opened a state-waters Pacific cod season to pot gear
2-GF-H-11-14	12/18/2014	Closed parallel Pacific cod season to longline gear for vessels less than 50 feet

Table 2.–Emergency orders issued for commercial groundfish fisheries in the Cook Inlet Area, 2012 and 2013.

Emergency Order Number	Effective Date	Explanation
2013		
2-GF-H-01-13	1/1/2013	Opened parallel Pacific cod season.
2-GF-H-02-13	2/10/2013	Closed parallel Pacific cod pot and opened state-waters Pacific cod pot season
2-GF-H-03-13	3/11/2013	Closed state-waters Pacific cod season to pot vessels greater than 58 feet
2-GF-H-04-13	3/21/2013	Closed parallel Pacific cod season to longline gear for vessels less than 50 feet
2-GF-H-05-13	5/9/2013	Closed retention of big skate as bycatch, followed NMFS closure in CGOA
2-GF-H-06-13	7/15/2013	Opened sablefish season at 12:00 pm.
2-GF-H-07-13	9/1/2013	Closed state-waters Pacific cod season to pot gear; opened parallel Pacific cod seasons to pot and longline gear
2012		
2-GF-H-01-12	1/1/2012	Opened parallel Pacific cod season.
2-GF-H-02-12	2/15/2012	Closed parallel Pacific cod pot season and opened state-waters Pacific cod pot season
2-GF-H-03-12	3/2/2012	Closed state-waters Pacific cod season to pot vessels greater than 58 feet
2-GF-H-04-12	3/4/2012	Closed parallel Pacific cod season to longline gear for vessels less than 50 feet
2-GF-H-05-12	3/4/2012	Closed parallel Pacific cod jig and opened state-waters Pacific cod jig seasons
2-GF-H-06-12	3/20/2012	Closed parallel Pacific cod season to longline gear for vessels greater than or equal to 50 feet
2-GF-H-07-12	3/29/2012	Closed state-waters Pacific cod pot season
2-GF-H-08-12	6/10/2012	Closed state-waters Pacific cod season to jig gear and immediately opened a parallel Pacific cod season to jig gear
2-GF-H-09a-12	6/29/2012	Closed parallel Pacific cod season to jig gear and immediately opened a state-waters Pacific cod season to jig gear
2-GF-H-09b-12	7/15/2012	Opened sablefish season at 12:00 pm.
2-GF-H-10-12	9/1/2012	Opened parallel Pacific cod season to pot and longline gear
2-GF-H-11-12	8/24/2012	Closed sablefish season at 12:00 pm.
2-GF-H-12-12	10/12/2012	Closed parallel Pacific cod season to pot gear and immediately opened state-waters Pacific cod season to pot gear
2-GF-H-13-12	10/29/2012	Closed state-waters Pacific cod season to pot gear and immediately opened parallel Pacific cod season to pot gear
2-GF-H-14-12	10/31/2012	Pacific cod jig gear limits are lifted and nonexclusive fishery designation is enacted

Table 3.–Cook Inlet Area Pacific cod parallel and state-waters season dates by gear type, 2012–2015.

Year	Dates and Times	Season and Gear
2015	1/1/15-6/10/15; 9/1/15-12/15/15	Parallel season, longline
	1/1/15-2/16/15; 9/1/15-12/31/15	Parallel season, pots
	1/1/15-3/2/15; 6/10/15-12/31/15	Parallel season, jig
	2/17/15-9/1/15	State-waters season pot vessels $\leq 58'$
	2/17/15-9/1/15	State-waters season pot vessels $> 58'$
	3/3/15-6/10/15	State-waters season jig
2014	1/1/14-3/11/14; 9/1/14-12/15/14	Parallel season, longline $< 50'$
	1/1/14-3/15/14; 9/1/14-12/15/14	Parallel season, longline $\geq 50'$
	1/1/14-2/13/14; 9/1/14-11/10/14	Parallel season, pots
	1/1/14-12/31/14	Parallel season, jig
	2/14/14-8/31/14; 11/10/14-12/31/14	State-waters season pot vessels $\leq 58'$
	2/14/14-3/5/14; 11/10/14-12/31/14	State-waters season pot vessels $> 58'$
	never opened	State-waters season jig
2013	1/1/13-3/21/13; 9/1/13-12/31/13	Parallel season, longline
	1/1/13-2/10/13; 9/1/13-12/31/13	Parallel season, pots
	1/1/13-12/31/13	Parallel season, jig
	2/11/13-9/1/13	State-waters season pot vessels $\leq 58'$
	2/11/13-3/11/13	State-waters season pot vessels $> 58'$
	never opened	State-waters season jig
2012	1/1/12-3/4/12; 9/1/12-12/31/12	Parallel season, longline
	1/1/12-2/10/12; 9/1/12-10/12/12; 10/29/12-12/31/12	Parallel season, pots
	1/1/12-3/6/12; 6/10/12-6/29/12	Parallel season, jig
	2/11/12-3/29/12; 10/12/12-10/29/12	State-waters season pot vessels $\leq 58'$
	2/11/12-3/2/12	State-waters season pot vessels $> 58'$
	3/7/12-6/10/12; 6/29/12-12/31/12	State-waters season jig

^a Opening and closure times occurred at 12:00 noon unless otherwise noted, except that openings on January 1 occurred at 12:01 am and closures on December 31 occurred at 11:59 pm.

Table 4.—Annual harvest and effort by gear type of commercial Pacific cod parallel fisheries in the Cook Inlet Area, 1988–2015.

Year	Vessels	Landings	Harvest (lb) ^a				Total
			Longline	Pot	Jig ^b	Other ^c	
1988	59	213	482,365	^d	^d	^d	517,497
1989	9	21	35,978	^d	^d		36,846
1990	52	127	250,888	20,244	^d	107,505	378,637 ^e
1991	122	489	1,347,759	525,774	17,284	25,819	1,916,636
1992	190	868	3,553,709	1,873,717	13,995		5,441,421
1993	109	427	2,316,492	1,336,799		8,454	3,661,744
1994	74	386	1,386,775	1,290,860	5,487	^d	2,685,562
1995	140	669	2,250,472	1,721,079	3,572	433,528	4,408,651
1996	106	567	2,219,948	987,626	25,645	1,411,726	4,644,945
1997	137	576	2,049,394	1,114,131	37,362	72,354	3,273,240
1998	116	519	1,900,375	529,355	42,453	211,406	2,683,589
1999	112	457	2,171,877	981,674	21,331	8,296	3,183,178
2000	101	417	815,742	770,298	^d		1,586,041 ^e
2001	86	243	301,654	314,098			615,752
2002	65	222	582,635	307,937	^d		890,573 ^e
2003	45	142	126,168	294,630			420,798
2004	62	133	27,026	360,637	^d		387,662 ^e
2005	44	118	25,720	167,320	^d		193,040 ^e
2006	51	171	70,507	520,613			591,121
2007	47	202	364,427	328,878			693,305
2008	52	161	267,991	145,473			413,464
2009	57	172	452,796	88,657			541,453
2010	50	124	197,795	228,429	^d		426,223 ^e
2011	49	144	199,613	579,007	237		778,857
2012	51	216	1,018,217	957,217	^d		1,982,207
2013	61	220	1,039,822	367,635	4,817		1,412,274
2014	50	156	678,901	348,900	32,260	18	1,060,078
2015	57	205	1,716,574	407,494	87	252	2,124,408

Note: Harvest combines directed parallel seasons and Pacific cod bycatch from other fisheries.

^a Harvest is reported in round pounds.

^b Includes mechanical jig and hand troll gear.

^c “Other” includes trawl and gillnet gear.

^d Confidential data due to limited number of participants.

^e Total harvest does not include confidential data.

Table 5.—Annual harvest and effort by gear type from commercial Pacific cod state-waters season in the Cook Inlet Area, 1997–2015.

Year	Vessels	Landings	Jig ^a	Vessels	Landings	Pot	Harvest ^b	State GHL	% of GHL
1997	46	233	561,947	10	136	276,966	838,913	2,549,646	32.9 %
1998	29	123	188,209	13	183	542,260	730,469	2,434,565	30.0 %
1999	14	51	127,229	24	278	1,390,678	1,517,907	2,637,445	57.5 %
2000	5	12	13,885	17	219	1,135,903	1,149,788	2,160,255	53.2 %
2001	5	13	19,428	9	196	875,923	895,351	1,917,195	46.7 %
2002	6	15	18,163	9	306	1,310,684	1,328,847	1,571,455	84.6 %
2003	15	160	429,684	10	140	1,023,854	1,453,538	1,438,516	101.0%
2004	18	120	326,298	12	170	1,785,386	2,111,684	2,367,765	89.2%
2005	8	28	90,734	10	205	2,227,417	2,318,151	2,737,893	84.7%
2006	1	1	1,406	11	148	1,476,115	1,477,521	3,131,088	47.2%
2007	4	7	5,545	13	145	1,436,804	1,442,349	3,131,088	46.1%
2008	3	7	14,456	13	227	2,379,085	2,393,541	3,133,403	76.4%
2009	9	41	138,960	13	181	2,393,574	2,532,535	2,606,393	97.2%
2010	6	20	48,754	9	128	3,074,871	3,123,626	4,054,466	77.0%
2011	31	203	498,185	11	156	3,902,154	4,400,339	4,449,911	98.9%
2012	27	137	192,847	13	155	4,043,548	4,236,395	4,707,420	90.0%
2013	0	0	0	13	154	2,754,265	2,754,265	4,074,804	67.6%
2014	0	0	0	8	121	3,018,318	3,018,318	4,389,955	68.8%
2015	7	31	70,639	11	134	3,256,063	3,326,701	5,069,530	65.6%

^a Includes mechanical jig and hand troll gear.

^b Harvest is reported in round pounds.

Table 6.—Annual guideline harvest level (GHL), harvest by gear type, and percent of GHL harvested by gear type of Pacific cod from Cook Inlet Area state-waters season, 1997–2015.

Year	GHL	Harvest (lb) ^a					
		Total	Total % GHL	Pot	Pot % GHL	Jig ^b	Jig % GHL
1997	2,549,646	838,913	32.9	276,966	11%	561,947	22.0%
1998	2,434,565	730,469	30.0	542,260	22%	188,209	7.7%
1999	2,637,445	1,517,907	57.5	1,390,678	53%	127,229	4.8%
2000	2,160,255	1,149,788	53.2	1,135,903	53%	13,885	0.6%
2001	1,917,195	895,351	46.7	875,923	46%	19,428	1.0%
2002	1,571,455	1,328,847	84.6	1,310,684	83%	18,163	1.2%
2003	1,438,516	1,453,538	101.0	1,023,854	71%	429,684	29.9%
2004	2,367,765	2,111,685	89.2	1,785,386	75%	326,298	13.8%
2005	2,737,893	2,318,151	84.7	2,227,417	81%	90,734	3.3%
2006	3,131,088	^c	^c	1,476,115	47%	^c	^c
2007	3,131,088	1,442,349	46.1	1,436,804	46%	5,545	0.2%
2008	3,133,403	2,393,541	76.4	2,379,085	76%	14,456	0.5%
2009	2,606,393	2,532,535	97.2	2,393,574	92%	138,960	5.3%
2010	4,054,466	3,123,626	77.0	3,074,871	76%	48,754	1.2%
2011	4,449,911	4,400,339	98.9	3,902,154	79%	498,185	11.1%
2012	4,707,420	4,236,395	90.0	4,043,548	86%	192,847	4%
2013	4,074,804	2,754,265	67.6	2,754,265	68%	0	0%
2014	4,389,955	3,018,318	68.8	3,018,318	69%	0	0%
2015	5,069,530	3,326,701	65.6	3,256,063	64%	70,639	1%

^a Harvest is reported in round pounds.

^b Includes mechanical jig and hand troll gear.

^c Confidential data due to limited number of participants.

Table 7.—Annual harvest and effort by district in the commercial Pacific cod parallel season in the North Gulf and Cook Inlet Districts, 1988–2015.

Year	North Gulf District			Cook Inlet District			Total Both Districts
	Vessels	Landings	Harvest (lb) ^a	Vessels	Landings	Harvest (lb)	
1988	28	79	303,778	38	135	213,719	517,497
1989	7	18	29,256	4	4	7,590	36,846
1990	19	26	158,654	34	101	220,145	378,799
1991	79	158	980,179	77	331	936,458	1,916,636
1992	155	611	4,656,230	50	257	785,191	5,441,421
1993	89	265	2,752,451	29	162	909,294	3,661,744
1994	52	160	1,482,618	30	226	1,202,944	2,685,562
1995	112	255	3,014,296	50	415	1,394,355	4,408,651
1996	94	300	3,807,762	24	271	837,183	4,644,945
1997	109	290	2,050,031	39	286	1,223,209	3,273,240
1998	93	295	2,122,576	27	224	561,013	2,683,589
1999	88	255	2,103,345	33	202	1,079,834	3,183,178
2000	80	224	1,057,657	31	195	529,732	1,587,390
2001	68	120	269,982	27	125	345,769	615,752
2002	49	96	577,725	19	126	314,244	891,970
2003	29	42	162,757	19	101	258,041	420,798
2004	39	56	112,899	31	77	275,003	387,902
2005	31	62	67,194	15	57	125,881	193,075
2006	42	90	258,569	11	83	332,552	591,121
2007	36	107	394,640	16	96	298,665	693,305
2008	40	87	266,486	16	74	146,978	413,464
2009	38	98	438,766	24	74	102,687	541,453
2010	36	65	222,248	17	61	203,993	426,241
2011	31	68	219,804	23	79	559,053	778,857
2012	38	112	1,103,198	16	105	879,009	1,982,207
2013	43	123	1,039,694	20	98	372,580	1,412,274
2014	31	81	772,160	22	77	287,918	1,060,078
2015	38	136	1,752,360	20	69	371,733	2,124,094

Note: Harvest combines directed parallel Pacific cod harvest and Pacific cod bycatch from other fisheries.

^a Harvest includes reported at-sea discards.

Table 8.—Annual harvest and effort by district from commercial Pacific cod state-waters fisheries in the North Gulf and Cook Inlet Districts, 1997–2015.

Year	North Gulf District			Cook Inlet District			Pooled Districts		
	Vessels	Landings	Harvest (lb)	Vessels	Landings	Harvest (lb)	Vessels ^a	Landings	Harvest (lb) ^{bc}
1997	29	81	291,565	35	288	547,349	55	367	838,913
1998	28	92	164,540	20	214	565,929	42	306	730,469
1999	20	56	359,511	23	274	1,158,396	38	329	1,517,907
2000	7	11	19,817	19	320	1,129,971	21	331	1,149,788
2001	5	15	60,310	9	194	835,042	14	209	895,351
2002	5	7	170,239	12	315	1,158,608	15	321	1,328,847
2003	15	41	616,306	14	260	837,232	19	300	1,453,538
2004	15	63	938,541	19	228	1,173,144	25	290	2,111,685
2005	7	25	798,623	15	208	1,519,528	17	233	2,318,151
2006	4	19	567,290	9	131	910,231	12	149	1,477,521
2007	8	31	809,949	11	122	632,400	17	152	1,442,349
2008	4	28	1,088,694	13	206	1,304,847	16	234	2,393,541
2009	9	35	1,142,965	15	189	1,389,570	18	222	2,532,535
2010	4	23	1,701,278	13	125	1,422,348	15	148	3,123,626
2011	16	90	2,126,614	30	271	2,273,725	40	359	4,400,339
2012	16	59	2,119,552	32	243	2,116,843	39	292	4,236,395
2013	6	36	1,473,670	9	122	1,280,595	13	154	2,754,265
2014	4	22	1,690,431	5	99	1,327,887	9	121	3,018,318
2015	5	42	1,866,104	14	125	1,460,598	18	165	3,326,701

^a Pooled vessel count is discrete vessels.

^b All harvest totals include reported at-sea discards.

^c Sum discrepancies are due to rounding.

Table 9.—Average weight, average length, and percent female of commercially harvested Pacific cod in the Cook Inlet Area, 1997–2015.

Year	Average weight (kg)	<i>n</i>	Average length (cm)	<i>n</i>	% female	<i>n</i>
1997	n/a		61	2,480	n/a	
1998	3.3	92	66	1,186	n/a	
1999	2.9	519	64	3,522	53	2,261
2000	3.5	1,957	65	2,825	56	2,403
2001	3.1	716	61	1,318	58	817
2002	3.1	1,024	62	2,939	57	1,397
2003	3.4	590	64	1,714	51	624
2004	3.2	745	61	2,772	59	766
2005	3.3	545	61	1,642	57	650
2006	3.3	535	62	1,143	59	540
2007	3.7	632	65	2,833	59	623
2008	3.8	648	65	2,237	58	649
2009	3.3	776	63	1,595	60	776
2010	3.4	872	63	1,800	60	873
2011	3.0	2,812	63	2,811	56	1,419
2012	3.1	1,436	63	2,819	53	1,446
2013	3.3	1,033	63	2,032	55	1,032
2014	3.2	1,223	63	2,399	52	1,223
2015	2.9	2,320	61	4,466	51	2,269

Note: *n* = sample size.

Table 10.—Harvest and effort from the Cook Inlet Area commercial sablefish fishery, 1988–2015.

Year	Vessels	Landings	Round Weight (lb)			GHL ^c	Avg lb/landing
			Commercial Harvest ^a	ADF&G Survey ^b	Total Harvest		
1988	37	86	136,260		136,260		1,566
1989	4	5	2,996		2,996		599
1990	22	24	8,480		8,480		339
1991	25	33	103,597		103,597		3,139
1992	79	103	126,852		126,852		1,208
1993	36	52	95,016		95,016		1,827
1994	39	56	45,008		45,008		790
1995	33	45	22,551		22,551		501
1996	25	79	81,067		81,067	32,000–172,000	1,013
1997	39	97	125,349		125,349	72,000	1,279
1998	29	57	69,689		69,689	72,000	1,223
1999	23	40	73,695	3,046	76,741	63,400	1,842
2000	16	31	102,639	1,023	103,662	67,000	3,207
2001	21	32	133,435		133,435	67,000	4,170
2002	23	26	108,117	849	108,966	67,000	4,158
2003	14	14	122,098		122,098	75,000	8,721
2004	17	17	82,836		82,836	87,000	4,873
2005 ^d	10	37	84,023		84,023	86,000	2,271
2006	16	41	88,695		88,695	76,000	2,163
2007	10	36	76,889		76,889	74,000	2,136
2008	11	42	68,724		68,724	66,000	1,636
2009	13	66	55,263		55,263	59,880	837
2010	9	44	55,899		55,899	53,733	1,270
2011	10	39	57,350		57,350	56,473	1,471
2012	12	49	67,452		67,452	69,000	1,377
2013	8	44	42,287		42,287	66,000	961
2014	5	29	50,703		50,703	56,000	1,748
2015	4	34	31,780		31,780	55,500	935

^a Does not include reported at-sea discards.

^b Sablefish caught during the longline assessment survey and sold to defray survey costs.

^c Prior to implementation of the federal IFQ program, sablefish seasons were set to coincide with federal sablefish seasons and an annual state-water GHL was not established.

^d Vessel trip limits implemented, 3,000 lb within 2 days.

Table 11.—Average catch per unit effort (CPUE) in pounds per hook for sablefish harvest using longline gear, from analysis of logbook and fish ticket data, 2005–2015.

Year	Total Hooks	Sablefish Harvest	CPUE (lb per hook)
2005	179,800	83,035	0.46
2006	220,417	71,675	0.33
2007	289,738	76,379	0.26
2008	232,174	60,546	0.26
2009	429,315	51,323	0.12
2010	224,191	50,462	0.23
2011	304,218	57,350	0.19
2012	261,963	52,675	0.20
2013	202,092	37,349	0.18
2014	199,125	49,061	0.25
2015	165,365	28,416	0.17

Note: Harvest and hook data for incomplete logbook data is omitted.

Table 12.—Average weight, average length, and sex ratio of commercially harvested sablefish in the Cook Inlet Area, 1999–2015.

Year	Average weight (kg)	<i>n</i>	Average length (cm)	<i>n</i>	Average Age (Years)	<i>n</i>	% female	<i>n</i>
1999	^a	9	^a	9	—	0	^a	9
2000	2.7	199	62	199	^b	199	^c	
2001	2.3	100	57	180	^b	178	^c	
2002	2.6	47	60	398	^b	397	68	397
2003	2.1	367	58	439	4	388	62	439
2004	2.3	460	60	500	6	496	63	498
2005	2.7	400	63	400	10	393	66	400
2006	2.6	358	62	360	8	359	64	360
2007	2.2	560	60	560	7	530	67	540
2008	2.4	441	60	441	9	437	66	441
2009	2.5	511	61	511	8	510	58	511
2010	2.5	409	61	409	9	408	54	408
2011	2.1	614	58	613	7	596	66	613
2012	2.0	561	58	561	6	561	58	559
2013	2.4	590	60	590	6	588	54	587
2014	2.6	534	61	534	6	532	56	531
2015	2.0	550	57	550	^b	550	59	543

Note: *n* = sample size.

^a Select samples and small sample sizes in 1999 provide insufficient data to evaluate biological variables.

^b Age structures were submitted to Age Determination Unit laboratory in Juneau, AK; data has not been analyzed.

^c Insufficient gender data to evaluate sex ratio for 2000 and 2001 samples; in 2000, 100%, and in 2001, 44%, recorded as sex unknown.

Table 13.—Commercial harvest of rockfish in Cook Inlet Area, by assemblage with percent total harvest, 1988–2015.

Year	Demersal Shelf		Pelagic Shelf ^a		Slope ^b		Total Pounds (lb)
	Pounds (lb)	% of total	Pounds (lb)	% of total	Pounds (lb)	% of total	
1988	5,536	3	148,326	70	59,436	28	213,298
1989	10,376	13	69,046	85	1,639	2	81,060
1990	1,252	4	21,751	71	7,577	25	30,580
1991	7,217	3	190,212	85	26,392	12	223,822
1992	126,726	35	217,379	61	14,772	4	358,877
1993	27,802	15	155,780	82	5,814	3	189,396
1994	35,074	9	354,263	88	12,704	3	402,040
1995	37,812	8	454,241	90	9,992	2	502,046
1996	38,999	20	150,201	76	7,376	4	196,577
1997	49,809	23	153,139	70	14,417	7	217,364
1998	24,268	30	45,361	56	10,692	13	80,321
1999	46,129	53	32,298	37	9,225	11	87,652
2000	24,229	15	127,021	80	8,159	5	159,409
2001	26,894	23	83,608	72	5,821	5	116,323
2002	36,171	32	72,439	65	2,898	3	111,508
2003	44,808	31	96,367	68	1,554	1	142,729
2004	32,819	28	84,883	72	387	<1	118,089
2005	16,454	25	46,741	72	1,950	3	65,145
2006	13,298	48	12,972	46	1,664	6	27,935
2007	15,264	60	5,689	22	4,434	17	25,388
2008	17,817	59	6,171	21	5,942	20	29,930
2009	18,606	60	3,154	10	9,434	30	31,194
2010	24,406	46	22,843	43	5,365	10	52,615
2011	19,327	29	44,105	66	3,000	5	68,530
2012	29,585	63	12,788	27	4,414	9	46,787
2013	25,472	36	38,875	55	6,371	9	70,759
2014	18,730	31	39,254	65	2,758	5	60,839
2015	54,052	38	82,401	59	4,243	3	140,818

^a Includes black rockfish from federal waters, and dark rockfish from federal waters beginning in 2008.

^b Includes thornyhead rockfish

Table 14.—Annual effort and harvest (lb) of commercial rockfish by jig and longline gear in the Cook Inlet Area, 1988–2015.

Year	Vessels	Landings	Jig Harvest	Longline Harvest
1988	44	102	90,676	122,622
1989	12	31	4,870	17,891
1990	31	41	18,977	11,452
1991	62	161	207,028	16,378
1992	121	408	122,560	235,673
1993	86	292	132,073	57,089
1994	74	277	301,083	100,957
1995	120	406	431,884	69,117
1996	124	343	131,152	53,396
1997	130	369	145,890	70,750
1998	110	313	41,756	34,012
1999	95	285	30,321	57,097
2000	96	243	130,150	29,259
2001	76	166	98,469	17,854
2002	71	158	93,470	18,031
2003	64	135	128,745	13,954
2004	60	114	99,236	18,813
2005	50	123	47,012	18,133
2006	56	109	13,268	14,666
2007	45	118	7,029	18,359
2008	48	113	9,667	20,264
2009	57	137	4,471	26,723
2010	52	112	23,889	28,725
2011	50	121	46,793	21,687
2012	51	143	13,076	33,711
2013	57	171	39,479	31,280
2014	56	131	42,104	18,709
2015	55	213	81,337	59,265
Average	70	191	90,588	44,138

Note: Discards at seas and test fish included in harvest. Harvest includes black rockfish from federal waters. Dark rockfish from federal waters included in harvest beginning in 2008. Other gear not included due to confidential harvest in some years.

Table 15.—Harvest and effort by district of Cook Inlet Area commercial rockfish, including black and dark rockfish from federal waters, 1988–2015.

Year	Vessels	Landings	Round Weight (lb)			Total Harvest ^{a, b, c}
			Cook Inlet District	North Gulf District	Federal Waters	
1988	44	102	2,859	148,227	62,213	213,298
1989	12	31	^d	22,762	^d	81,060
1990	31	41	^d	29,807	^d	30,580
1991	62	161	^d	222,993	^d	223,822
1992	121	408	1,029	334,149	23,699	358,877
1993	86	292	2,641	68,177	118,579	189,396
1994	74	277	110	205,451	196,480	402,040
1995	120	406	4,190	270,351	227,504	502,046
1996	124	343	700	120,777	75,101	196,577
1997	130	369	3,269	179,763	34,332	217,364
1998	110	303	^d	72,887	7,423	80,321
1999	95	285	0	86,007	1,645	87,652
2000	96	243	0	133,431	25,978	159,409
2001	76	166	^d	109,175	^d	116,323
2002	71	158	^d	106,638	^d	111,508
2003	64	135	^d	142,207	^d	142,729
2004	60	114	246	117,843	0	118,089
2005	50	123	^d	64,950	^d	65,145
2006	56	109	556	27,379	0	27,935
2007	45	118	105	24,950	332	25,388
2008	48	113	4,430	25,441	59	29,930
2009	57	137	317	30,841	36	31,194
2010	52	112	52	52,057	506	52,615
2011	50	121	1,148	65,241	42	66,432
2012	51	143	169	46,570	48	46,787
2013	57	171	200	66,581	3,978	70,759
2014	56	131	271	60,503	65	60,839
2015	55	213	239	139,118	1,461	140,818
Average	72	194	941	110,896	35,235	147,072

^a Includes reported at-sea discards.

^b Data combined from ADF&G Neptune and Venus fish ticket software applications.

^c Differences in harvest totals are due to rounding.

^d Confidential data.

Table 16.—Species composition of pelagic shelf rockfish sampled in the Cook Inlet Area, 1998–2015.

Year	Black		Dusky ^a		Dark		Yellowtail/Widow ^b		Total Sampled
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
1998	361	91.6	32	8.1			1	0.3	394
1999	311	92.6	25	7.4			0		336
2000	723	96.0	30	4.0			0		753
2001	440	92.4	35	7.4			1	0.2	476
2002	441	94.6	25	5.4			0		466
2003	481	93.8	28	5.5			4	0.8	513
2004	532	91.7	48	8.3			0		580
2005	259	99.6	1	0.4			0		260
2006	248	99.6	1	0.4			0		249
2007 ^c	73	91.3	4	5.0	3	3.8	0		80
2008 ^d	0		0		0		0		0
2009	62	93.9	3	4.5	1	1.5	0		66
2010	320	87.7	11	3.0	34	9.3	0		365
2011	351	67.2	25	4.8	132	25.3	14	2.7	522
2012	227	92.3	11	4.5	6	2.4	2	0.8	246
2013	274	93.5	15	5.1	4	1.4	0		293
2014	513	77.6	44	6.7	103	15.6	1	0.2	661
2015	799	69.8	163	14.2	142	12.4	40	3.5	1,144

Note: *n* = sample size.

^a Dusky rockfish includes light dusky and dark dusky specimens 1998–2006, *Sebastes ciliatus*.

^b The only incidence of widow rockfish was 1 specimen in 2003; all other specimens are yellowtail rockfish.

^c In 2004, light dusky and dark dusky rockfish were split into dusky rockfish *Sebastes variabilis* (name resurrected) and dark rockfish *Sebastes ciliatus*. However, the new nomenclature was not adopted into ADF&G regulation until 2007.

^d Reduced effort in directed jig fishery resulted in lower incidence of rockfish sampling opportunities.

Table 17.—Average length, average weight, average age, sex ratio, and corresponding sample sizes of commercially harvested black rockfish in the Cook Inlet Area, 1998–2015.

Year	Average Length (cm)	<i>n</i>	Average Weight (kg)	<i>n</i>	Average Age (years)	<i>n</i>	% female	<i>n</i>
1998	52	361	2.3	111	21	113	n/a	
1999	48	311	2.3	67	18	58	49	59
2000	47	723	2.0	510	12	157	53	590
2001	49	440	2.1	229	13	429	47	390
2002	50	441	2.4	180	14	347	60	331
2003	49	481	2.3	369	13	387	62	447
2004	50	532	2.5	468	14	531	66	469
2005	51	259	2.5	130	15	184	62	236
2006	51	248	2.6	60	16	248	61	99
2007	52	73	2.6	73	14	70	59	61
2008		0		0		0		0
2009	53	62	2.6	1	19	62	47	62
2010	50	320	2.4	320	15	296	47	318
2011	49	351	2.1	351	16	351	40	351
2012	51	227	2.4	227	17	267	40	226
2013	49	274	2.3	274	^a	274	45	274
2014	49	513	2.2	513	^a	505	48	513
2015	50	799	2.2	799	^a	799	32	798

Note: *n* = sample size.

^a Age determination not yet complete.

Table 18.—Species composition of commercially harvested non-pelagic rockfish, including number sampled and proportion, in the Cook Inlet Area, 1998–2015.

Year	Thornyhead		Yelloweye		Quillback		Rougheye		Shortraker		Silvergray		Other ^a		Total Samples
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
1998	0		0		1	6	13	72	0		0		4	22	18
1999	23	6	77	22	58	16	86	24	32	9	16	4	65	18	357
2000	0		49	56	21	24	7	8	2	2	4	5	4	5	87
2001	17	8	80	38	6	3	95	45	6	3	8	4	0		212
2002	0		136	74	0		15	8	0		1	1	32	17	184
2003	0		204	88	0		15	6	0		12	5	1	<1	232
2004	0		141	95	7	5	0		0		0		0		148
2005	0		81	86	12	13	0		0		0		1	1	94
2006	0		306	82	15	4	46	12	1	<1	2	<1	5	1	375
2007	0		417	93	14	3	5	1	0		10	2	2	<1	448
2008	0		322	97	0		0		0		0		11	3	333
2009	3	<1	523	71	53	7	135	18	10	1	0		8	1	732
2010	1	<1	492	81	30	5	29	5	10	2	2	<1	44	7	605
2011	5	1	356	58	6	1	211	34	2	<1	27	4	13	1	616
2012	14	1	706	59	314	26	81	7	7	<1	34	3	48	4	1,204
2013	1	<1	364	55	214	32	59	9	3	<1	10	2	11	2	662
2014	1	<1	390	51	221	29	82	11	2	<1	20	3	51	7	767
2015	13	1	372	34	469	42	164	15	8	1	34	3	46	4	1,106

Note: *n* = sample size.

^a Other non-pelagic rockfish (demersal and slope species): redstripe, Pacific ocean perch, northern, bocaccio, canary, copper, tiger, China, rosethorn, redbanded, and unspecified Sebastes.

Table 19.—Commercial lingcod harvest and effort by gear type from the combined Cook Inlet area and adjacent federal waters, 1988–2015.

Year	Vessels	Landings	Round weight (lb)		
			Jig/Troll	Other ^a	Total Harvest ^{b, c}
1988	16	37	6,512	18,436	24,948
1989	10	20	399	2,495	2,894
1990	22	22	1,306	5,463	6,769
1991	31	96	57,691	4,492	62,183
1992	84	192	6,998	35,220	42,218
1993	18	64	86,724	646	87,370
1994	14	30	56,505	331	56,836
1995	43	72	72,489	4,687	77,176
1996	39	58	47,986	11,310	59,296
1997	34	49	17,572	14,575	32,147
1998	23	41	27,284	13,955	41,239
1999	41	66	10,741	17,421	28,162
2000	41	72	29,488	4,029	33,517
2001	33	73	29,472	11,321	40,793
2002	33	64	16,383	3,794	20,177
2003	29	64	23,124	4,030	27,154
2004	30	63	31,009	5,635	36,644
2005	28	55	13,328	7,465	20,793
2006	28	55	11,679	45,899	57,578
2007	50	90	22,536	24,556	47,080
2008	33	66	26,966	17,066	44,032
2009	37	70	5,571	13,609	19,180
2010	31	53	13,298	8,669	21,966
2011	30	46	2,283	6,912	9,195
2012	31	44	1,609	7,886	9,494
2013	37	22	8,790	3,220	12,010
2014	27	37	7,535	2,686	10,221
2015	26	51	2,747	3,995	6,742

^a Other includes longline, pot, trawl, or salmon gillnet gears.

^b Does not include reported at-sea discards.

^c Sum discrepancies are due to rounding.

Table 20.—Commercial lingcod harvest from Cook Inlet Area and adjacent federal waters, 1988–2015.

Year	State Waters		Federal Waters	
	Harvest (lb)	% of total	Harvest (lb)	Total Harvest ^{a, b}
1988	18,362	74	6,586	24,948
1989	1,833	63	1,060	2,894
1990	2,496	37	4,272	6,769
1991	59,196	95	2,987	62,183
1992	24,660	58	17,558	42,218
1993	7,627	9	79,743	87,370
1994	21,782	38	35,054	56,836
1995	44,314	57	32,862	77,176
1996	29,461	50	29,835	59,296
1997	30,948	96	1,199	32,147
1998	39,781	96	1,458	41,239
1999	19,841	70	8,320	28,162
2000	26,524	79	6,992	33,517
2001	30,184	74	10,609	40,793
2002	18,664	93	1,513	20,177
2003	24,864	92	2,290	27,154
2004	35,632	97	1,012	36,644
2005	18,075	87	2,718	20,793
2006	19,495	34	38,083	57,578
2007	32,695	69	14,385	47,080
2008	36,781	84	7,251	44,032
2009	13,116	68	6,064	19,180
2010	17,312	79	4,655	21,966
2011	7,306	70	3,136	10,442
2012	5,617	59	3,878	9,494
2013	9,868	82	2,142	12,010
2014	8,833	86	1,388	10,221
2015	3,494	52	3,248	6,742

^a Does not include reported at-sea discards.

^b Sum discrepancies are due to rounding.

Table 21.—Average weight, average length, average age, sex ratio, and corresponding sample sizes of commercially harvested lingcod in the Cook Inlet Area, 1998–2015.

Year	Weight		Length		Age		Sex Ratio	
	(kg)	<i>n</i>	(cm)	<i>n</i>	(Years)	<i>n</i>	% female	<i>n</i>
1998	14.1	304	110	304	13	80	66	157
1999 ^a	n/a		n/a		n/a		n/a	
2000	13.2	26	108	26	15	26	n/a	
2001	13.5	179	109	179	14	113	52	67
2002	14.3	152	111	152	16	149	50	28
2003	14.8	83	113	83	17	69	66	56
2004	15.5	155	115	155	18	143	77	108
2005	17.3	108	119	108	20	12	79	108
2006	15.5	139	115	139	18	129	79	134
2007	13.6	275	110	275	15	157	81	274
2008	16.2	103	117	103	18	80	87	103
2009	14.1	177	111	177	15	127	88	176
2010	13.8	194	110	194	16	191	71	163
2011	15.0	95	114	95	18	95	72	39
2012	14.1	87	111	87	16	87	84	74
2013	14.0	84	111	84	16	84	80	82
2014	15.3	93	114	93	^b	93	77	91
2015	13.9	41	110	41	^b	41	68	31

^a Sample size in 1999 insufficient for biological data analysis ($n = 2$).

^b Age analysis not yet completed.

Table 22.—Commercial pollock fishing harvest and effort in the Cook Inlet Area, 1988–2015.

Year	Vessels	Landings	Harvest (lb) ^a	CPUE ^b
1988	6	14	2,380	170
1989	c	c	c	c
1990	18	35	61,817	1,766
1991	3	3	9,528	3,176
1992	34	43	3,875	90
1993	33	47	154,345	3,284
1994	24	39	238,261	6,109
1995	22	33	2,995	91
1996	16	33	1,943,659	58,899
1997	25	59	3,895,099	66,019
1998	18	74	9,693,429	130,992
1999	12	24	2,983,371	124,307
2000	4	4	615	154
2001	7	12	3,129	261
2002	7	9	1,381	153
2003	c	c	c	c
2004	4	7	342,305	48,901
2005	c	c	c	c
2006	c	c	c	c
2007	4	6	1,694	282
2008	c	c	c	c
2009	16	26	5,269	203
2010	c	c	c	c
2011	10	32	5,751	180
2012	13	18	4,301	239
2013	20	59	47,315	802
2014	13	24	12,931	539
2015	21	59	42,094	713

^a Includes reported at-sea discards and test fish.

^b CPUE is catch per unit effort in pounds per landing.

^c Confidential data due to limited number of participants.

Table 23.—Average weight, average length, and % female of commercially harvested walleye pollock in the Cook Inlet Area, 1997–2015.

Year	Average weight (kg)	<i>n</i>	Average length (cm)	<i>n</i>	Average age	<i>n</i>	% female	<i>n</i>
1997	1.5	600	56	598	8	600	45	598
1998	2.3	108	56	435	8	118	54	418
1999	1.0	124	50	1,226	6	167	47	1,218
2000-2003	NA		NA		NA		NA	
2004	0.9	200	44	199	4	200	43	199
2005-2012	NA		NA				NA	
2013 ^a	0.9	200	47	200	6	200	64	200
2014 ^b	0.7	200	43	200	5	174	46	175
2015 ^b	0.6	324	42	549	5	323	53	324

^a Jig gear, Pacific cod fishery samples, pollock retained as bycatch.

^b Seine gear, Commissioner's permit fishery samples.

Table 24.—Commercial harvest and effort of other groundfish species, from the Cook Inlet Area, 1988–2015.

Year	Vessels	Landings	Round weight (lb)				Total
			Flatfish ^a	Sharks ^b	Skates	Other ^c	
1988	6	6	2,418	101	275	24	2,819
1989	3	3	0	234	0	0	234
1990	15	23	1,353	20	0	936	2,309
1991	10	12	31,866	0	2,321	40	34,227
1992	26	37	1,056	1,009	6,004	30	8,099
1993	21	57	4,560	0	2,967	501	8,028
1994	19	80	4,471	112	68	0	4,651
1995	14	47	283	100	180	6	569
1996	48	129	149,926	408	48,405	31	198,770
1997	42	190	51,929	394	22,006	715	75,044
1998	46	187	47,874	268	62,381	48	110,571
1999	22	129	86,410	6,594	2,679	532	96,215
2000	16	138	274	0	66	14	354
2001	10	106	31	0	0	193	224
2002	11	166	416	0	0	0	416
2003	13	138	333	0	270	3	606
2004	20	143	248	110	18,728	0	19,086
2005	11	108	0	25	3,951	0	3,976
2006	9	109	88	6,214	0	0	6,302
2007	14	84	0	0	252	0	252
2008	15	141	0	0	11,177	0	11,177
2009	18	113	50	0	2,442	147	2,639
2010	16	113	0	0	7,044	4	7,048
2011	30	145	207	0	12,241	8	12,456
2012	18	48	8	0	126,576	154	126,738
2013	27	77	263	0	113,288	14	113,565
2014	18	45	55	0	53,742	191	53,988
2015	29	121	11	0	164,085	715	164,811

Note: Discards at sea not included.

^a Flatfish includes general flatfish, flounders, sole, and turbot.

^b Sharks include spiny dogfish, salmon, Pacific sleeper, and unspecified sharks.

^c Other includes general groundfish, miscellaneous finfish, and unidentified fish.

Table 25.–Cook Inlet Area groundfish fisheries reported at-sea discards in whole pounds, 1989–2015.

Year	Sablefish	Rockfish	Lingcod	Pacific cod	Pollock	Flatfish	Sharks	Skates	Other	Octopus	Squid	Total
1989	0	18	0	0	0	0	0	0	0	0	0	18
1990	10	0	1,500	0	0	2,899	0	0	0	0	0	4,409
1991	0	27	1,528	200	3,830	60	0	400	1,610	0	0	7,655
1992	57	1,251	4,235	5,489	2,926	19,125	7,948	64,997	570	27	0	106,625
1993	13	0	1,180	6,906	4,470	13,396	10,704	43,607	1,900	329	2	82,507
1994	54	76	1,835	173	832	4,284	1,825	34,850	205	0	0	44,134
1995	1,000	356	2,950	5,007	1,550	4,387	19,531	34,486	0	0	0	69,267
1996	8,010	5,490	1	14,203	3,153	88,357	0	12,369	4,316	2,894	0	138,793
1997	0	0	0	0	25,000	0	500	300	0	10	0	25,810
1998	4,895	3,672	0	396	10,451	89,224	4,994	6,090	4,374	0	1,828	125,924
1999	0	0	68	0	137	241	864	959	1,188	0	690	4,147
2000	2,448	836	4,746	17,194	167	1,701	17,700	5,453	90	0	0	50,335
2001	1,510	0	7,549	1,253	1	734	23,651	2,709	111	113	0	37,631
2002	2,147	5	5,688	457	4	428	9,095	1,875	12	4	0	19,715
2003	3,445	30	3,277	645	0	206	23,206	2,892	47	1,400	0	35,148
2004	1,674	60	434	1,008	3	439	49,568	1,898	26	0	0	55,110
2005	833	9	1,643	1,002	0	620	14,915	3,862	37	0	0	22,920
2006	1,060	0	1,954	1,526	14	90	14,747	980	110	2	0	20,484
2007	1,139	0	2,086	742	9	192	27,707	4,730	373	15	0	36,994
2008	262	0	4,780	809	22	449	13,823	1,717	27	7	0	21,896
2009	1,183	0	1,531	1,332	16	767	20,895	6,401	30	407	0	32,563
2010	560	0	803	770	6	705	18,356	7,233	48	48	0	28,528
2011	853	0	453	1,175	10	259	3,147	1,977	13	42	0	7,929
2012	551	3	842	495	0	170	3,672	4,937	27	17	0	10,713
2013	763	11	117	1,585	22	218	4,754	3,834	115	132	0	11,549
2014	1,383	95	2,077	1,477	1	147	2,447	3,014	80	31	0	10,752
2015	171	0	589	314	0	112	32,393	5,987	160	0	0	39,727
Total	34,022	11,940	51,866	64,158	52,624	229,211	324,441	257,556	15,469	5,478	2,520	1,051,283
Average	1,309	459	1,995	2,566	2,105	8,816	13,602	10,302	619	228	105	38,906
% of Total	3%	1%	5%	6%	5%	22%	31%	25%	1%	<1%	<1%	100%

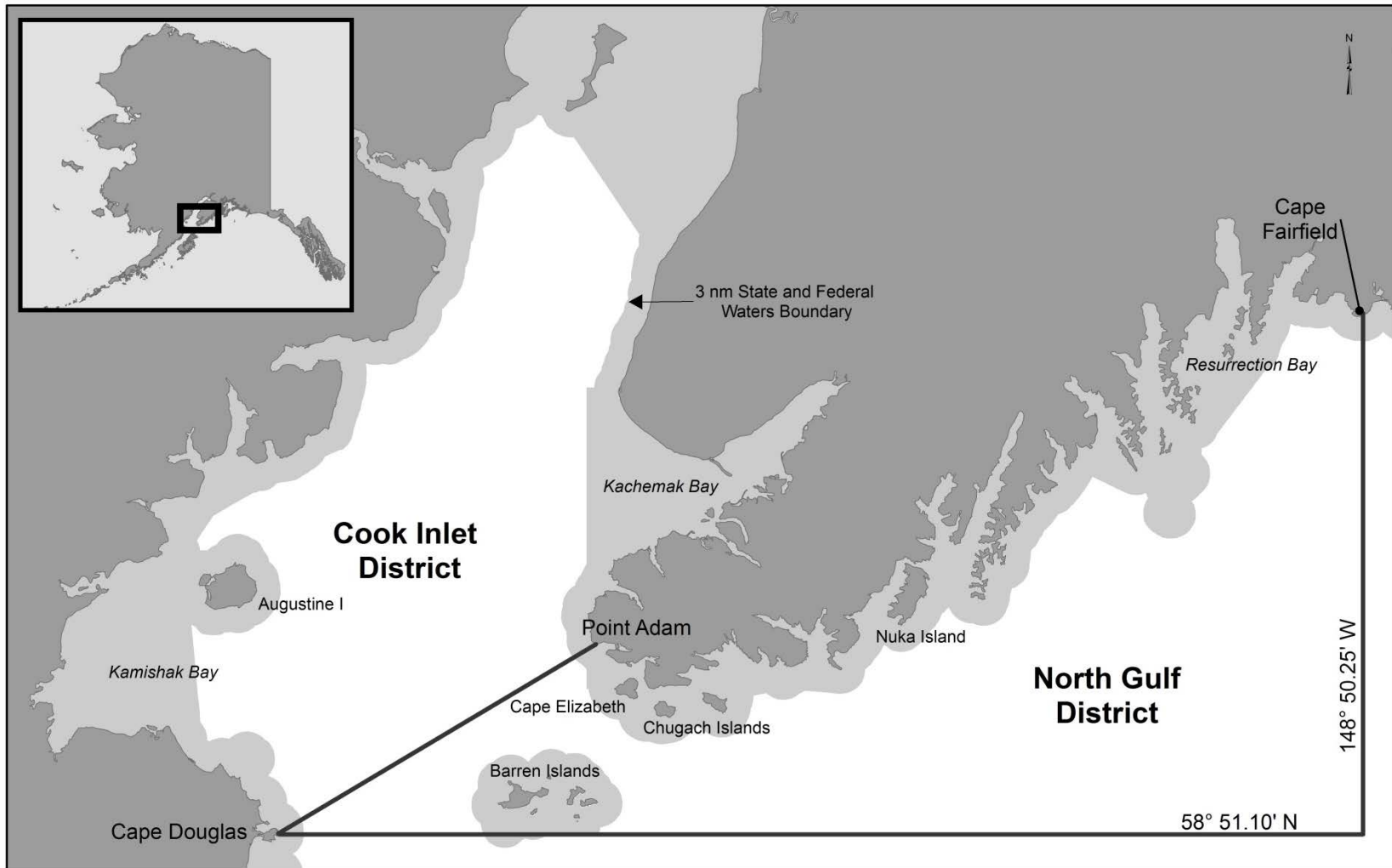


Figure 1.—Cook Inlet Management Area commercial groundfish area and district boundaries from 1997 to present.

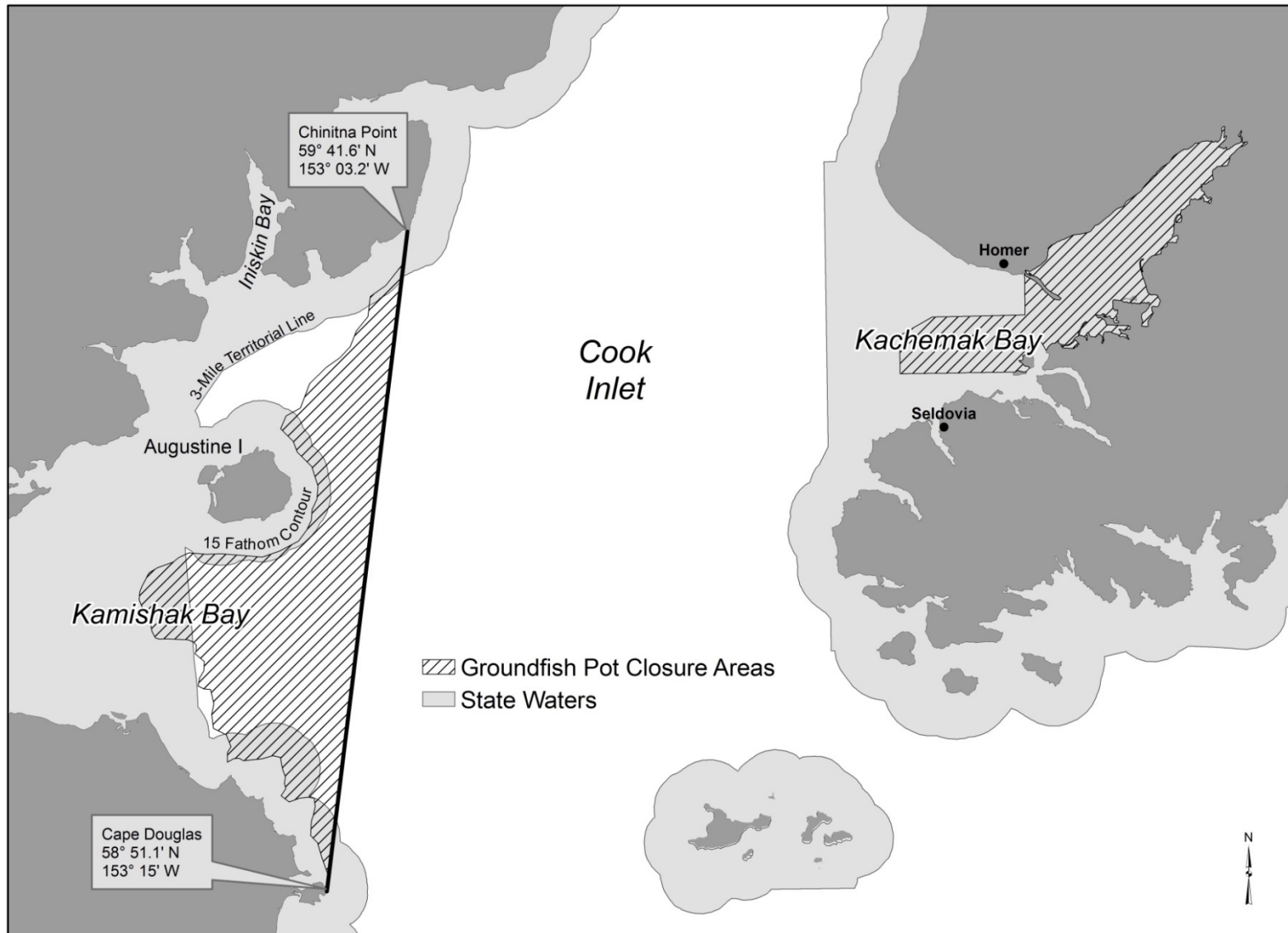


Figure 2.—Kachemak Bay and Kamishak Bay groundfish pot closure area.

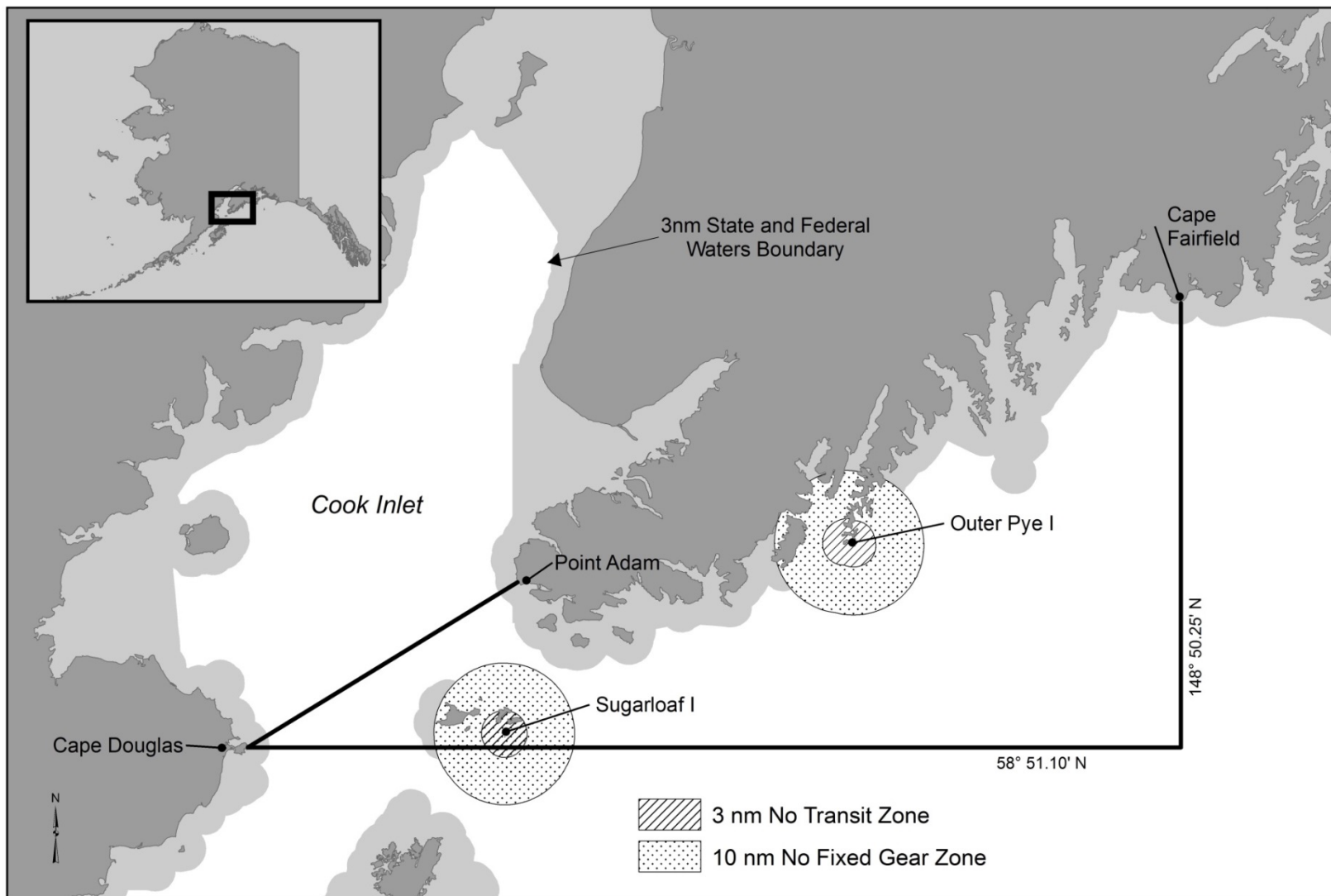


Figure 3.—Vessel no-transit and fixed gear Pacific cod fishing closure zones around Steller sea lion rookeries within the Cook Inlet Management Area.

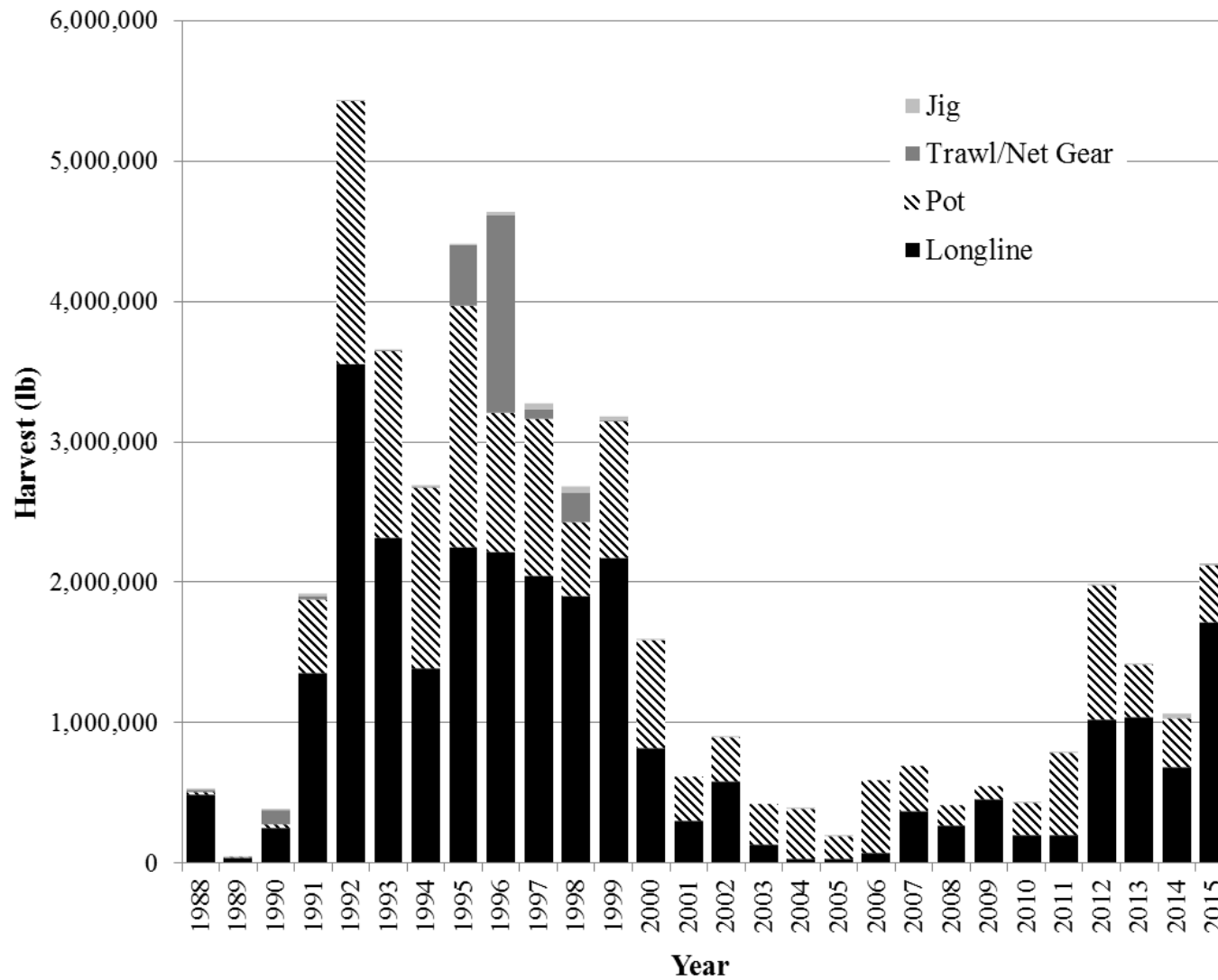


Figure 4.—Annual harvest (lb) by gear type in the commercial parallel Pacific cod fishery from the Cook Inlet Area, 1997–2015.

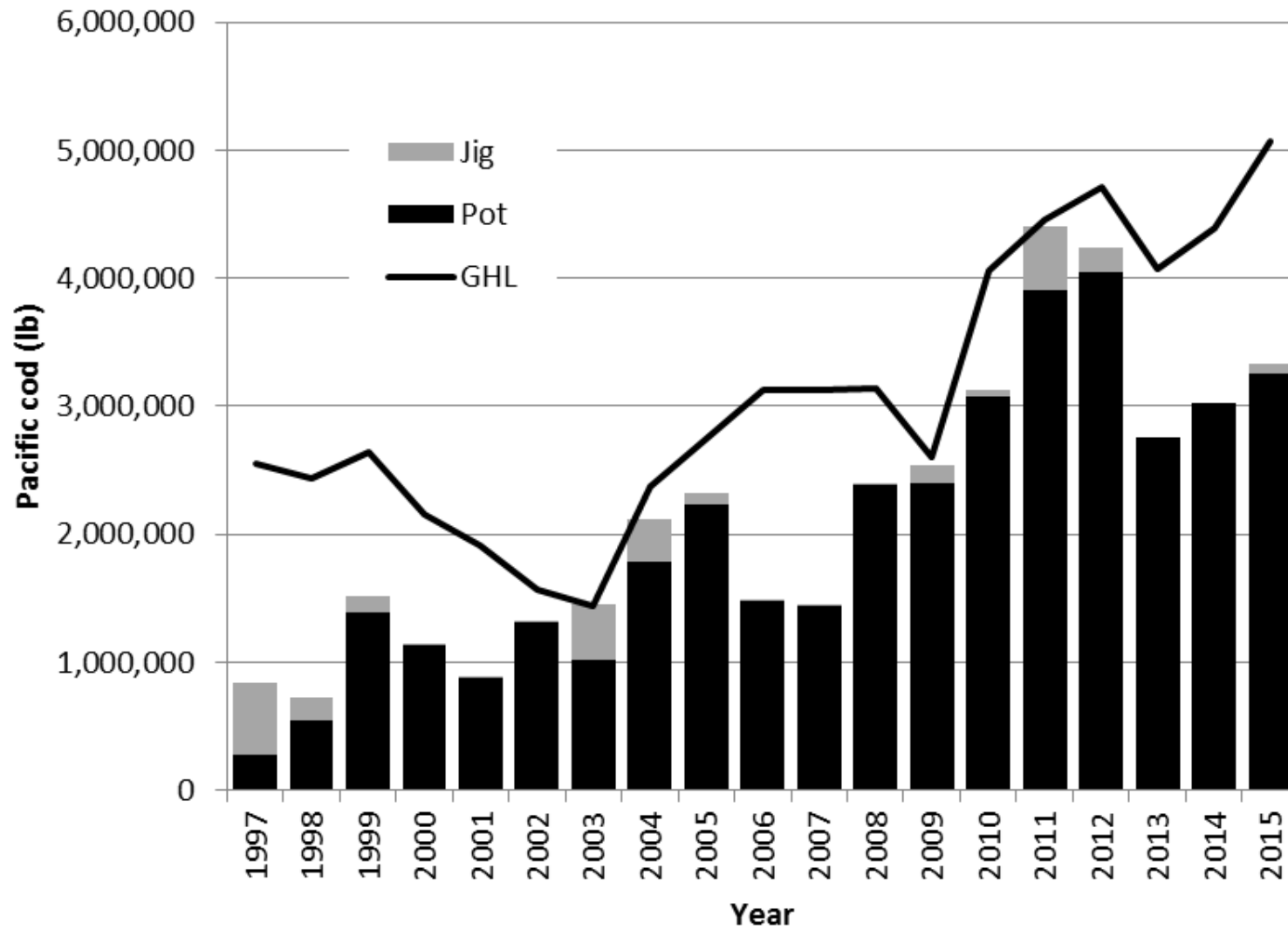


Figure 5.—Annual harvest (lb) by gear type in the commercial state-waters Pacific cod fishery from the Cook Inlet Area, 1997–2015.

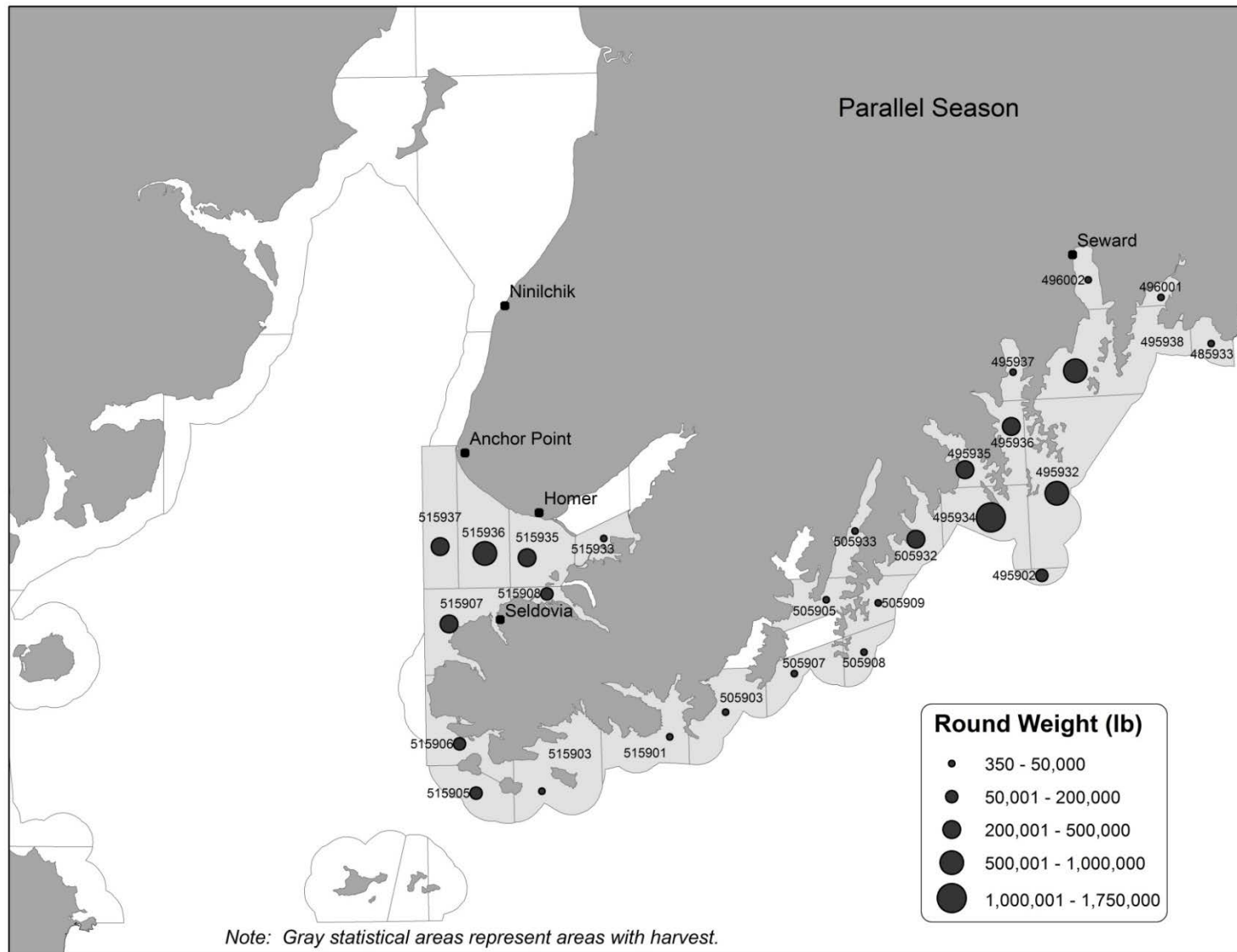


Figure 6.—Cook Inlet Area commercial Pacific cod harvest from the parallel season by statistical area, 2012–2015 combined.

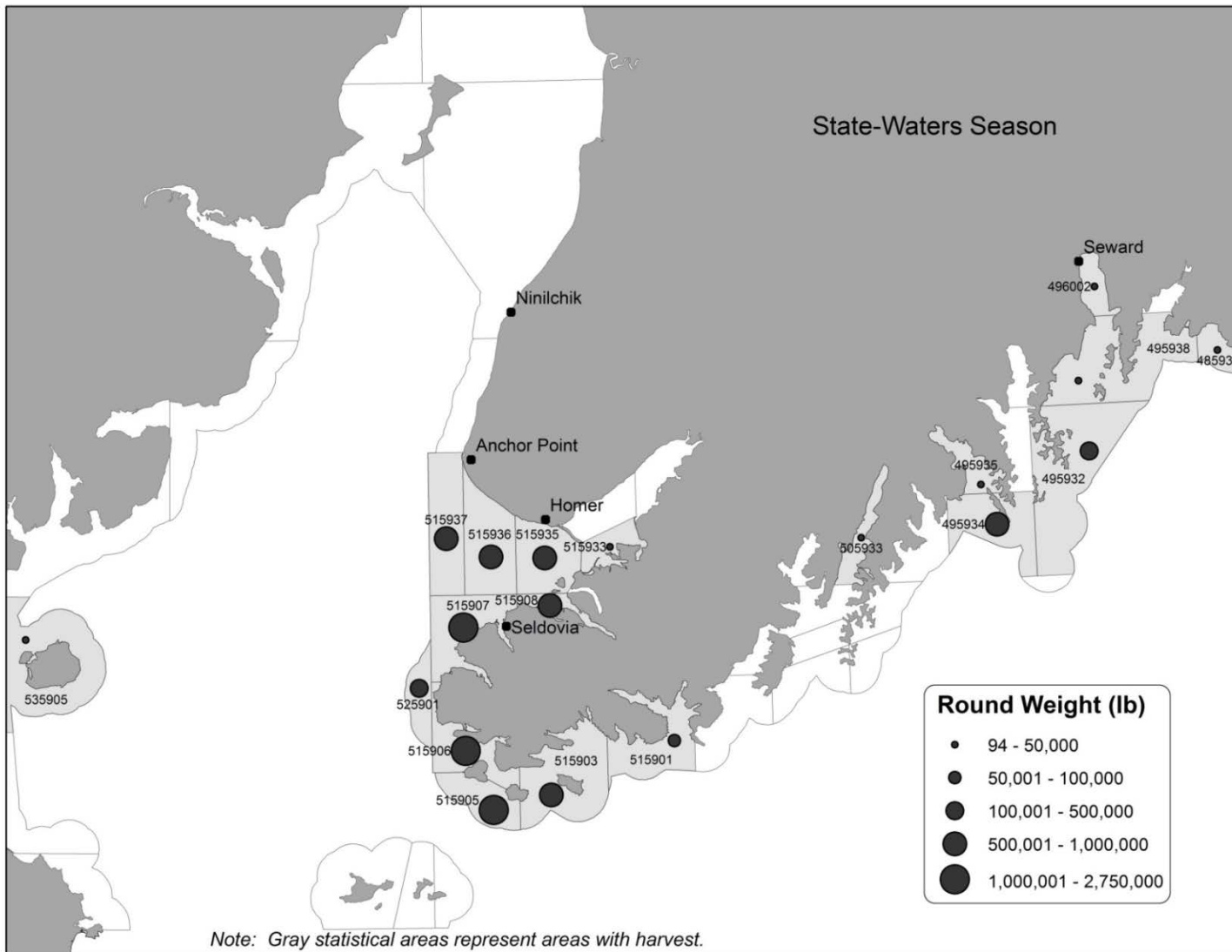


Figure 7.—Cook Inlet Area commercial Pacific cod harvest from the state-waters season by statistical area, 2012–2015 combined.

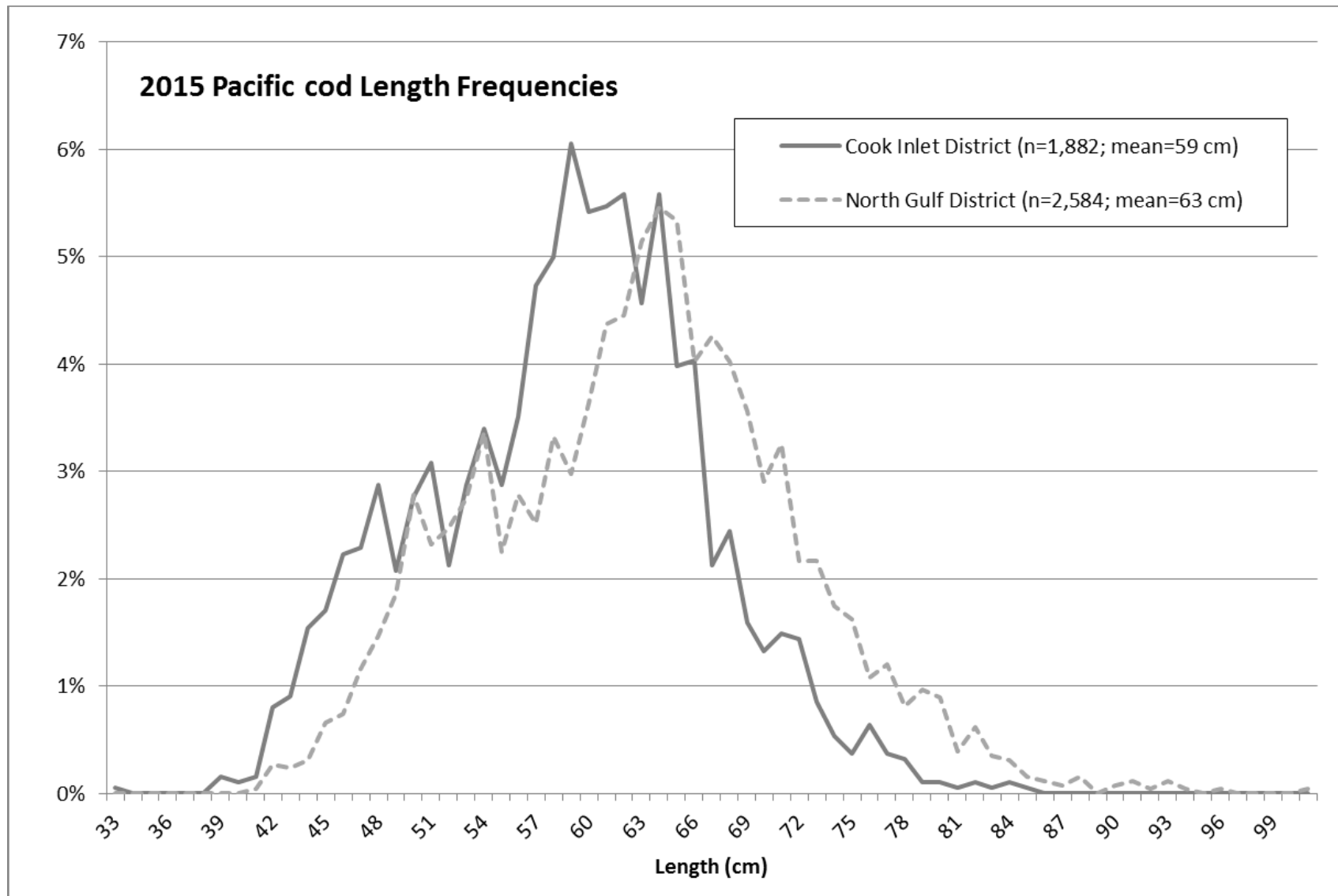


Figure 8.—Pacific cod length frequency distribution for Cook Inlet and North Gulf districts, 2015.

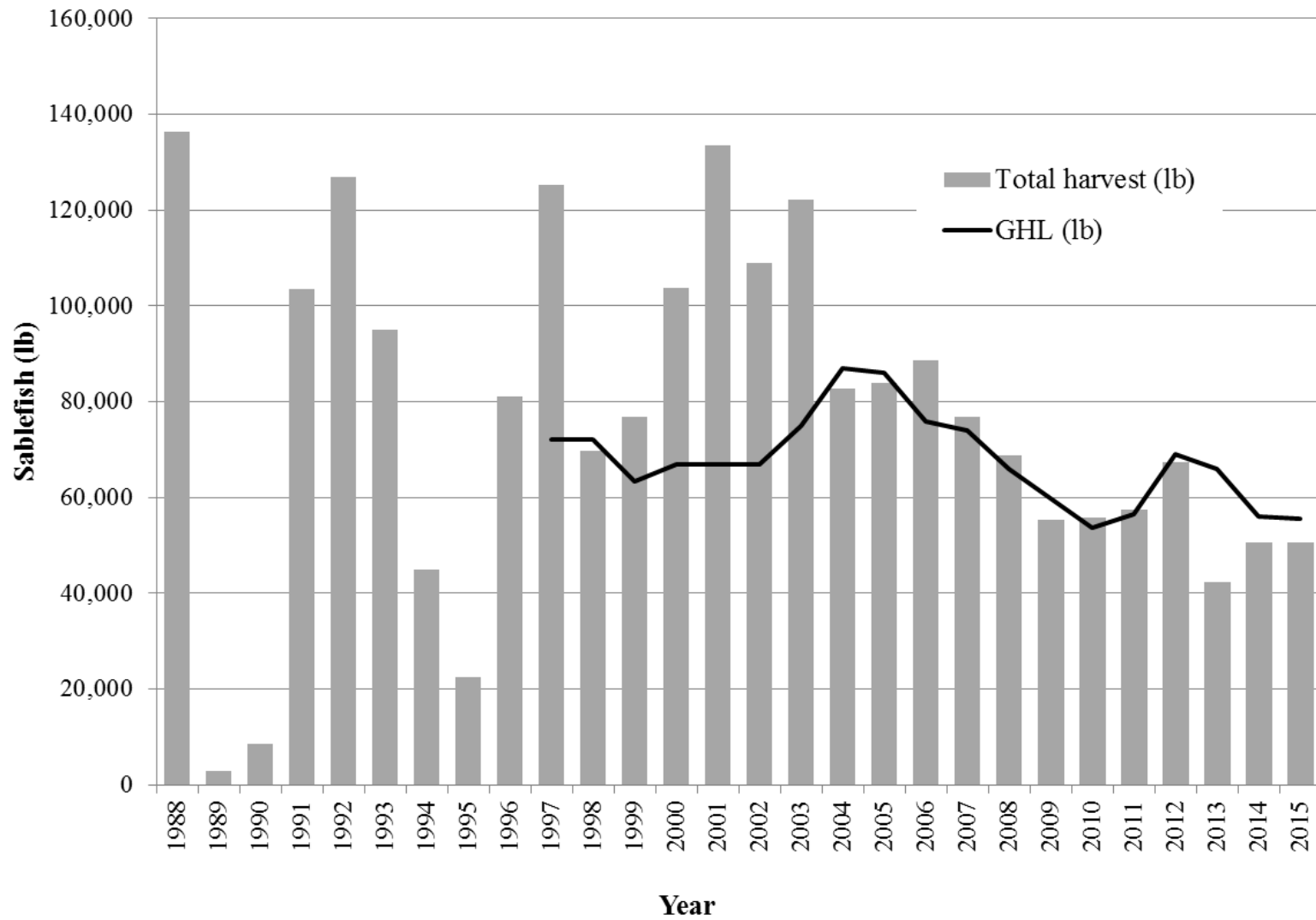


Figure 9.—Cook Inlet Area commercial sablefish harvest and guideline harvest level (GHL), 1988–2015.

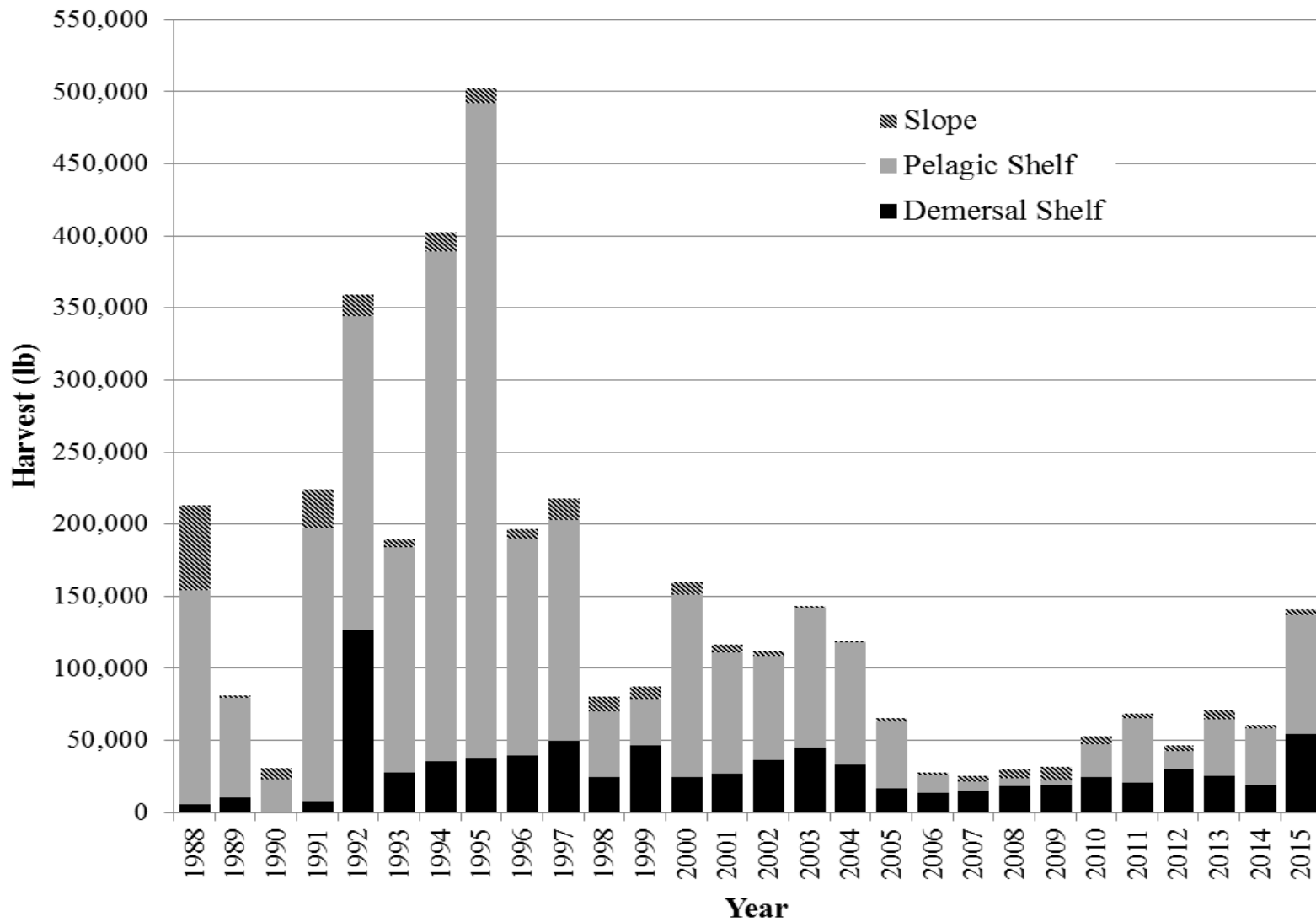


Figure 10.—Cook Inlet Area commercial rockfish harvest contribution by rockfish species assemblage, 1988–2015.

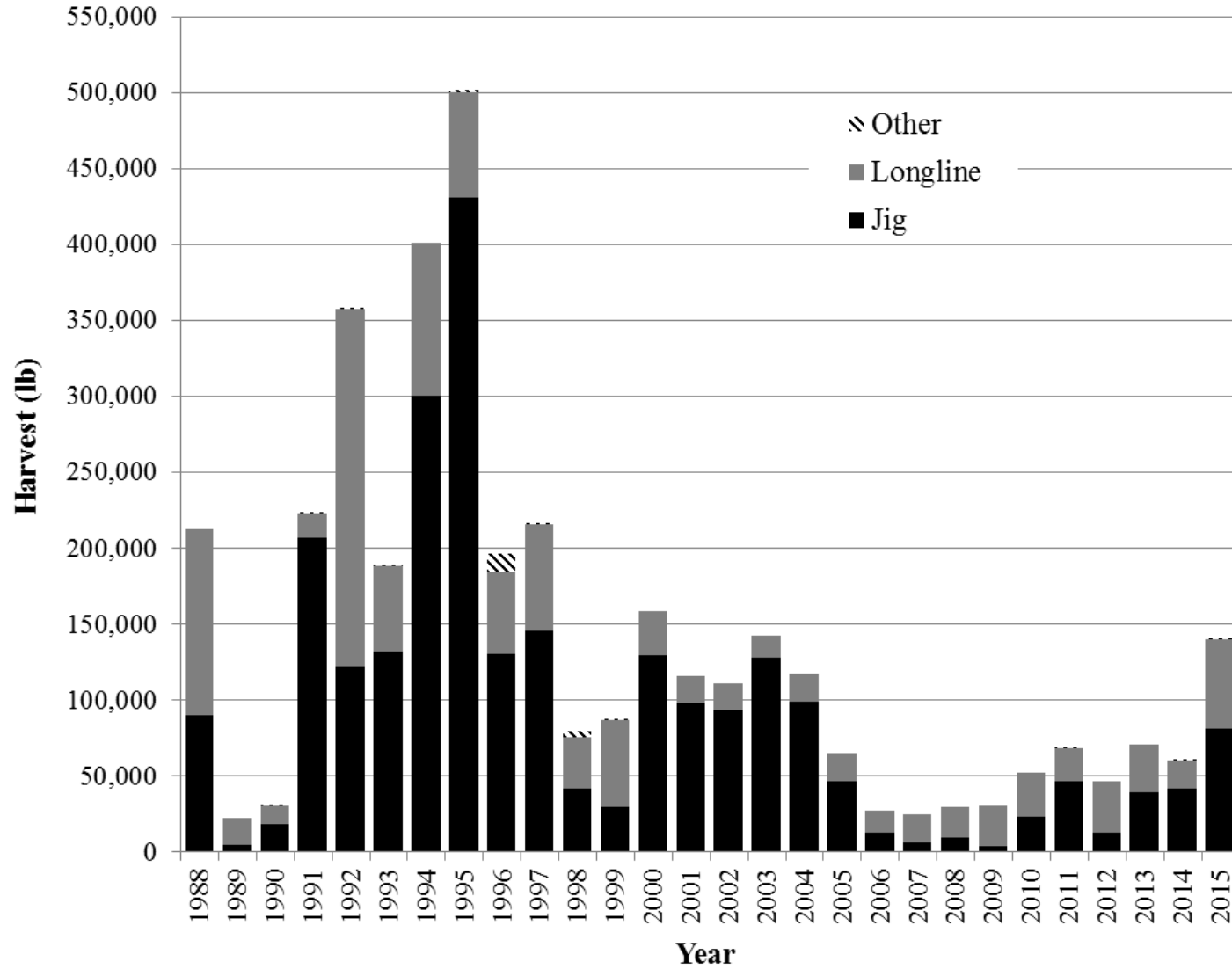


Figure 11.—Cook Inlet Area commercial rockfish harvest contribution by gear type, 1988–2015.

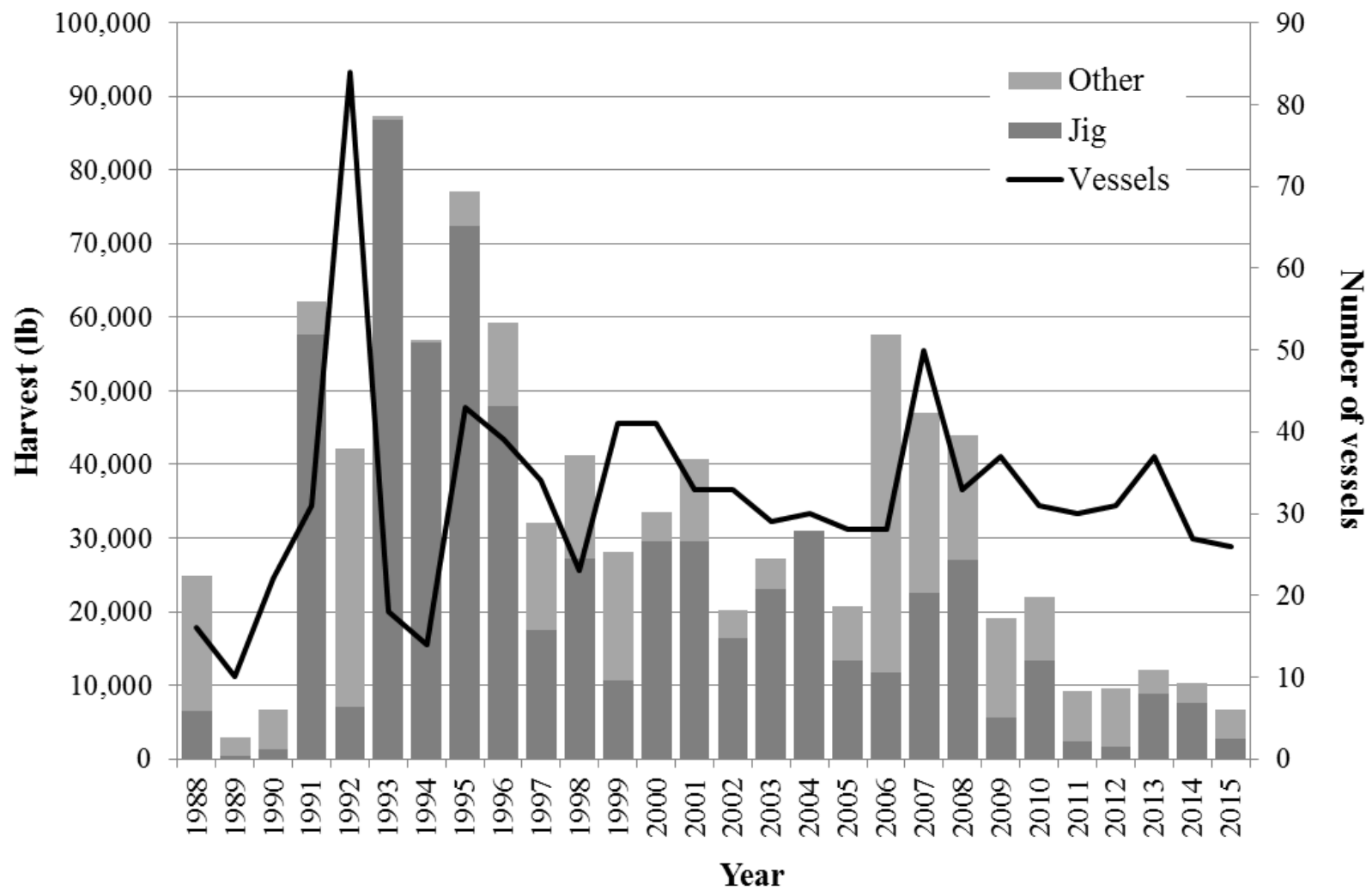


Figure 12.—Harvest by gear type and effort for the commercial lingcod fishery in Cook Inlet Area state and federal waters, 1988–2015.

APPENDIX A

Appendix A1.—Estimated exvessel values of Cook Inlet Area groundfish harvests, 1988–2015.

Year	Lingcod	Pacific Cod	Pollock	Rockfish	Sablefish	Skates	Other ^a	Total
2015 Harvest								
Round Weight (lb)	6,742	5,451,109	42,094	140,819	31,780	164,085	726	5,837,355
Price (\$/lb)	\$0.76	\$0.36	\$0.09	\$0.59	\$3.29	\$0.41	\$0.80	
Value	\$5,124	\$1,962,399	\$3,788	\$83,083	\$104,556	\$67,275	\$581	\$2,226,807
2014 Harvest								
Round Weight (lb)	10,221	4,078,396	12,931	60,839	50,703	53,742	246	4,267,078
Price (\$/lb)	\$1.23	\$0.36	\$0.28	\$0.62	\$3.48	\$0.40	\$0.63	
Value	\$12,572	\$1,468,223	\$3,621	\$37,720	\$176,447	\$21,497	\$155	\$1,720,234
2013 Harvest								
Round Weight (lb)	12,010	4,166,538	47,314	70,759	42,287	113,288	277	4,452,474
Price (\$/lb)	\$1.10	\$0.30	\$0.28	\$0.65	\$2.93	\$0.39	\$0.00	
Value	\$13,211	\$1,249,961	\$13,248	\$45,994	\$123,901	\$44,182	\$0	\$1,490,497
2012 Harvest								
Round Weight (lb)	9,494	6,218,602	4,301	47,041	67,452	124,381	162	6,471,433
Price (\$/lb)	\$0.79	\$0.39	\$0.25	\$0.52	\$2.60	\$0.40	\$0.01	
Value	\$7,500	\$2,425,255	\$1,075	\$24,461	\$175,374	\$49,753	\$2	\$2,683,420
2011 Harvest								
Round Weight (lb)	9,195	5,179,196	5,751	66,432	57,350	12,241	215	5,330,379
Price (\$/lb)	\$0.77	\$0.39	\$0.21	\$0.63	\$4.55	\$0.36	\$0.00	
Value	\$7,080	\$2,019,886	\$1,208	\$41,520	\$260,941	\$4,407	\$0	\$2,335,042
2010 Harvest								
Round Weight (lb)	21,966	3,549,867	155	52,615	55,899	7,044	4	3,687,550
Price (\$/lb)	\$0.77	\$0.29	\$0.20	\$0.56	\$3.55	\$0.22	\$0.34	
Value	\$16,914	\$1,029,461	\$31	\$29,464	\$198,441	\$1,550	\$1	\$1,275,863
2009 Harvest								
Round Weight (lb)	19,180	3,073,988	5,269	31,192	55,263	2442	197	3,187,531
Price (\$/lb)	\$0.63	\$0.34	\$0.14	\$0.48	\$2.89	\$0.20	\$0.00	
Value	\$12,083	\$1,045,156	\$722	\$14,972	\$159,959	\$488	\$0	\$1,233,380
2008 Harvest								
Round Weight (lb)	44,032	2,807,005	85	29,930	68,724	11,177	0	2,960,953
Price (\$/lb)	\$0.66	\$0.60	\$0.00	\$0.58	\$2.85	\$0.10	\$0.00	
Value	\$29,061	\$1,684,203	\$0	\$17,359	\$195,900	\$1,118	\$0	\$1,927,641
2007 Harvest								
Round Weight (lb)	47,080	2,135,654	1,694	25,388	76,889	252	0	2,286,957
Price (\$/lb)	\$0.60	\$0.51	\$0.09	\$0.45	\$2.44	\$0.00	\$0.00	
Value	\$28,137	\$1,089,184	\$149	\$11,361	\$187,461	\$0	\$0	\$1,316,292
2006 Harvest								
Round Weight (lb)	57,588	2,068,642	14	27,924	88,695	0	6,302	2,249,165
Price (\$/lb)	\$0.58	\$0.43	\$0.00	\$0.54	\$2.39	\$0.00	\$0.18	
Value	\$33,674	\$883,230	\$0	\$15,111	\$211,554	\$0	\$1,134	\$1,144,703

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Year	Lingcod	Pacific Cod	Pollock	Rockfish	Sablefish	Skates	Other ^a	Total
2005 Harvest								
Round Weight (lb)	20,793	2,511,226	99	65,145	84,023	3,951	25	2,685,262
Price (\$/lb)	\$0.61	\$0.31	\$0.00	\$0.41	\$2.02	\$0.10	\$0.00	
Value	\$12,595	\$790,939	\$0	\$26,873	\$169,660	\$395	\$0	\$1,000,462
2004 Harvest								
Round Weight (lb)	36,644	2,499,587	342,305	118,089	82,836	18,728	358	3,098,547
Price (\$/lb)	\$0.57	\$0.32	\$0.07	\$0.49	\$1.70	\$0.14	\$0.00	
Value	\$20,933	\$811,610	\$23,739	\$57,389	\$140,580	\$2,622	\$0	\$1,056,873
2003 Harvest								
Round Weight (lb)	27,154	1,874,336	21	142,729	122,098	270	336	2,166,944
Price (\$/lb)	\$0.60	\$0.37	\$0.00	\$0.53	\$2.21	\$0.22	\$0.06	
Value	\$16,306	\$693,504	\$0	\$75,816	\$269,355	\$59	\$20	\$1,055,060
2002 Harvest								
Round Weight (lb)	20,177	2,220,817	1,381	111,508	108,966	0	416	2,463,265
Price (\$/lb)	\$0.58	\$0.33	\$0.07	\$0.55	\$1.98	\$0.00	\$0.00	
Value	\$11,621	\$732,505	\$102	\$60,878	\$215,613	\$0	\$0	\$1,020,719
2001 Harvest								
Round Weight (lb)	40,793	1,511,103	3,129	116,323	133,435	0	224	1,805,007
Price (\$/lb)	\$0.51	\$0.39	\$0.07	\$0.40	\$1.77	\$0.00	\$0.00	
Value	\$20,782	\$586,390	\$206	\$46,741	\$235,581	\$0	\$0	\$889,700
2000 Harvest								
Round Weight (lb)	33,517	2,737,178	615	159,409	103,662	66	288	3,034,735
Price (\$/lb)	\$0.58	\$0.40	\$0.06	\$0.48	\$2.04	\$0.00	\$0.30	
Value	\$19,395	\$1,094,871	\$37	\$77,010	\$211,022	\$0	\$87	\$1,402,423
1999 Harvest								
Round Weight (lb)	28,162	4,701,085	2,983,371	87,652	76,741	2,679	93,536	7,973,226
Price (\$/lb)	\$0.50	\$0.37	\$0.09	\$0.58	\$1.52	\$0.18	\$0.04	
Value	\$13,981	\$1,724,949	\$262,032	\$50,499	\$116,481	\$482	\$3,783	\$2,172,206
1998 Harvest								
Round Weight (lb)	41,239	3,414,058	9,693,429	80,321	69,689	62,381	48,190	13,409,307
Price (\$/lb)	\$0.47	\$0.24	\$0.08	\$0.51	\$1.43	\$0.19	\$0.01	
Value	\$19,368	\$819,374	\$744,006	\$40,816	\$99,800	\$11,852	\$636	\$1,735,852
1997 Harvest								
Round Weight (lb)	32,147	4,112,154	3,895,099	217,364	125,349	22,006	53,038	8,457,157
Price (\$/lb)	\$0.47	\$0.27	\$0.09	\$0.59	\$2.33	\$0.09	\$0.04	
Value	\$15,109	\$1,110,281	\$350,559	\$128,245	\$292,064	\$1,981	\$2,122	\$1,900,360
1996 Harvest								
Round Weight (lb)	59,296	4,644,945	1,943,659	196,577	81,067	48,405	150,365	7,124,314
Price (\$/lb)	\$0.52	\$0.24	\$0.09	\$0.57	\$1.94	\$0.14	\$0.03	
Value	\$30,951	\$1,105,026	\$171,700	\$111,450	\$157,502	\$6,777	\$4,755	\$1,588,161

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Year	Lingcod	Pacific Cod	Pollock	Rockfish	Sablefish	Skates	Other ^a	Total
1995 Harvest								
Round Weight (lb)	77,176	4,408,651	2,995	502,045	22,551	180	389	5,013,987
Price (\$/lb)	\$0.46	\$0.24	\$0.00	\$0.58	\$2.06	\$0.00	\$0.04	
Value	\$35,865	\$1,045,991	\$3	\$291,247	\$46,489	\$0	\$17	\$1,419,612
1994 Harvest								
Round Weight (lb)	56,836	2,685,562	238,264	402,040	45,008	68	4,583	3,432,361
Price (\$/lb)	\$0.38	\$0.19	\$0.00	\$0.42	\$1.38	\$0.00	\$0.00	
Value	\$21,690	\$511,595	\$0	\$168,348	\$62,097	\$0	\$0	\$763,730
1993 Harvest								
Round Weight (lb)	87,370	3,661,744	154,345	189,396	95,016	2,976	5,061	4,195,908
Price (\$/lb)	\$0.43	\$0.24	\$0.08	\$0.32	\$0.87	\$0.40	\$0.12	
Value	\$37,498	\$880,826	\$13,007	\$59,947	\$83,002	\$1,190	\$598	\$1,076,068
1992 Harvest								
Round Weight (lb)	42,218	5,441,421	3,875	358,877	126,852	6,004	2,095	5,981,342
Price (\$/lb)	\$0.22	\$0.23	\$0.01	\$0.25	\$0.69	\$0.31	\$0.04	
Value	\$9,434	\$1,250,924	\$45	\$89,927	\$87,269	\$1,861	\$83	\$1,439,543
1991 Harvest								
Round Weight (lb)	62,183	1,916,636	9,528	223,822	103,597	2,321	31,905	2,349,992
Price (\$/lb)	\$0.24	\$0.27	\$0.06	\$0.20	\$0.48	\$0.25	\$0.34	
Value	\$15,134	\$513,991	\$534	\$44,971	\$49,533	\$580	\$10,871	\$635,614
1990 Harvest								
Round Weight (lb)	6,769	378,799	61,817	30,580	8,480	0	2,309	488,754
Price (\$/lb)	\$0.36	\$0.13	\$0.07	\$0.29	\$0.55	\$0.00	\$0.03	
Value	\$2,432	\$49,851	\$4,441	\$8,930	\$4,631	\$0	\$65	\$70,350
1989 Harvest								
Round Weight (lb)	2,894	36,846	250	81,060	2,996	0	234	124,280
Price (\$/lb)	\$0.37	\$0.07	\$0.00	\$0.07	\$0.71	\$0.00	\$0.14	
Value	\$1,058	\$2,587	\$0	\$5,662	\$2,116	\$0	\$33	\$11,456
1988 Harvest								
Round Weight (lb)	24,948	517,497	2,380	213,298	136,260	275	2,544	897,202
Price (\$/lb)	\$0.22	\$0.21	\$0.08	\$0.12	\$1.02	\$0.28	\$0.20	
Value	\$5,487	\$107,970	\$193	\$26,307	\$139,421	\$77	\$491	\$279,946

Note: Prices and values are derived from fish ticket information.

^a Other includes flatfish, sharks, salmon, and other miscellaneous finfish.

Appendix A2.—Estimated exvessel values for the Cook Inlet Area Pacific cod parallel and state-waters seasons, 1988–2015.

Year	Price per lb	Parallel Season Harvest (lb) ^{a, b}	Parallel Season Value	State-waters Season Harvest (lb) ^a	State-waters Season Value	Total Combined Pacific cod Harvest (lb) ^c	Total Combined Pacific cod Fishery Value
1988	\$0.21	517,497	\$107,970			517,497	\$107,970
1989	\$0.07	36,846	\$2,587			36,846	\$2,587
1990	\$0.13	378,799	\$49,851			378,799	\$49,851
1991	\$0.27	1,916,636	\$513,991			1,916,636	\$513,991
1992	\$0.23	5,441,421	\$1,250,924			5,441,421	\$1,250,924
1993	\$0.24	3,661,744	\$880,826			3,661,744	\$880,826
1994	\$0.19	2,685,562	\$511,595			2,685,562	\$511,595
1995	\$0.24	4,408,651	\$1,045,991			4,408,651	\$1,045,991
1996	\$0.24	4,644,945	\$1,105,026			4,644,945	\$1,105,026
1997 ^d	\$0.27	3,273,240	\$879,572	838,913	\$225,429	4,112,154	\$1,105,001
1998	\$0.24	2,683,589	\$636,819	730,469	\$173,341	3,414,058	\$810,160
1999	\$0.37	3,183,178	\$1,167,990	1,517,907	\$556,959	4,701,085	\$1,724,949
2000	\$0.40	1,587,390	\$640,842	1,149,788	\$464,178	2,737,178	\$1,105,020
2001	\$0.39	615,752	\$238,945	895,351	\$347,445	1,511,103	\$586,390
2002	\$0.33	891,970	\$294,204	1,328,847	\$438,301	2,220,817	\$732,505
2003	\$0.37	420,798	\$155,695	1,453,538	\$537,809	1,874,336	\$693,504
2004	\$0.32	387,902	\$125,945	2,111,685	\$685,627	2,499,587	\$811,610
2005	\$0.31	193,075	\$60,811	2,318,151	\$730,128	2,511,226	\$790,939
2006	\$0.43	591,121	\$252,386	1,477,521	\$630,844	2,068,642	\$883,230
2007	\$0.49	693,305	\$338,302	1,442,349	\$703,803	2,135,654	\$1,042,105
2008	\$0.60	413,464	\$246,770	2,393,541	\$1,428,547	2,807,005	\$1,675,317
2009	\$0.34	541,453	\$184,094	2,532,535	\$861,062	3,073,988	\$1,045,156
2010	\$0.29	426,241	\$123,610	3,123,626	\$905,852	3,549,867	\$1,029,461
2011	\$0.39	778,857	\$303,754	4,400,339	\$1,716,132	5,179,196	\$2,019,886
2012	\$0.39	1,982,207	\$773,061	4,236,395	\$1,652,194	6,218,602	\$2,425,255
2013	\$0.30	1,412,274	\$423,682	2,754,265	\$826,279	4,166,538	\$1,249,961
2014	\$0.36	1,060,078	\$381,628	3,018,318	\$1,086,595	4,078,396	\$1,468,223
2015	\$0.36	2,124,094	\$764,674	3,326,701	\$1,197,613	5,451,109	\$1,962,399

^a Harvest is reported in round pounds.

^b Includes Pacific cod bycatch to other directed groundfish and halibut fisheries in state-waters.

^c Any inconsistencies in totals are due to rounding.

^d State-waters season implemented in 1997.

APPENDIX B

Appendix B1.–Species encountered in Central Region groundfish management.

ADF&G Species Code	Common Name	Scientific Name
710	Sablefish	<i>Anoplopoma fimbria</i>
110	Pacific Cod	<i>Gadus macrocephalus</i>
270	Walleye Pollock	<i>Theragra chalcogramma</i>
130	Lingcod	<i>Ophiodon elongatus</i>
870	Giant Pacific Octopus	<i>Octopus dofleini</i>
875	Majestic Squid	<i>Berryteuthis magister</i>
692	Pacific Sleeper Shark	<i>Somniosus pacificus</i>
690	Pacific Salmon Shark	<i>Lamna ditropis</i>
691	Pacific Spiny Dogfish	<i>Squalus suckleyi</i>
700	Other Skates	Family Rajidae
701	Longnose Skate	<i>Raja rhina</i>
702	Big Skate	<i>Raja binoculata</i>
703	Alaska Skate	<i>Bathyraja parmifera</i>
704	Aleutian Skate	<i>Bathyraja aleutica</i>
NA	Assorted Flatfishes	Order Pleuronectiformes
Pelagic Shelf Rockfish		
142	Black Rockfish	<i>Sebastes melanops</i>
155	Yellowtail Rockfish	<i>Sebastes flavidus</i>
172	Dusky Rockfish	<i>Sebastes variabilis</i>
173	Dark Rockfish	<i>Sebastes ciliatus</i>
Demersal Shelf Rockfish		
138	Copper Rockfish	<i>Sebastes caurinus</i>
145	Yelloweye Rockfish	<i>Sebastes ruberrimus</i>
146	Canary Rockfish	<i>Sebastes pinniger</i>
147	Quillback Rockfish	<i>Sebastes maliger</i>
148	Tiger Rockfish	<i>Sebastes nigrocinctus</i>
149	China Rockfish	<i>Sebastes nebulosus</i>
150	Rosethorn Rockfish	<i>Sebastes helvomaculatus</i>
Slope Rockfish		
136	Northern Rockfish	<i>Sebastes polyspinis</i>
137	Bocaccio Rockfish	<i>Sebastes paucispinis</i>
141	Pacific Ocean Perch	<i>Sebastes alutus</i>
151	Rougeye Rockfish	<i>Sebastes aleutianus</i>
152	Shortraker Rockfish	<i>Sebastes borealis</i>
153	Redbanded Rockfish	<i>Sebastes babcocki</i>
157	Silvergray Rockfish	<i>Sebastes brevispinis</i>
158	Redstripe Rockfish	<i>Sebastes proriger</i>
159	Darkblotched Rockfish	<i>Sebastes crameri</i>
166	Sharpchin Rockfish	<i>Sebastes zacentrus</i>
182	Splitnose Rockfish	<i>Sebastes diploproa</i>
176	Harlequin Rockfish	<i>Sebastes variegatus</i>
143	Shortspine Thornyhead	<i>Sebastolobus alascanus</i>

Appendix B2.–Frequently used acronyms and key words.

Acronym	Definition
ABC	Acceptable biological catch, stock specification as set annually by the NPFMC.
ADF&G	Alaska Department of Fish and Game
BOF	The Alaska Board of Fisheries
CGOA	Central Gulf of Alaska; management areas 620 and 630
EGOA	Eastern Gulf of Alaska; management area 640
EEZ	Exclusive economic zone; from 3 to 200 nautical miles offshore
EO	Emergency order; management action taken by ADF&G to effect regulatory change
GHL	Guideline harvest level
GOA	Gulf of Alaska
mt	Metric tons (equal to 2,204.62 pounds)
nmi	Nautical mile (equal to 6,076 feet)
NMFS	National Marine Fisheries Service
NPFMC	North Pacific Fishery Management Council
Parallel fishery	State waters from 0 to 3 nautical miles opened via EO but with the same gear and seasons that apply to the federal fishery in the adjacent EEZ
State waters	Territorial sea from shore to 3 nautical miles offshore
State-waters fishery	Fishery occurring from shore to 3 nautical miles, open under state rules and managed exclusively by ADF&G
TAC	Total allowable catch; final federal harvest specification as recommended by NPFMC and set by NMFS