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# **An Overview of the Subsistence Fisheries of the Bristol Bay Management Area**

by

**Davin Holen**

and

**Terri Lemons**

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November 2012

Alaska Department of Fish and Game

Division of Subsistence



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The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the reports by the Division of Subsistence. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

### Weights and measures (metric)

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

### Weights and measures (English)

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

### Time and temperature

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

### Physics and chemistry

*all atomic symbols*

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

### General

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

### Measures (fisheries)

fork length	FL
mid-eye-to-fork	MEF
mid-eye-to-tail-fork	METF
standard length	SL
total length	TL

### Mathematics, statistics

*all standard mathematical signs, symbols and abbreviations*

alternate hypothesis	H <sub>A</sub>
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, $\chi^2$ , etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	E
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	log <sub>2</sub> , etc.
minute (angular)	'
not significant	NS
null hypothesis	H <sub>0</sub>
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	$\alpha$
probability of a type II error (acceptance of the null hypothesis when false)	$\beta$
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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THE BRISTOL BAY MANAGEMENT AREA**

by

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## EXECUTIVE SUMMARY

- Bristol Bay subsistence fisheries are an essential component of the local economy and way of life of Bristol Bay communities. About 56% of the subsistence harvest by local community residents, as measured in pounds usable weight, is Pacific salmon *Oncorhynchus* and about 9% is other fishes.
- The Alaska Board of Fisheries (board) has found that all finfishes of the Bristol Bay Management Area are customarily taken or used for subsistence purposes. As established by the board amounts reasonably necessary for subsistence uses (ANS) include 157,000–172,171 salmon (including 55,000–65,000 Kvichak River drainage sockeye salmon *O. nerka*) and 250,000 pounds usable weight of other finfishes.
- The number of Bristol Bay subsistence salmon permits issued has been stable since 1990. The recent 10-year average (2002–2011) is 1,108 permits.
- Most subsistence permit holders are residents of Bristol Bay communities: for the 2002–2011 period, 84% of permit holders were Bristol Bay residents.
- Most subsistence permits are issued for the Nushagak and Naknek-Kvichak districts.
- Sockeye salmon make up the largest portion of the Bristol Bay subsistence salmon harvest, as reported on subsistence permits: 77% of the recent 10-year average (2002–2011), followed by king *O. tshawytscha* (12%), coho *O. kisutch* (6%), chum *O. keta* (4%), and pink salmon *O. gorbuscha* (1%).
- Annual subsistence salmon harvests in the Bristol Bay Management Area (BBMA) declined from the early 1990s to the early 2000s. Since 1983, the average annual harvest was about 146,948 salmon; the recent 5-year average (2007–2011) was 125,206 salmon. Estimated harvests in 2000 (118,824 salmon), 2001 (119,856 salmon), and 2002 (109,587 salmon) are among the lowest on record. Salmon harvests have slightly recovered since 2002.
- The largest decline over the last 15 years has occurred in the Kvichak River watershed subsistence sockeye salmon fishery, historically the largest component of the Bristol Bay subsistence salmon harvest. The long-term (49 years, the time for which permit data are available) average annual harvest for this fishery is 64,896 sockeye salmon. The recent 5-year average annual harvest is 45,957 sockeye salmon. Harvests in 2000 (36,990 sockeye salmon), 2001 (32,808), and 2002 (33,001) were the lowest on record. Declines are due to lower harvests per permit rather than less fishing effort. Local fishers attribute the declines to reduced abundance of fish in traditional harvest areas. Since 1996, harvest per day is down 26% in years of escapements under 2 million fish, compared to the previous 13-year average.
- From 1983 to 2011 (the most recent data year), salmon harvests have shown an overall decline in the Nushagak District, from a high of 86,400 fish in 1986 to a low of 40,373 salmon in 2006; however, harvests have recovered slightly since that time to a recent high of 51,395 salmon in 2008. The 28-year average harvest (the time for which data are available) is 52,861 fish. The number of subsistence salmon permits issued in the Nushagak District has remained relatively stable since 1983. In 2011, 525 permits were issued, with a comparable 5-year average of 530 and the 10-year average of 517. Average salmon harvests per subsistence permit in the Nushagak District began to decline in 1995, reaching a low of 82 fish per permit in 1998. Harvests per permit have risen slightly since that time and for all permit holders, the average harvest per permit was 94 salmon in 2011, with a comparable 5-year average of 89 salmon, 10-year average of 91 salmon, and 20-year average of 93 salmon.
- Other fishes taken for subsistence purposes in the BBMA include Pacific herring *Clupea pallasii*, various species of smelt, Dolly Varden *Salvelinus malma*, lake trout *S. namaycush*, rainbow trout *O. mykiss*, Arctic grayling *Thymallus arcticus*, northern pike *Esox lucius*, various species of whitefishes, burbot *Lota lota*, and Alaska blackfish *Dallia pectoralis*. Although there are no Alaska Department of

Fish and Game annual subsistence harvest assessment programs for these species, harvest estimates are available through periodic household surveys. These fishes are taken throughout the year with a variety of harvest methods and are an important part of annual subsistence uses in the general Bristol Bay area.

Key words: subsistence fishing, Kvichak River, Bristol Bay, subsistence permit, sockeye salmon, Board of Fisheries.

## INTRODUCTION

In an area that is world-renowned for its commercial fisheries and its recreational opportunities, subsistence uses of wild renewable resources remains the most consistent and the most reliable component of the local economy of Bristol Bay communities (Figure 1). Subsistence fishing, hunting, and gathering provide hundreds of pounds of highly nutritious food for residents of the area. Much of the seasonal round of activities is shaped by the natural cycles of fishes, birds, mammals, and plants. Knowledge that is fundamental to making a living in the region is preserved and communicated through gathering and processing of wild resources, including fishing and hunting activities. Values that support families and communities are expressed, emphasized, and taught during the harvest, preparation, and sharing of wild foods. In the 20th century, much economic, social, cultural, and demographic change took place in Bristol Bay during the evolution of its economy, which is a mixture of cash and subsistence sectors. At the beginning of the 21st century, subsistence activities and values remain a cornerstone of area residents' way of life, a link to the traditions of the past, and one of their bases for survival and prosperity.

This report briefly describes the subsistence fisheries of the Bristol Bay Management Area (BBMA), with a primary focus on the fisheries for Pacific salmon *Oncorhynchus*. It is based on information gathered from a subsistence salmon permit program administered by the Alaska Department of Fish and Game (ADF&G) Division of Subsistence, as well as research conducted by the division.

## THE BRISTOL BAY REGION

### POPULATION, COMMUNITIES, AND CASH ECONOMY

At the time of the last federal census in 2010, the population of the general Bristol Bay area was 7,094 in 27 communities (Table 1). This was a decrease of 6% since 2000. There are 2 regional centers: Dillingham (population 2,329 in 2010) and the Bristol Bay Borough, which consists of Naknek, South Naknek, and King Salmon (population 997 in 2010). In 2010, in the region overall, 64% of the population was Alaska Native. In 23 communities other than the regional centers, 71% of the population was Alaska Native. Alaska Native peoples of the area include Central Yup'ik, Dena'ina Athabascan, and Alutiiq.

Commercial fishing and services dominate the cash economy of the area, and thus, the economy is highly seasonal. The 2010 federal census estimated a per capita income for the Dillingham area of \$39,106, Bristol Bay Borough of \$49,595, and Lake and Peninsula Borough of \$36,810, slightly lower than the Alaska average of \$44,233 (U.S. Census Bureau 2011). Studies by the Division of Subsistence have also documented a pattern of seasonal employment, reliance on commercial fishing, and relatively low cash incomes Krieg et al. 2009b; Fall et al. 2006; Holen 2011b, 2012 (see also the Division of Subsistence Community Subsistence Information System<sup>1</sup> and the Community Profile Database.<sup>2</sup>)

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1. ADF&G Community Subsistence Information System: <http://www.subsistence.adfg.state.ak.us/CSIS>. Hereinafter cited as CSIS.

2. ADF&G Community Profile Database: <http://subsistence.adfg.state.ak.us/geninfo/publctns/cpdb.cfm>. Hereinafter cited as CPDB.



## GENERAL PATTERNS OF SUBSISTENCE HARVESTS

Subsistence harvests in the BBMA are among the largest in the state, and are very diverse. Based on the results of systematic household surveys conducted by the Division of Subsistence, the estimated annual areawide harvest of wild foods was 329 pounds usable weight per capita and 1,087 pounds per household. For 18 of the communities used in this estimate, these surveys were conducted between 2005 and 2010, with the remaining 6 surveys conducted in communities in the mid-1980s. As shown in Figure 2, salmon made up 56% of this harvest, land mammals (mostly moose *Alces americanus* and caribou *Rangifer tarandus*) were 23%, fishes other than salmon comprised 9%, and other resources, such as marine mammals, birds and eggs, marine invertebrates, and wild plants, provided 12%.

Wild resource harvests are generally higher in the smaller communities of the BBMA than in the 2 regional centers of Dillingham and King Salmon-Naknek. The estimate for these smaller communities was 426 pounds per person per year, with a household average of 1,541 pounds. For this period, the composition of subsistence harvests in the smaller communities was very similar to that of the area overall: 51% salmon, 25% land mammals, 11% other fishes, and 13% other resources.

The importance of subsistence harvests to the economy of the Bristol Bay region is evident when considering potential replacement costs of foods produced by local hunting, fishing, and gathering activities. For a subset of Bristol Bay communities studied in 2005, the estimated cost of replacing wild foods, at \$7 per pound, based on the 2008 costs of buying meat at a local store or the cost of importing store-bought meat to small communities, would range from \$4,851 in Levelock to \$14,973 per household in Koliganek (see Table 2). Residents have reported that they spend from 15% to 26% of their income on store-bought foods (Holen 2011a:197). However, this exercise omits the cultural, social, and nutritional costs of replacing subsistence foods with imported substitutes. Indeed, it is unlikely that adequate substitutes for many subsistence foods produced in the region could be purchased.

## THE BRISTOL BAY MANAGEMENT AREA SUBSISTENCE SALMON FISHERIES

### REGULATIONS

The Alaska Board of Fisheries (board) has found that salmon of BBMA support customary and traditional (subsistence) uses (5 AAC 01.336). In 1993, the board established a range of 157,000–172,171 salmon as the amount necessary to provide a reasonable opportunity for subsistence uses (ANS). The low point of this range was the lowest subsistence harvest in the area over the previous 11 years (1982–1992), while the high point was the average harvest over that period. In 2001, the finding was amended to specify that of the total ANS, 55,000–65,000 Kvichak River drainage sockeye salmon *O. nerka* (excluding Alagnak River stocks) were necessary to provide a reasonable opportunity for subsistence uses.

The following is a synopsis of the key provisions of subsistence salmon fishing regulations for the BBMA.

- Permits: Required. Limit of one per household. Must be returned with a record of harvest.
- Seasonal limits: With one exception, none established in regulation, although ADF&G may set harvest limits for conservation reasons. The exception is in the Naknek District, where there is an annual possession limit of 200 sockeye salmon taken after August 15.
- Gear: Drift and set gillnets in waters open to commercial fishing. Set gillnets only in other waters, with certain exceptions. Spears may be used in the Togiak River. Nets may be up to 25 fathoms in length except in the Naknek, Egegik, and Ugashik rivers, in Dillingham beach areas, and during emergency openings in the Nushagak District, where they may be no more than 10 fathoms in length.

Also, in 1998, the board adopted new regulations for the taking of “redfish” (spawned sockeye salmon) in portions of the Naknek District. Gillnets, spears, and dip nets may be used along a 100-yard portion of the west shore of Naknek Lake near its outlet to the Naknek River from August 20 through September 30; at Johnny’s Lake from August 15 through September 25; and at the mouth of the Brooks River from October 1 through November 15. In 2006, the board adopted regulations to allow harvest of salmon by spear in Lake Clark (excluding its tributaries) and by beach seines in Iliamna Lake, Sixmile Lake, and Lake Clark. Beach seines may not exceed 25 fathoms in length.

- Seasons: Except as follows, fishing is open at any time.
  - In areas open to commercial fishing, from May 1–31 and October 1–31, from 9:00 a.m. Monday to 9:00 a.m. Friday; from June 1–September 30, during open commercial fishing periods.
  - In the area of the Nushagak District generally called the “Dillingham beaches,” from July 2–July 17, three 24-hour periods per week (from 9:00 a.m. Monday to 9:00 a.m. Tuesday, 9:00 a.m. Wednesday to 9:00 a.m. Thursday, and 9:00 a.m. Friday to 9:00 a.m. Saturday). This area is defined as all waters upstream of a line between an ADF&G regulatory marker located 2 statute miles south of Bradford Point and an ADF&G regulatory marker located on Nushagak Point to an ADF&G regulatory marker located at Red Bluff on the west shore of the Wood River, and to an ADF&G regulatory marker located at Lewis Point on the north shore of the Nushagak River.
  - In the Naknek, Egegik, and Ugashik rivers, from June 23–July 17, two 24-hour periods per week (from 9:00 a.m. Tuesday to 9:00 a.m. Wednesday and 9:00 a.m. Saturday to 9:00 a.m. Sunday). (In 2001, 2002, and 2003, ADF&G issued emergency orders to open additional subsistence fishing periods in the Egegik District during commercial fishing closures.)

## **THE SUBSISTENCE PERMIT PROGRAM**

As noted above, subsistence salmon fishers in the BBMA are required to obtain an annual subsistence permit from ADF&G. These permits are issued free of charge, but are issued only to Alaska residents (minimum of 12 consecutive months’ residency in the state). The permit includes a harvest calendar for recording daily harvests by species. These permits are available at ADF&G offices in Dillingham, King Salmon, and Anchorage, and from vendors in most area communities. The Division of Subsistence has the primary responsibility for administering the Bristol Bay subsistence permit program.

Since 1963, subsistence salmon harvest data based on permit returns have been reported in an ADF&G Bristol Bay Annual Management Report series (“AMRs”) prepared by the Division of Commercial Fisheries. Since 1983, the Division of Subsistence has performed data entry for the permit program. To ensure high permit return rates, Division of Subsistence staff mail two reminder letters to permit holders, visit area communities, and contact permit recipients by telephone, as time and funding permit. These measures have been very successful, with permit returns averaging better than 85% annually. Thus, most subsistence fishing households in the BBMA that do obtain permits do return their salmon permits and harvest calendars.

## **PARTICIPATION**

Figure 3 illustrates the number of subsistence permits issued for the BBMA from 1983 through 2011 (see also Table 3, Appendix Table 1). For this 29-year period, the average number of Bristol Bay subsistence permits issued is 1,093. The recent 10-year average (2002–2011) is 1,101 permits and the recent 5-year average is 1,102 (Table 3). Most of the increase in permits issued in 1990 and 1991 was likely due to the reopening of the area’s subsistence salmon fisheries to nonlocal Alaska residents. Since the early 1990s, the number of subsistence permits issued annually for Bristol Bay has been stable. Appendix Table 2 reports participation and harvest levels by district and subdistrict for 2011, the most recent study year for which data are available.

The majority of participants in the Bristol Bay subsistence salmon fishery are year-round residents of Bristol Bay communities. For the 10-year period from 2002–2011, 84% of the permits were issued to Bristol Bay residents and 16% to other Alaska residents. These percentages have been fairly steady since 1992 (Figure 4)

## SUBSISTENCE SALMON HARVESTS

Figure 5 illustrates the estimated subsistence salmon harvests for the BBMA for 1983–2011 (see also Table 3 and Appendix Table 1), based on permit returns and expanded to nonreturned permits. The 29-year average harvest is 146,948 salmon, the most recent 10-year average is 124,453 salmon, and the most recent 5-year average is 125,206 salmon (Table 3). These data show that after about two decades of relative stability through the 1990s, a downward trend in total subsistence salmon harvests in Bristol Bay began, although harvests in 2003–2011 rebounded from near record lows from 2000–2002. The estimated total Bristol Bay subsistence salmon harvest in 2011 is 126,744 fish.

Average harvests per permit in the BBMA subsistence salmon fishery declined over the 1983–2002 period and especially from 1991 to 2002 (Figure 6). Average harvests per permit have increased since 2002. For the 29-year period overall, the average harvest per permit is about 134 salmon; for the most recent 10-year period, this average is 113 salmon; and for the most recent 5-year period, the average is 114 salmon. The average harvest per permit in 2011 is 113 salmon per permit (Table 3).

From 1983 to 2011, sockeye salmon made up about 78% of the total subsistence salmon harvest in the BBMA (Figure 7, Table 3). King salmon *O. tshawytscha* ranked second at 10%, followed by coho salmon *O. kisutch* (6%), chum salmon *O. keta* (4%), and pink salmon *O. gorbuscha* (2%). For the most recent 10-year period (2002–2011), the contribution of king salmon to the area's subsistence harvest increased to about 12%, with drops in contributions of chum and pink salmon. For 2011, king salmon made up 11% of the harvest, sockeye salmon 80%, coho salmon 6%, chum salmon 3%, and pink salmon less than 1%.

Figure 8 illustrates the recent 10-year (2002–2011) average percentage of the total BBMA subsistence salmon harvest for each management district. The Naknek-Kvichak District has accounted for the largest portion of the subsistence harvest, at about 55%; the Nushagak District ranked second at 36%, followed by Togiak (4%), Egegik (2%), and Ugashik (1%).

Table 4 reports the most recent 10-year (2002–2011) average subsistence salmon harvests for each of the 5 Bristol Bay districts, based on permit returns and expanded to nonreturned permits. In descending order, these most recent average harvests are 68,678 salmon in the Naknek-Kvichak District; 46,827 salmon in the Nushagak District; 5,073 salmon in the Togiak District; 2,507 salmon in the Egegik District; and 1,350 salmon in the Ugashik District.

The majority of the subsistence salmon harvest in the BBMA is taken by residents of the area. For the most recent 10-year period (2002–2011), 93% of the total harvest was taken by local permit holders, and 7% by nonlocal Alaska residents (Figure 9).

Within the BBMA, average subsistence salmon harvests per permit differ by district. As illustrated in Figure 10 (see also Table 4), the largest annual average harvest from 2002 through 2011 occurred in the Naknek-Kvichak District at 146 fish per permit, followed by the Nushagak District (91 salmon), Togiak District (86 salmon), Ugashik District (70 salmon), and the Egegik District (61 salmon).

## **KVICHAK DISTRICT SOCKEYE SALMON SUBSISTENCE FISHERY**

The Division of Subsistence prepared a detailed report on the Kvichak River watershed subsistence salmon fishery for the board in January 2001 Fall et al. 2001. This section updates harvest data for this component of the Bristol Bay subsistence salmon fisheries.

Historically, subsistence salmon harvests in the Kvichak River watershed, including Iliamna Lake and Lake Clark, have been the largest within the general Bristol Bay area. There are 8 year-round communities within the watershed: Igiugig (population 50 in 2010), Iliamna (109), Kokhanok (170), Levelock (69), Newhalen (190), Nondalton (164), Pedro Bay (42), and Port Alsworth (159) (Table 1). Appendix Table 3 shows the historic harvest by community from 1985–2011. Virtually all of the subsistence salmon harvest in the watershed is sockeye salmon; other salmon species are much less abundant upstream of the confluence of the Alagnak (Branch) River with the Kvichak River.

The number of subsistence salmon permits issued for fishing in the Kvichak River watershed has been relatively stable since the early 1990s, when nonlocal residents were again allowed to obtain permits (Figure 11). The recent 10-year average (2002–2011) is 192 permits. Note that the number of issued permits dropped in 2003 to 175, the lowest number issued since 1991 (Table 5). This reflects, in part, a prohibition by the National Park Service (NPS) against subsistence fishing in Lake Clark National Park and Preserve except by federally-qualified local rural residents, a prohibition that took effect in May 2001 (ADF&G 2002:40). The proposal especially affected seasonal residents of Port Alsworth Fall et al. 2010b. The NPS prohibition does not account for drops in subsistence harvests (see below), however, because most subsistence fishers in the Kvichak River watershed live in area communities: for the recent 10-year period (2002–2011), 86% of the subsistence permits were issued to local community residents (see Table 5).

Table 6 reports the estimated subsistence sockeye salmon harvests from the Kvichak River watershed for the period 1963–2011. The long term (49-year) average harvest is 64,896 sockeye salmon. As shown in Figure 12, subsistence sockeye salmon harvests in this drainage declined markedly from the early 1990s to the early 2000s, with an especially low harvest in 2002, when residents related that the salmon came through quickly and were missed (Holen et al. 2005). The average annual harvest for the most recent 10-year period (2002–2011) was 45,265, compared to 56,085 for the previous 10-year period (1992–2001). Estimated total harvests for 2000 (36,990 sockeye salmon), 2001 (32,808 sockeye salmon), and 2002 (33,001 sockeye salmon) were the lowest ever recorded for the fishery. These harvest levels are below the range of 55,000–65,000 sockeye salmon established by the board in 2001 as necessary for providing a reasonable opportunity for subsistence uses in the watershed. Estimated subsistence harvests in the drainage have increased in the past few years, with a recent 5-year average (2007–2011) of 45,957 fish below the minimum value in the ANS range.

As illustrated in Figure 13, average sockeye salmon harvests per subsistence permit in the Kvichak River watershed declined from the late 1980s to a record low in 2001. For all permit holders, the average harvest per permit was 174 sockeye salmon in 2000, 158 in 2001, and 183 in 2002, compared to a recent 20-year average of 252 sockeye salmon per permit. Since 2001, average subsistence harvests per permit have increased to a high of 278 sockeye salmon in 2006. The most recent average harvest of sockeye salmon per permit was 213 in 2011 (Figure 13). Permit holders who live in Kvichak River drainage communities show a similar pattern of declining subsistence harvests per permit from the early 1990s to 2001, when the lowest average harvest per permit (176 sockeye salmon) was recorded (Figure 14). Average harvests per permit for local residents have since increased to a high of 314 permits in 2006. These averages remain below those recorded before 2000, however.

In 2000, Division of Subsistence researchers interviewed representatives of about 29 subsistence fishing households in Kvichak watershed communities about their subsistence salmon harvests Fall et al. 2001.

Although systematic interviewing did not occur in subsequent years of record low harvests (2001 and 2002), less formal interaction between local fishers and division staff suggested that similar assessments pertained to those years as well. Generally, subsistence fishers reported that returns of sockeye salmon were late in 2000. Also, once runs began, fish returned in “bunches” or “spurts”, unlike the steadier runs of prior years. Consequently, fishers needed to keep their nets in the water longer to achieve their harvest goals. However, some fishers reported in 2000, that even with the increased effort, fishing was so “slow” that they eventually stopped fishing before reaching their harvest goals. They intended to compensate for poor salmon harvests with more fishing over the winter for nonsalmon fishes (although recent warm winters have inhibited these harvests as well), and with more caribou and moose harvests Fall et al. 2001:47. Interviews conducted in 2000 and in 2003 also found that subsistence fishing families in several Kvichak River watershed communities (including Igiugig, Iliamna, Newhalen, and Pedro Bay) changed the location of their fishing efforts in an attempt reach their harvest goals Fall et al. 2001; Krieg et al. 2009a.

Review of subsistence permit data for 1996, 1997, 2000, 2001, 2002, and 2003, years of unusually low sockeye salmon escapements into the Kvichak River watershed (fewer than 2 million salmon in each year), shows that subsistence harvests per day fished dropped by 28% compared to the previous 13-year average; from about 42.2 sockeye salmon per day for 1983–1995 to 31.3 per day for 1996–1997 and 2000–2003 (figures 15 and 16). Since that time, harvests of salmon per day have continued to rise, with an average of 43.6 salmon per day in 2010 to 50.7 salmon per day in 2011.

It should also be noted that average harvests per day in years of good salmon returns likely do not reflect the harvest potential of the subsistence fishery. Thus, harvest-per-day averages prior to 1996 likely illustrate how many salmon an average family could process in one day, rather than the maximum they could harvest in one day. In contrast, the average of about 30 fish per day appears to reflect the harvest potential in recent years of returns under two million salmon. Normally, subsistence harvests are self-limiting, largely depending upon each family’s capability of processing the harvest, as was found in an ethnographic project conducted in the communities of Iliamna, Newhalen, Nondalton, Pedro Bay, Port Alsworth between 2007 and 2008 Fall et al. 2010b.

In 2006, the board adopted regulations to allow harvest of salmon by beach seine in Iliamna Lake, Sixmile Lake, and Lake Clark (5 AAC 01.320). The Division of Subsistence conducted harvest surveys, including questions about gear type in the communities listed above, following the 2007 and 2008 salmon seasons. In 2008, for example, 34% of households in Nondalton harvested salmon by using a beach seine (Table 7). Beach seines were also used by households in Iliamna (12%) and Newhalen (15%), but not by residents of Port Alsworth (Table 7). Beach seines were used to harvest both bright sockeye salmon in midsummer, as well as spawning sockeye salmon in fall (Fall et al. 2010a).

## **NUSHAGAK SALMON SUBSISTENCE FISHERY**

Subsistence salmon harvests in the Nushagak District are similar to those in the Kvichak District in terms of harvest levels. In 2011, for example, based on permit returns, 49,497 salmon were harvested in the Nushagak District, compared to 45,283 salmon by residents in the Kvichak River/Iliamna Lake Subdistrict (Table 8; Appendix Table 2). However, there are differences in the 2 fisheries. Whereas the salmon harvest in the Kvichak River watershed is almost all sockeye salmon (45,226 out of 45,283 in 2011), the salmon harvest in the Nushagak District is more varied, with larger harvests of king, coho, and chum salmon (Appendix Table 1). There are also larger communities in the Nushagak District, including Dillingham (2,329), and nearby Manokotak (442) and Aleknagik (219), and New Stuyahok (510), and Koliganek (209) located on the Nushagak River (Table 1). Appendix Table 4 shows the historic harvest by community from 1983–2011.

Table 8 reports estimated subsistence sockeye salmon harvests from the Nushagak District watershed for the period 1983–2011, based on permit return data. Since 1983, salmon harvests have shown an overall decline in the Nushagak District, from a high of 86,400 fish in 1986 to a low of 39,791 salmon in 2010.

The 20-year average harvest is 48,163 fish. The 2011 harvest of 49,497 salmon was slightly higher than either the 5- or 10-year averages of 47,386 and 46,827 salmon, respectively (Table 8 and Figure 18).

The number of subsistence salmon permits issued in the Nushagak District has remained relatively stable since 1983. In 2011, 525 permits were issued, with a comparable 5-year average of 530 permits issued and the 10-year average of 517 permits issued (Table 9). As illustrated in Figure 19, average salmon harvests per subsistence permit (expanded to nonreturned permits) in the Nushagak District began to decline in 1995, although the number of permits issued slightly increased, reaching a low of 82 fish per permit in 1998 (see also Table 9). For all permit holders, the average harvest per permit was 94 salmon in 2011, which was comparable to the 10-year average of 91 salmon and the 20-year average of 93 fish.

As mentioned above, king salmon returns are larger in the Nushagak River than in the Kvichak River watershed. In the upper portion of the Nushagak River, according to interviews, residents attempt to harvest large numbers of king salmon, their traditionally preferred salmon resource, using 10 fathom set gillnets (see Appendix Table 2). In 2011, in the Nushagak District, less than half the number of king salmon (12,461) were harvested as sockeye salmon (28,006). A similar situation occurred in the Wood River (2,216 king salmon and 7,576 sockeye salmon in 2011). In Nushagak Bay, during the noncommercial opener in 2011, harvests were varied, with sockeye salmon (9,758 fish) and king salmon (4,163 fish) harvested, as well as smaller harvests of coho (2,812 fish), chum (1,153), and pink salmon (166 fish). Appendix Table 1 provides a detailed overview of the harvest of salmon by species by district.

## **OTHER SUBSISTENCE FISHERIES**

### **SUBSISTENCE REGULATIONS**

The board has determined that all finfishes of the BBMA support customary and traditional uses (5 AAC 01.336). The board determined that approximately 250,000 pounds (in usable weight; about 41 pounds per person) of fishes other than salmon is the amount necessary to provide for these uses. This amount was based upon estimates of nonsalmon fish harvests derived from systematic household surveys conducted by the Division of Subsistence (CSIS; CPDB). The board did not establish amounts necessary for specific species or more specific stocks of nonsalmon fishes.

For the most part, subsistence fishing for fishes other than salmon and rainbow trout *O. mykiss* is open year-round in the BBMA with gear listed in 5 AAC 01.010. There are no seasonal limits established by regulation. The board repealed a subsistence permit requirement for trout and char in December 2003. The following regulations apply to subsistence fishing for fishes other than salmon in the area.

- Rainbow trout taken incidentally in other subsistence net fisheries or through the ice are lawfully taken and may be retained for subsistence uses (5 AAC 01.310(g)).
- Subsistence fishing with a line attached to a rod or pole is prohibited except when fishing through the ice (5 AAC 01.320(l)).
- Subsistence fishing with nets is prohibited in 18 waters of the Kvichak-Iliamna Lake drainage and within one-fourth mile of the terminus of those waters from September 1 through June 14.

### **SUBSISTENCE HARVESTS AND USES**

A detailed description of subsistence uses of freshwater fishes in the general Bristol Bay area appears in Fall et al. 1996, and specifically, for the Kvichak River watershed in Krieg et al. 2005. Wright and Chythlook 1985 describe uses of Pacific herring *Clupea pallasii* spawn on kelp in the Togiak District. Other recent reports documenting subsistence harvest of freshwater fishes in Bristol Bay include Fall et al. 2006, Krieg et al. 2009b, Holen and Lemons 2010, and Holen 2012. Fishes other than salmon generally rank third behind salmon and land mammals in their contribution to total subsistence harvests in Bristol Bay communities.

Although subsistence harvests of fishes other than salmon are not annually monitored by ADF&G, some findings of Division of Subsistence research regarding nonsalmon fishes are summarized in Table 10. The majority of households in the general Bristol Bay area use fishes other than salmon for subsistence purposes. Most households also participate in the harvest of these fishes. Harvests, as measured in pounds usable weight per person for available study years, vary from community to community, but are generally substantial. As shown in Figure 2, harvests of fishes other than salmon contribute about 9% of the annual subsistence harvests of wild foods in the general Bristol Bay area, or about 29 pounds (usable weight) per person. In the communities outside the regional centers (Dillingham and King Salmon-Naknek), the per capita harvest is about 47 pounds per person. Harvests ranged from a low of 8 pounds per person (South Naknek in 2007) to 101 pounds per person (Twin Hills in 1999). Harvests in 5 communities exceeded 50 pounds per person per year out of a total of 24 communities.

Table 11 presents only those nonsalmon fish species reported as harvested and used by residents of Bristol Bay communities through Division of Subsistence research. Harvests and uses of other species may occur.

Generally, fish taken in the largest quantities in the area as a whole include various species of smelt and whitefishes, as well as Dolly Varden *Salvelinus malma*, Arctic grayling *Thymallus arcticus*, and northern pike *Esox lucius*.<sup>3</sup>

In the general Bristol Bay area, harvests of nonsalmon finfishes occur throughout the year. Harvest effort for these fishes is generally lower among Bristol Bay residents in the summer as their attention is more focused on salmon. Spring is important for herring, herring spawn on kelp, and smelt. Substantial harvests of nonsalmon fishes occur through the ice in winter; effort increases in late winter prior to breakup as temperatures warm and daylight increases. Smelting is a popular activity in October and in late winter when these fish can be caught by jigging through the ice (Holen 2011b; Wright et al. 1985).

Many gear types are used to harvest nonsalmon fishes for home use in the general Bristol Bay area. Rod and reel<sup>4</sup> is used for most fish, and some, such as Dolly Varden/Arctic char *S. malma*, herring, and some marine fishes, are removed from commercial catches. Other methods are used, including (but not necessarily limited to) the following:

- Fyke nets (“Traps”): Alaska blackfish *Dallia pectoralis*, burbot *Lota lota*;
- Set lines: burbot;
- Handline jigging through the ice: Arctic grayling, Dolly Varden/Arctic char, lake trout *S. namaycush*, smelt, rainbow trout, whitefishes, northern pike;
- Set gillnets: Arctic grayling, Dolly Varden/Arctic char, lake trout, various species of suckers, rainbow trout, herring, northern pike, burbot, whitefishes;
- Beach seining: Dolly Varden/Arctic char, lake trout, whitefishes, smelt, herring;
- Handline in open water: Pacific halibut *Hippoglossus stenolepis*, rainbow trout;
- Dip nets: smelt, herring.

Herring spawn on kelp is usually picked by hand, although rakes, knives, and *uluqaqs* (woman's knife) are also used (Schichnes and Chythlook 1988:127).

Maps of areas used by Bristol Bay communities to harvest nonsalmon fishes appear in the *Alaska Habitat Management Guide Reference Atlas Series* ADF&G 1985, in Wright et al. 1985, in Krieg et al. 2005, for

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3. See Fall et al. 1996 for more a more detailed discussion of harvest quantities, as reported, by species and by community.

4. Respondents to Division of Subsistence harvest surveys generally do not describe or mention that their subsistence fishing efforts occur under state sport fishing regulations or federal subsistence regulations. Therefore, effort could occur under state sport fishing regulations or federal subsistence regulations.

Kvichak River drainage communities only, and in Fall et al. 2006; Holen 2011b, 2012; Krieg et al. 2009a. Harvest activities occur throughout the region in most rivers and lakes, as well as along shorelines. It is likely that most effort occurs near each community and near seasonal camps, such as at Kulukak.<sup>5</sup>

Bristol Bay residents use a wide variety of methods to process and preserve their harvests of fishes other than salmon. These vary by species and community. Some freezing of many species occurs. Some examples of other methods include the following:

- Arctic grayling: dried, half-dried, fresh frozen, aged frozen and eaten with seal oil;
- Dolly Varden: dried, smoked, half dried (*egamaarrluk*);
- Northern pike: dried, half-dried, fresh frozen, aged frozen and eaten with seal oil;
- Rainbow trout: dried, half-dried, smoked;
- Whitefishes: dried, fresh frozen, aged frozen and eaten with seal oil.

Dried fish is usually eaten with seal oil. Some consumption of fat from brown bears *Ursus arctos* with dried fish also occurs. Smelt are fried, boiled, dried, or eaten frozen with seal oil (Fall et al. 1986:100). Herring are salted or split, dried, and smoked (Schichnes and Chythlook 1988:126). The heads and stomachs of northern pike are boiled and eaten (Schichnes and Chythlook 1991:139). Freshwater fishes that are usually eaten frozen with seal oil also form a category called *kumlaneq*. This includes Arctic grayling, whitefishes, lake trout, and northern pike (Fall et al. 1986:102).

Much traditional knowledge is associated with nonsalmon fishes. For example, a Central Yup'ik taxonomic classification system for freshwater fishes has 3 entries, and thus 3 taxons, for the fish that western biologists classify into one taxon as "Dolly Varden". Distinctions in Central Yup'ik taxonomy depend on the condition of the flesh for aging, drying, or freezing; harvest locations; and harvest methods (Fall et al. 1996).

## CONCLUSIONS

This overview has illustrated the continued importance of subsistence fisheries to the economy and way of life of the general Bristol Bay area in Southwest Alaska. Salmon and other fishes provide the largest portion of substantial subsistence harvests of Bristol Bay communities. In addition to their nutritional and economic value, the subsistence fisheries of the region support cultural and social values that are a foundation of life for Bristol Bay residents. Historically, subsistence harvests of salmon and other fishes have been fairly stable and reliable, especially compared to the cash sector of the local economy. Subsistence salmon permit records demonstrate a decline in subsistence salmon harvests in the BBMA during the 1990s; however, between 2004–2011, harvest and effort has remained steady. This decline occurred primarily in the Nushagak and Naknek-Kvichak districts, and is the result of lower average harvests per permit rather than less participation by local community residents. Subsistence sockeye salmon harvests in the Kvichak River watershed, including Iliamna Lake and Lake Clark, historically the largest component of the Bristol Bay subsistence salmon fishery, declined by more than one-half during the 1990s and early 2000s. Local subsistence fishers attributed these lowered harvests to poor returns and scarcities of salmon in once reliable and abundant traditional harvest locations. However, although harvests have declined somewhat, effort has increased in harvesting salmon in these areas since the low harvest levels seen in early 2000.

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5. See Wright and Chythlook 1985 and Schichnes and Chythlook 1988 for maps of herring camps at Kulukak Bay. For frequency of use of various areas for freshwater fishing by Nushagak River communities, see Schichnes and Chythlook 1991.



## REFERENCES CITED

- ADF&G (Alaska Department of Fish and Game). 1985. Alaska habitat management guide. Southwest Region. Produced by the State of Alaska Department of Fish and Game Division of Habitat, Juneau.
- ADF&G (Alaska Department of Fish and Game). 2002. Alaska Department of Fish and Game Division of Commercial Fisheries annual management report - 2001 - Bristol Bay area. Alaska Department of Fish and Game Division of Commercial Fisheries Regional Information Report No. 2A02-18, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidPDFs/RIR.2A.2002.18.pdf>
- ADF&G. 2012. Alaska Subsistence Fisheries Database (ASFDB). Alaska Department of Fish and Game Division of Subsistence, Anchorage.
- ADLWD (Alaska Department of Labor and Workforce Development). 2009. Alaska population estimates State of Alaska Department of Labor and Workforce Development, Juneau. <http://laborstats.alaska.gov/?PAGEID=67&SUBID=171>
- Coiley-Kenner, P., T. M. Krieg, M. B. Chythlook, and G. Jennings. 2003. Wild resource harvests and uses by residents of Manokotak, Togiak, and Twin Hills, 1999/2000. Alaska Department of Fish and Game Division of Subsistence Technical Paper No. 275, Juneau. <http://www.subsistence.adfg.state.ak.us/techpap/tp275.pdf>
- Fall, J. A., C. L. Brown, N. Braem, L. Hutchinson-Scarborough, D. S. Koster, T. M. Krieg, and L. Slayton *In prep.* Subsistence harvests and uses in three Bering Sea communities, 2008: Akutan, Emmonak, and Togiak Alaska Department of Fish and Game Division of Subsistence Technical Paper No. 371, Anchorage.
- Fall, J. A., M. B. Chythlook, T. Krieg, and G. Jennings. 2001. Overview of the subsistence sockeye salmon fishery of the Kvichak River watershed, Bristol Bay, Southwest Alaska. Report to the Alaska Board of Fisheries, January 2001. Alaska Department of Fish and Game, Division of Subsistence, Anchorage.
- Fall, J. A., M. B. Chythlook, J. C. Schichnes, and J. M. Morris. 1996. An overview of the harvest and use of freshwater fish by the communities of the Bristol Bay region, Southwest Alaska. Alaska Department of Fish and Game Division of Subsistence Technical Paper No. 166, Juneau. <http://www.subsistence.adfg.state.ak.us/techpap/tp166.pdf>
- Fall, J. A., D. Holen, T. M. Krieg, R. La Vine, K. Stickman, M. Ravenmoon, J. Hay, and J. Stariwat. 2010a. The Kvichak watershed subsistence salmon fishery: an ethnographic study. Alaska Department of Fish and Game Division of Subsistence Technical Paper No. 352., Anchorage. <http://www.subsistence.adfg.state.ak.us/techpap/TP%20352.pdf>
- Fall, J. A., D. Holen, T. M. Krieg, R. L. Vine, K. Stickman, M. Ravenmoon, J. Hay, and J. Stariwat. 2010b. The Kvichak watershed subsistence salmon fishery: An ethnographic study. Technical Paper No. 352. Division of Subsistence, Alaska Department of Fish and Game, Anchorage.
- Fall, J. A., D. L. Holen, B. Davis, T. Krieg, and D. Koster. 2006. Subsistence harvests and uses of wild resources in Iliamna, Newhalen, Nondalton, Pedro Bay, and Port Alsworth, Alaska, 2004. Alaska Department of Fish and Game Division of Subsistence Technical Paper No. 302, Juneau. <http://www.subsistence.adfg.state.ak.us/TechPap/tp302.pdf>
- Fall, J. A., J. C. Schichnes, M. Chythlook, and R. J. Walker. 1986. Patterns of wild resource use in Dillingham: hunting and fishing in an Alaskan regional center Alaska Department of Fish and Game Division of Subsistence Technical Paper No. 135, Juneau. <http://www.subsistence.adfg.state.ak.us/techpap/tp135.pdf>
- Holen, D. 2011a. "We all drink this water:" The contemporary context of salmon fishing in Southwest Alaska. Pages 191–208 *in* D. Michelle, F. Levesque, and J. Ferguson, editors. Humanizing security in the Arctic. Circumpolar Institute, Edmonton, Canada.
- Holen, D., and T. Lemons. 2010. Subsistence harvests and uses of wild resources in Lime Village, Alaska, 2007. Division of Subsistence Technical Paper No. 355. Division of Subsistence, Alaska Department of Fish and Game, Anchorage.
- Holen, D., J. Stariwat, T. M. Krieg, and T. Lemons. 2012. Subsistence harvests and uses of wild resources in Aleknagik, Clark's Point, and Manokotak, Alaska, 2008, Anchorage. <http://www.adfg.alaska.gov/techpap/TP%20368.pdf>
- Holen, D., Theodore Krieg, Jory Stariwat, and Terri Lemons. 2012. Subsistence harvests and uses of wild resources in Aleknagik, Clark's Point, and Manokotak, Alaska, 2008. Technical Paper No. 368. Division of Subsistence, Alaska Department of Fish and Game, Anchorage.

- Holen, D., Theodore Krieg, Terri Lemons. 2011b. Subsistence harvests and uses of wild resources in King Salmon, Naknek, and South Naknek, Alaska, 2007. Technical Paper No. 360. Division of Subsistence, Alaska Department of Fish and Game, Anchorage.
- Holen, D. L., T. Krieg, R. Walker, and H. Nicholson. 2005. Harvests and uses of caribou, moose, bears, and Dall sheep by communities of Game Management Units 9B and 17, Western Bristol Bay, Alaska 2001-2002. Alaska Department of Fish and Game, Division of Subsistence Technical Data Report No. 283, Juneau.
- Holen, D. L., T. M. Krieg, and T. Lemons. 2011. Subsistence harvests and uses of wild resources in King Salmon, Naknek, and South Naknek, Alaska, 2007. Alaska Department of Fish and Game Division of Subsistence Technical Paper No. 360, Anchorage. <http://www.adfg.alaska.gov/techpap/TP360.pdf>
- Krieg, T., M. Chythlook, P. Coiley-Kenner, D. Holen, K. Kamletz, and H. Nicholson. 2005. Freshwater fish harvest and use in communities of the Kvichak watershed, 2003. Alaska Department of Fish and Game Division of Subsistence Technical Paper No. 297, Juneau. <http://www.subsistence.adfg.state.ak.us/techpap/tp297.pdf>
- Krieg, T., D. Holen, and D. Koster. 2009a. Subsistence harvests and uses of wild resources in Igiugig, Kokhanok, Koliganek, Levelock, and New Stuyahok, Alaska, 2005. Alaska Department of Fish and Game, Division of Subsistence Technical Paper No. 322, Dillingham.
- Krieg, T. M., D. L. Holen, and D. Koster. 2009b. Subsistence harvests and uses of wild resources in Igiugig, Kokhanok, Koliganek, Levelock, and New Stuyahok, Alaska, 2005 Alaska Department of Fish and Game Division of Subsistence Technical Paper No. 322, Dillingham. <http://www.subsistence.adfg.state.ak.us/TechPap/TP322.pdf>
- Schichnes, J., and M. Chythlook. 1988. Use of fish and wildlife in Manokotak, Alaska. Alaska Department of Fish and Game Division of Subsistence Technical Paper No. 152, Dillingham. <http://www.subsistence.adfg.state.ak.us/techpap/tp152.pdf>
- Schichnes, J., and M. Chythlook. 1991. Contemporary use of fish and wildlife in Ekwok, Koliganek, and New Stuyahok, Alaska. Alaska Department of Fish and Game Division of Subsistence, Technical Paper No. 185, Juneau. <http://www.subsistence.adfg.state.ak.us/techpap/tp185.pdf>
- U. S. Census Bureau. 2001. Profiles of general demographic characteristics, Alaska: 2000. U.S. Department of Commerce Washington, D. C.
- U. S. Census Bureau. 2011. 2010 Census. U. S. Census Bureau, Washington, D. C. <http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>
- Wright, J. M., and M. B. Chythlook. 1985. Subsistence harvests of herring spawn-on-kelp in the Togiak district of Bristol Bay. Alaska Department of Fish and Game Division of Subsistence Technical Paper No. 116, Juneau. <http://www.subsistence.adfg.state.ak.us/techpap/tp116.pdf>
- Wright, J. M., J. M. Morris, and R. Schroeder. 1985. Bristol Bay regional subsistence profile. Alaska Department of Fish and Game Division of Subsistence Technical Paper No. 114, Dillingham. <http://www.subsistence.adfg.state.ak.us/techpap/tp114.pdf>

## **TABLES AND FIGURES**

Table 1.—Population of the Bristol Bay Management Area, 1980, 1990, 2000, and 2010.

Community	1980	1990			2000			2010		
	Total population	Total population	Alaska Native		Total population	Alaska Native		Total population	Alaska Native	
			Number	Percentage of total		Number	Percentage of total		Number	Percentage of total
<b>Dillingham Census Area</b>										
Aleknagik	154	185	154	83.2%	221	187	84.6%	219	166	75.8%
Clarks Point	79	60	53	88.3%	75	69	92.0%	62	55	88.7%
Dillingham	1,563	2,017	1,125	55.8%	2,466	1,503	60.9%	2,329	1,301	55.9%
Ekuk	7	3	2	66.7%	b.	b.	b.	b.	b.	b.
Ekwok	77	77	67	87.0%	130	122	93.8%	115	104	90.4%
Koliganek	117	181	174	96.1%	182	159	87.4%	209	200	95.7%
Manokotak	294	385	368	95.6%	399	378	94.7%	442	423	95.7%
New Stuyahok	331	391	375	95.9%	471	452	96.0%	510	477	93.5%
Portage Creek	48	5	3	60.0%	36	31	86.1%	2	1	50.0%
Togiak	470	613	535	87.3%	809	750	92.7%	817	637	78.0%
Twin Hills	70	66	61	92.4%	69	65	94.2%	74	70	94.6%
Remainder	22	29	8	27.6%	64	37	57.8%	68		0.0%
<b>Subtotal</b>	<b>3,232</b>	<b>4,012</b>	<b>2,925</b>	<b>72.9%</b>	<b>4,922</b>	<b>3,753</b>	<b>76.2%</b>	<b>4,847</b>	<b>3,434</b>	<b>70.8%</b>
<b>Bristol Bay Borough</b>										
King Salmon	545	696	108	15.5%	442	133	30.1%	374	104	27.8%
Naknek	318	575	236	41.0%	678	319	47.1%	544	165	30.3%
South Naknek	145	136	108	79.4%	137	115	83.9%	79	65	82.3%
Remainder	86	3	3	100.0%	1	0	0.0%	0		
<b>Subtotal</b>	<b>1,094</b>	<b>1,410</b>	<b>455</b>	<b>32.3%</b>	<b>1,258</b>	<b>567</b>	<b>45.1%</b>	<b>997</b>	<b>334</b>	<b>33.5%</b>
<b>Lake and Peninsula Borough<sup>a</sup></b>										
Egegik	75	122	86	70.5%	116	89	76.7%	109	43	39.4%
Igiugig	33	33	26	78.8%	53	44	83.0%	50	20	40.0%
Iliamna	94	94	62	66.0%	102	59	57.8%	109	59	54.1%
Kokhonak	83	152	137	90.1%	174	158	90.8%	170	136	80.0%
Levelock	79	105	87	82.9%	122	116	95.1%	69	58	84.1%
Newhalen	87	160	151	94.4%	160	146	91.3%	190	152	80.0%

-continued-

Table 1.–Page 2 of 2.

Community	1980	1990			2000			2010		
	Total population	Total population	Alaska Native		Total population	Alaska Native		Total population	Alaska Native	
			Number	Percentage of total		Number	Percentage of total		Number	Percentage of total
Nondalton	173	178	159	89.3%	221	199	90.0%	164	104	63.4%
Pedro Bay	33	42	38	90.5%	50	32	64.0%	42	28	66.7%
Pilot Point	66	53	45	84.9%	100	86	86.0%	68	45	66.2%
Pope-Vannoy Landing					8	4	50.0%	6	2	33.3%
Port Alsworth	22	55	1	1.8%	104	23	22.1%	159	34	21.4%
Port Heiden	92	119	86	72.3%	119	93	78.2%	102	85	83.3%
Ugashik	13	7	6	85.7%	11	9	81.8%	12	7	58.3%
Remainder	19	31	5	16.1%	0	0	0.0%	0	0	0.0%
<b>Subtotal</b>	<b>869</b>	<b>1,151</b>	<b>889</b>	<b>77.2%</b>	<b>1,340</b>	<b>1,058</b>	<b>79.0%</b>	<b>1,250</b>	<b>773</b>	<b>61.8%</b>
<b>Total</b>	<b>5,195</b>	<b>6,573</b>	<b>4,269</b>	<b>64.9%</b>	<b>7,520</b>	<b>5,378</b>	<b>71.5%</b>	<b>7,094</b>	<b>4,541</b>	<b>64.0%</b>

Sources U. S. Census Bureau 2001 for 2000, 1990, and 1980; ADLWD 2009 for 2008; U. S. Census Bureau 2011 for 2010.

- a. Port Heiden is in the Alaska Peninsula Management Area; Chignik, Chignik Lagoon, Chignik Lake, Ivanof Bay, and Perryville of this borough are in the Chignik Management Area and are excluded from this table. The “remainder” may include some population living outside the BBMA.
- b. The community of Ekuk is now counted with neighboring Clark’s Point since the only resident is a cannery security guard.

Table 2.–Wild food harvests in select communities: replacement values in 2005.

Community	Annual wild food harvest per household (pounds)	Estimated wild food replacement value per household at \$7 per pound	Mean household cost of annual food purchases	Annual household income <sup>a</sup>	Resident responses of percentage of annual cash income spent on food
Igiugig	1,584	\$11,088	\$8,110	\$32,755	24.8%
Kokhanok	2,136	\$14,952	\$7,452	\$30,007	24.8%
Koliganek	2,139	\$14,973	\$7,279	\$34,800	20.9%
Levelock	693	\$4,851	\$4,213	\$28,459	14.8%
New Stuyahok	871	\$6,097	\$7,104	\$27,572	25.8%

Sources Krieg et al. 2009b:25,27, Holen 2011a.

- a. Unpublished data; collected as part of the survey, however, not included in Krieg et al. 2009b.

Table 3.—Estimated historical subsistence salmon harvests, Bristol Bay area, 1983–2011.

Year	Permits		Estimated salmon harvest						Estimated harvest per permit
	Issued	Returned	King	Sockeye	Coho	Chum	Pink	Total	
1983	829	674	13,268	143,639	7,477	11,646	1,073	177,104	214
1984	882	698	11,537	168,803	16,035	13,009	8,228	217,612	247
1985	1,015	808	9,737	142,755	8,122	5,776	825	167,215	165
1986	930	723	14,893	129,487	11,005	11,268	7,458	174,112	187
1987	996	866	14,424	135,782	8,854	8,161	673	167,894	169
1988	938	835	11,848	125,556	7,333	9,575	7,341	161,652	172
1989	955	831	9,678	125,243	12,069	7,283	801	155,074	162
1990	1,042	870	13,462	128,343	8,389	9,224	4,455	163,874	157
1991	1,194	1,045	15,245	137,837	14,024	6,574	572	174,251	146
1992	1,203	1,028	16,425	133,605	10,722	10,661	5,325	176,739	147
1993	1,206	1,005	20,527	134,050	8,915	6,539	1,051	171,082	142
1994	1,193	1,019	18,873	120,782	9,279	6,144	2,708	157,787	132
1995	1,119	990	15,921	107,717	7,423	4,566	691	136,319	122
1996	1,110	928	18,072	107,737	7,519	5,813	2,434	141,575	128
1997	1,166	1,051	19,074	118,250	6,196	2,962	674	147,156	126
1998	1,234	1,155	15,621	113,289	8,126	3,869	2,424	143,330	116
1999	1,219	1,157	13,009	122,281	6,143	3,653	420	145,506	119
2000	1,219	1,109	11,547	92,050	7,991	4,637	2,599	118,824	97
2001	1,226	1,137	14,412	92,041	8,406	4,158	839	119,856	98
2002	1,093	994	12,936	81,088	6,565	6,658	2,341	109,587	100
2003	1,182	1,058	21,231	95,690	7,816	5,868	1,062	131,667	111
2004	1,100	940	18,012	93,819	6,667	5,141	3,225	126,865	115
2005	1,076	979	15,212	98,511	7,889	6,102	1,098	128,812	120
2006	1,050	904	12,617	95,201	5,697	5,321	2,726	121,564	116
2007	1,063	917	15,444	99,549	4,880	3,991	815	124,679	117
2008	1,178	1,083	15,153	103,583	7,627	5,710	2,851	134,924	115
2009	1,063	950	14,020	98,951	7,982	5,052	442	126,447	119
2010	1,082	979	10,852	90,444	4,623	4,692	2,627	113,238	105
2011	1,122	1,039	14,106	101,017	7,493	3,794	333	126,744	113
5-year average (2007–2011)	1,102	994	13,915	98,709	6,521	4,648	1,414	125,206	114
10-year average (2002–2011)	1,101	984	14,958	95,785	6,724	5,233	1,752	124,453	113
Historical average (1983–2011)	1,093	958	14,730	115,072	8,320	6,477	2,349	146,948	134

Source ADF&G Division of Subsistence, ASFDB 2012 ADF&G 2012.

Table 4.—Ten year average subsistence salmon harvest by district, 2002–2011.

District	Permits issued	King salmon	Sockeye salmon	Coho salmon	Chum salmon	Pink salmon	Total	Salmon per permit
Naknek-Kvichak District	471	782	66,077	881	395	544	68,678	146
Nushagak district	517	12,872	23,966	4,711	4,227	1,052	46,827	91
Togiak District	59	1,169	2,880	401	498	124	5,073	86
Egegik District	41	96	1,835	466	94	17	2,507	61
Ugashik District	19	37	1,020	258	19	16	1,350	70
<b>Total Bristol Bay area</b>	<b>1,108</b>	<b>14,956</b>	<b>95,777</b>	<b>6,717</b>	<b>5,233</b>	<b>1,752</b>	<b>124,434</b>	<b>453</b>

Source Alaska Department of Fish and Game, Division of Subsistence, Bristol Bay Subsistence Permit Database.

Table 5.—Number of subsistence permits issued, Kvichak Watershed, 1983–2011.

Year	Iliamna–							Other Kvichak	Subtotal, local	Other Alaska	Total
	Igiugig	Newhalen	Kokhanok	Levelock	Nondalton	Pedro Bay	Port Alsworth	Residents	residents	residents	
1983	3	63	17	18	38	15	18	0	172	2	174
1984	8	53	19	19	43	15	16	2	175	3	178
1985	4	66	15	17	37	20	23	2	184	74	258
1986	6	58	20	21	29	17	24	5	180	3	183
1987	ND	57	17	19	29	17	21	0	160	1	161
1988	ND	59	22	18	31	14	19	1	164	5	169
1989	4	56	16	17	39	14	18	1	165	5	170
1990	7	49	14	18	37	17	23	1	166	17	183
1991	8	48	17	3	18	26	26	0	146	25	171
1992	4	61	14	16	24	23	27	0	169	33	202
1993	7	57	22	14	49	22	28	0	199	35	234
1994	5	51	21	7	38	17	29	0	168	41	209
1995	7	54	21	15	14	18	28	0	157	44	201
1996	6	60	21	9	28	20	25	0	169	42	211
1997	4	59	16	6	32	14	24	0	155	37	192
1998	4	55	15	6	36	18	29	0	163	42	205
1999	5	45	18	4	26	17	44	0	159	57	216
2000	8	47	22	14	24	10	38	1	164	48	212
2001	8	49	24	9	33	17	30	0	170	37	207
2002	8	53	27	7	20	15	19	0	149	31	180
2003	9	48	26	8	27	11	22	0	151	24	175
2004	6	60	25	3	40	22	25	0	181	25	206
2005	6	48	33	11	33	16	24	0	171	23	194
2006	7	44	28	2	25	21	24	0	151	28	179
2007	6	54	29	1	29	19	30	0	168	28	196
2008	7	58	25	1	28	18	38	0	175	40	215
2009	8	39	27	3	19	21	37	0	154	33	187
2010	11	36	26	7	13	20	43	0	156	24	180
2011	14	50	25	9	24	20	50	0	192	20	212
25-year average	6.9	51.9	22.0	9.1	28.6	17.9	28.8	0.2	164.9	29.8	194.7
Average, 1992–2001	5.8	53.8	19.4	10.0	30.4	17.6	30.2	0.1	167.3	41.6	208.9
Average, 2002–2011	8.2	49.0	27.1	5.2	25.8	18.3	31.2	0.0	164.8	27.6	192.4
Average, 2002–2006	7.2	50.6	27.8	6.2	29.0	17.0	22.8	0.0	160.6	26.2	186.8
Average, 2007–2011	9.2	47.4	26.4	4.2	22.6	19.6	39.6	0.0	169.0	29.0	198.0

Source Bristol Bay Subsistence Permit Database, Division of Subsistence, ADF&G

Notes For 1983 through 1986, includes a small number of permits issued for fishing in areas outside the Kvichak watershed to local residents. In 1983, 1984, and 1986 through 1989, only local watershed residents were eligible for permits. Due to updates to the database, these data may differ slightly from that published in annual management reports. ND = no data (missing information).



Table 6.—Subsistence harvest of sockeye salmon by community, in numbers of fish, Kvichak River drainage, Bristol Bay, 1963–2011.

Year	Levelock	Igiugig	Pedro Bay	Kokhanok	Iliamna– Newhalen	Nondalton	Port Alsworth	All Local Communities	Other <sup>c</sup>	Total
1963	600	ND	14,000	7,000	10,000	25,000	ND	56,600		56,600
1964	1,000	4,000	12,000	8,000	19,000	35,000	ND	79,000		79,000
1965	1,000	3,300	9,800	10,200	9,700	35,500	ND	69,500		69,500
1966	600	1,200	6,000	10,500	6,600	45,800	ND	70,700		70,700
1967	1,400	3,400	9,900	10,200	9,100	29,600	ND	63,600		63,600
1968	1,400	4,800	9,800	10,200	8,700	33,700	ND	68,600		68,600
1969	1,000	5,100	4,200	15,000	4,900	44,000	ND	74,200		74,200
1970	1,600	11,200	11,200	22,300	16,400	42,900	ND	105,600		105,600
1971	1,600	6,500	10,100	12,800	8,500	22,100	ND	61,600		61,600
1972	1,600	2,200	4,000	8,300	10,000	24,100	ND	50,200		50,200
1973	4,800	2,200	2,900	9,200	10,200	8,500	1,300	39,100		39,100
1974	8,600	6,200	14,400	21,500	16,400	29,500	1,500	98,100		98,100
1975	5,300	6,400	8,300	18,000	26,700	48,700	2,100	115,500		115,500
1976	5,300	6,800	4,400	17,100	16,300	20,500	5,500	75,900		75,900
1977	2,600	6,000	5,600	14,300	11,400	27,200	4,900	72,000		72,000
1978	8,900	8,800	11,200	23,700	11,000	17,300	3,000	83,900		83,900
1979	4,400	6,600	3,500	16,200	15,900	14,700	4,200	65,500		65,500
1980	6,100	8,100	7,400	22,600	11,100	11,300	6,000	72,600		72,600
1981	6,600	5,400	9,700	16,500	15,400	15,200	6,800	75,600		75,600
1982	5,400	1,900	8,200	16,600	13,500	11,200	4,500	61,300		61,300
1983	4,800	3,300	10,400	20,100	23,800	29,400	4,700	96,500		96,500
1984	8,100	6,300	12,100	24,400	15,900	29,100	4,600	100,500		100,500
1985	6,600	3,400	12,900	21,900	22,300	14,900	4,500	86,500		86,500
1986	6,400	1,600	6,700	18,300	17,000	6,600	3,300	59,900		59,900
1987	5,700	a.	7,300	16,500	27,500	11,800	3,200	72,000		72,000
1988	3,500	a.	5,500	14,400	29,800	20,700	3,200	77,100	b.	77,100
1989	5,100	1,200	6,700	13,000	24,700	18,500	2,200	71,400	b.	71,400
1990	4,700	2,200	6,600	12,400	18,800	27,300	3,200	75,200	1,400	76,600
1991	1,029	1,712	9,739	17,184	29,094	4,163	2,755	65,676	1,110	66,786
1992	4,374	1,056	6,932	11,477	29,633	13,163	2,954	69,589	2,559	72,148
1993	4,699	1,397	6,226	18,810	19,067	17,890	3,254	71,343	2,780	74,123
1994	1,467	1,201	8,747	15,771	15,553	15,246	3,074	61,059	3,284	64,343
1995	3,756	497	5,359	14,412	20,134	4,188	2,892	51,238	3,441	54,679

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Table 6.–Page 2 of 2.

Year	Levelock	Igiugig	Pedro Bay	Kokhanok	Iliamna– Newhalen	Nondalton	Port Alsworth	All Local Communities	Other <sup>c</sup>	Total
1996	1,120	2,309	5,219	14,011	14,787	11,856	3,263	52,565	2,307	54,872
1997	1,062	2,067	5,501	8,722	19,513	17,194	2,348	56,407	3,101	59,508
1998	2,454	1,659	3,511	10,418	16,165	13,136	2,678	50,021	3,635	53,656
1999	1,276	1,608	5,005	10,725	14,129	17,864	4,282	54,889	2,834	57,723
2000	1,467	1,981	1,815	7,175	6,679	11,953	3,200	34,270	2,720	36,990
2001	908	779	2,118	9,447	8,132	7,566	1,958	30,908	1,901	32,808
2002	625	2,138	2,687	9,847	9,417	5,508	1,201	31,423	1,578	33,001
2003	737	1,081	2,135	9,771	13,824	8,016	1,370	36,934	1,591	38,525
2004	1,000	1,026	4,803	11,869	21,652	8,789	2,455	51,594	1,631	53,225
2005	914	1,017	4,162	16,801	12,010	8,824	2,457	46,185	2,078	48,263
2006	0	1,252	4,319	19,028	11,488	8,885	2,418	47,390	2,460	49,850
2007	102	1,803	5,487	15,106	11,453	7,902	3,211	45,064	2,474	47,538
2008	30	1,558	4,884	14,755	13,569	8,917	3,307	47,020	2,543	49,563
2009	759	1,457	7,802	15,759	9,871	5,709	3,155	44,512	2,260	46,771
2010	940	2,901	2,609	13,973	8,815	3,185	3,250	35,673	5,015	40,688
2011	933	1,931	3,898	9,895	15,433	7,947	4,026	44,062	1,164	45,226
Historical average, 1963–2011	2,946	3,272	6,893	14,411	15,327	18,531	3,287	63,796	2,448	64,896
1963–1987 average	4,056	4,987	8,640	15,656	14,292	25,344	4,007	74,980	ND	74,980
Recent 25-year average (1987–2011)	1,946	1,558	5,162	13,250	16,849	11,448	2,852	52,941	2,448	55,095
1972–1981 average	5,420	5,870	7,140	16,740	14,440	21,700	3,922	74,840	ND	74,840
1982–1991 average	5,133	2,702	8,614	17,478	22,239	17,366	3,616	76,608	1,255	76,859
1992–2001 average	2,258	1,455	5,043	12,097	16,379	13,006	2,990	53,229	2,856	56,085
2002–2011 average	604	1,616	4,279	13,680	12,753	7,368	2,685	42,986	2,279	45,265
Average, 2002–2006	655	1,303	3,621	13,463	13,678	8,004	1,980	42,705	1,868	44,573
Average, 2007–2011	553	1,930	4,936	13,898	11,828	6,732	3,390	43,266	2,691	45,957

Sources Weiland et al. 2003:112 for 2000 to 2002; ADF&G 2000a:120 for 1979 to 1999; ADF&G 1985 for 1965 to 1978; Schroeder et al. 1987:365 for 1963 and 1964.

Notes Harvests are extrapolated for all permits issued, based on those returned. Harvest estimates from before 1991 are rounded to the nearest hundred fish. This table reports harvest estimates as they have appeared in annual management reports. Harvest estimates prior to 1990 are based on the community where the permit was issued; estimates from 1990 to the present are based on community of residence and include fish caught only in the Kvichak District. ND = no data (missing information) or unable to calculate. ND = no data (missing information) or unable to calculate.

- a. No permits issued.
- b. No permits issued. Only residents of the Naknek-Kvichak watershed could obtain subsistence permits.
- c. Subsistence harvests by non-Kvichak River watershed residents.

Table 7.—Estimated percentage of households harvesting salmon by gear type, 2008.

Resource	Percentage of households			Any method
	Gillnet	Seine	Rod and reel	
<b>Iliamna</b>				
Salmon	77%	12%	12%	81%
Chum salmon	4%	0%	0%	4%
Coho salmon	0%	0%	0%	0%
King salmon	8%	0%	0%	8%
Pink salmon	0%	0%	0%	0%
Sockeye salmon	77%	0%	12%	81%
Spawning salmon	27%	12%	0%	38%
Unknown salmon	0%	0%	0%	0%
<b>Newhalen</b>				
Salmon	65%	15%	24%	71%
Chum salmon	18%	0%	0%	18%
Coho salmon	3%	0%	12%	15%
King salmon	9%	0%	0%	9%
Pink salmon	9%	0%	0%	9%
Sockeye salmon	56%	3%	15%	62%
Spawning salmon	15%	15%	3%	32%
Unknown salmon	0%	0%	0%	0%
<b>Nondalton</b>				
Salmon	69%	34%	28%	81%
Chum salmon	0%	0%	0%	0%
Coho salmon	0%	0%	3%	3%
King salmon	3%	0%	0%	3%
Pink salmon	0%	0%	0%	0%
Sockeye salmon	66%	34%	28%	81%
Spawning salmon	25%	0%	0%	25%
Unknown salmon	0%	0%	0%	0%
<b>Port Alsworth</b>				
Salmon	81%	0%	19%	89%
Chum salmon	4%	0%	4%	7%
Coho salmon	0%	0%	11%	11%
King salmon	0%	0%	7%	7%
Pink salmon	0%	0%	4%	4%
Sockeye salmon	78%	0%	11%	81%
Spawning salmon	7%	0%	0%	7%
Unknown salmon	0%	0%	0%	0%

Source Fall et al. 2010a.

Table 8.—Harvests of salmon in the Nushagak District, 1983–2011.

Year	Sockeye salmon	King salmon	Chum salmon	Pink salmon	Coho salmon	Total
1983	38,400	11,800	9,200	500	5,200	65,100
1985	38,000	7,900	4,000	600	6,100	56,600
1986	49,000	12,600	10,000	5,400	9,400	86,400
1987	40,900	12,200	6,000	200	6,200	65,500
1988	31,086	10,079	8,234	6,316	5,223	60,938
1989	34,535	8,122	5,704	407	8,679	57,447
1990	33,003	12,407	7,808	3,183	5,919	62,320
1991	33,161	13,627	4,688	292	10,784	62,552
1992	30,640	13,588	7,076	3,519	7,103	61,926
1993	27,114	17,709	3,257	240	5,038	53,358
1994	26,501	15,490	5,055	2,042	5,338	54,426
1995	22,793	13,701	2,786	188	3,905	43,373
1996	22,935	15,941	4,704	1,573	5,217	50,370
1997	25,080	15,318	2,056	218	3,433	46,106
1998	25,217	12,258	2,487	1,076	5,316	46,355
1999	29,387	10,057	2,409	124	3,993	45,969
2000	24,451	9,470	3,463	1,662	5,983	45,029
2001	26,939	11,760	3,011	378	5,993	48,080
2002	22,777	11,281	5,096	1,179	4,565	44,897
2003	25,491	18,686	5,064	403	5,432	55,076
2004	17,491	15,610	3,869	1,944	4,240	43,154
2005	23,916	12,529	5,006	793	5,596	47,841
2006	20,773	9,971	4,448	1,591	3,590	40,373
2007	25,127	13,330	3,006	430	3,050	44,944
2008	26,828	12,960	4,552	1,923	5,133	51,395
2009	26,922	12,737	4,510	355	6,777	51,300
2010	22,326	9,150	3,660	1,672	2,983	39,791
2011	28,006	12,461	3,055	230	5,746	49,497
Historical average (1983–2011)	28,529	12,598	4,793	1,373	5,569	52,861
20-year average	25,036	13,200	3,929	1,077	4,921	48,163
15-year average (1983–1997)	32,368	12,892	5,755	1,763	6,253	59,030
Recent 15-year average (1997–2011)	24,715	12,505	3,713	932	4,789	46,654
10-year average	23,966	12,871	4,227	1,052	4,711	46,827
5-year average	25,842	12,128	3,757	922	4,738	47,386

Source ADF&G Division of Subsistence, ASFDB 2012 ADF&G 2012.

Table 9.—Subsistence harvest of salmon by community, in numbers of fish, Nushagak District, Bristol Bay, 1983–2011.

Year	Dillingham <sup>a</sup>	Manokotak	Aleknagik	Ekwok	New Stuyahok	Koliganek	Other Alaska residents	Total	Permits issued	Harvest per permit
1983	20,100	5,300	1,900	5,800	18,700	13,300	b.	65,100	389	167
1985	22,900	3,600	1,600	7,000	14,500	6,800	b.	56,400	406	139
1986	31,900	5,500	6,900	7,800	26,400	8,200	b.	86,700	424	204
1987	33,500	5,900	3,100	6,400	11,400	4,900	b.	65,200	474	138
1988	29,600 c.	5,500	2,400	6,100	11,700	5,700	d.	61,000	441	138
1989	31,800 c.	5,800	2,000	4,700	9,700	3,800	d.	57,800	432	134
1990	28,860 c.	6,600	2,300	4,900	9,900	8,000	700	61,260	441	139
1991	34,399 c.	5,873	3,043	4,532	8,326	5,438	2,163	63,774	528	121
1992	31,702 c.	4,317	2,184	5,971	11,325	3,708	2,635	61,842	476	130
1993	25,315 c.	3,048	2,593	2,936	12,169	4,180	2,538	52,779	500	106
1994	30,145 c.	3,491	2,289	4,343	8,056	4,513	2,322	55,159	523	105
1995	24,998 c.	2,453	1,468	2,046	6,911	2,983	2,406	43,265	484	89
1996	27,161 c.	3,883	1,733	2,866	8,892	3,319	2,113	49,967	481	104
1997	23,255 c.	3,988	1,989	1,797	6,427	4,179	4,598	46,233	538	86
1998	24,072 c.	4,069	1,112	3,555	5,419	3,166	4,958	46,351	562	82
1999	26,502 c.	3,413	1,532	1,805	4,556	2,772	5,389	45,969	548	84
2000	27,931 c.	3,173	1,111	3,946	3,715	2,792	2,362	45,029	541	83
2001	26,435 c.	3,700	2,129	2,218	7,294	2,209	4,096	48,080	554	87
2002	25,004 c.	3,254	1,517	2,735	6,043	3,098	3,247	44,897	520	86
2003	26,955 c.	4,214	2,044	2,291	10,817	5,721	3,034	55,076	527	105
2004	23,308 c.	2,052	2,206	1,891	6,714	3,619	3,364	43,154	511	84
2005	21,898 c.	1,576	1,795	1,388	9,673	8,422	3,088	47,841	502	95
2006	22,081 c.	1,654	2,047	1,499	6,160	3,885	3,047	40,373	461	88
2007	25,190 c.	2,443	1,382	1,267	8,284	3,054	3,324	44,944	496	91
2008	27,388 c.	5,429	3,309	1,902	5,690	4,423	3,255	51,395	571	90
2009	30,117 c.	2,068	2,646	2,345	6,855	3,700	3,568	51,300	530	97

-continued-

Table 9.–Page 2 of 2.

Year	Dillingham <sup>a</sup>	Manokotak	Aleknagik	Ekwok	New Stuyahok	Koliganek	Other Alaska residents	Total	Permits issued	Harvest per permit
2010	22,842 c.	2,665	1,570	1,380	5,608	2,406	3,320	39,791	528	75
2011	26,850 c.	1,433	3,016	1,805	7,980	3,539	4,875	49,498	525	94
Historical average (1983–2011)	26,865	3,800	2,247	3,472	9,258	4,708	3,200	52,863	497	109
20-year average	25,957	3,116	1,984	2,499	7,429	3,784	3,377	48,147	519	93
15-year average (1983–1997)	28,260	4,661	2,536	4,799	11,743	5,644	2,434	59,034	467	129
Recent 15-year average (1997–2011)	25,322	3,009	1,960	2,122	6,749	3,799	3,702	46,662	528	89
10-year average	25,163	2,679	2,153	1,850	7,382	4,187	3,412	46,827	517	91
5-year average	26,477	2,808	2,385	1,740	6,883	3,424	3,668	47,385	530	89

*Notes* Harvests are extrapolated for all permits issued, based on those returned. Harvest estimates prior to 1991 are rounded to the nearest 100 fish. Harvest estimates prior to 1990 are based on the community where the permit was issued; estimates from 1990 to the present are based on community of residence and include only fish harvested in the Nushagak District.

- a. Includes the villages of Portage Creek and Clark's Point.
- b. Due to differences in compilation of data, the data prior to 1988 are not comparable to subsequent years.
- c. Includes permits issued in Clark's Point and Ekuk.
- d. No permits issued. Only residents of the Nushagak watershed could obtain subsistence permits.

Table 10.—Uses and harvests of fishes other than salmon, Bristol Bay communities.

Community	Year <sup>a</sup>	Percentage of households <sup>a</sup>					Average pounds harvested	
		Use	Fish for	Harvest	Receive	Give	Per household	Per person
Aleknagik	2008	78%	69%	66%	50%	44%	95	26
Clark's Point	2008	100%	100%	100%	73%	73%	71	34
Dillingham	1984	75%	56%	55%	40%	20%	52	17
Egegik	1984	64%	60%	60%	24%	40%	37	16
Ekwok	1987	76%	72%	62%	62%	38%	229	69
Igiugig	2005	100%	83%	83%	92%	58%	188	59
Iliamna	2004	92%	77%	77%	39%	31%	113	34
King Salmon	2007	57 %	55%	49%	16%	12%	15	5
Kokhanok	2005	74%	66%	66%	51%	57%	137	36
Koliganek	2005	96%	93%	93%	75%	68%	323	90
Levelock	2005	86%	86%	86%	50%	57%	71	40
Manokotak	2008	93%	80%	80%	84%	56%	173	44
Naknek	2007	76%	68%	65%	48%	32%	47	18
New Stuyahok	2005	88%	78%	78%	67%	47%	123	28
Newhalen	2004	88%	88%	88%	56%	52%	128	32
Nondalton	2004	82%	76%	76%	45%	53%	129	34
Pedro Bay	2004	89%	61%	61%	83%	39%	50	15
Pilot Point	1987	94%	94%	94%	35%	59%	56	16
Port Alsworth	2004	73%	64%	64%	46%	41%	44	12
Port Heiden	1987	92%	62%	62%	70%	46%	33	12
South Naknek	2007	86%	52%	52%	67%	43%	16	8
Togiak	2008	94%	85%	84%	81%	73%	264	62
Twin Hills	1999	92%	92%	92%	75%	92%	303	101
Ugashik	1987	1%	100%	100%	0%	40%	72	36

Sources ADF&G CPDB; Bristol Bay Native Association and ADF&G 1996; Coiley-Kenner et al. 2003; Krieg et al. 2005; Fall et al. 2006; Krieg et al. 2009a; Holen et al. 2011; Holen et al. 2012; and Fall et al. *In prep*.

a. Most recent year for which data are available.

Table 11.—Nonsalmon finfishes reported to be used for subsistence purposes in the general Bristol Bay area.

Common English name	Scientific name	Yup'ik name(s)	Dena'ina name(s)
Arctic grayling	<i>Thymallus arcticus</i>	<i>Nakrullugpak</i> <i>Culugpauk</i>	<i>Ch'dat'an</i>
Alaska blackfish	<i>Dallia pectoralis</i>	<i>Can'giiq</i>	<i>Huzhegh</i>
Burbot	<i>Lota lota</i>	<i>Manignaq</i> <sup>a</sup> <i>Atgiaq</i> <sup>b</sup>	<i>Ch'unya</i>
Dolly Varden <sup>c</sup>	<i>Salvelinus malma</i>	<i>Yugyaq</i> <sup>d</sup> <i>Anerrluaq</i> <i>Anyuk</i>	<i>Qak'elay</i>
Lake trout	<i>Salvelinus namaycush</i>	<i>Cikignaq</i>	<i>Zhuk'udghuzha</i>
Longnose sucker	<i>Catostomus catostomus</i>	<i>Cungartak</i>	<i>Duch'ehdi</i>
Northern pike	<i>Esox lucius</i>	<i>Cuukvak</i>	<i>Ghelguts'i</i>
Rainbow smelt	<i>Osmerus mordax</i>	<i>Iqalluaq</i>	
Rainbow trout	<i>Oncorhynchus mykiss</i>	<i>Talaariq</i>	<i>Tuni</i>
Broad whitefish <sup>e</sup>	<i>Coregonus nasus</i>	<i>Akakiik</i>	<i>Telay</i>
Humpback whitefish <sup>e</sup>	<i>Coregonus pidschian</i>	<i>Uraruq</i>	<i>Q'untuq'</i>
Round whitefish <sup>e</sup>	<i>Prosopium cylindraceum</i>	<i>Uraruq</i>	<i>Hesten</i>
Least cisco	<i>Coregonus sardinella</i>	<i>Cavirrutnaq</i>	<i>Ghelguts'i k'una</i>
Pacific herring	<i>Clupea pallasii</i>	<i>Iqalluarpak</i>	
Herring spawn on kelp		<i>Melucuaq</i>	
Starry flounder	<i>Platichthys stellatus</i>	<i>Naternaq</i>	
Pacific halibut	<i>Hippoglossus stenolepis</i>	<i>Naternarpak</i>	
Pacific cod	<i>Gadus macrocephalus</i>	<i>Ceturtnaq</i>	
Sculpin	Various species	<i>Kayutaq</i>	
Capelin	<i>Mallotus villosus</i>	<i>Cikaaq</i>	
Yellowfin sole	<i>Limanda aspera</i>	<i>Sagiq</i>	

Source Fall et al. 1996.

a. Nushagak River villages.

b. Manokotak, Aleknagik, Twin Hills, Togiak.

c. Also includes the closely-related Arctic char, *Salvelinus alpinus*.

d. At Togiak, Manokotak, and Aleknagik, and perhaps elsewhere, there are 3 Yup'ik names for Dolly Varden/Arctic char. *Yugyak* probably refers to resident Dolly Varden/Arctic char. *Anerrluaq*, called “Togiak trout” in the local English dialect, probably refers to anadromous fish taken in fresh water. Finally, *anyuk*, or “sea-run Dollies”, are Dolly Varden or Arctic char taken in salt waters. See Fall et al. (1996):16–20 for further discussion of these distinctions.

e. Broad whitefish are rare to absent in the Bristol Bay region. *Akakiik* is the word used at Aleknagik and Manokotak to refer to whitefishes they receive from Kuskokwim River communities, where broad whitefish are common. Humpback whitefish are harvested in the Iliamna Lake subregion and are called *uraruq*. *Uraruq* is also used for round whitefish in the Togiak and Nushagak drainages.



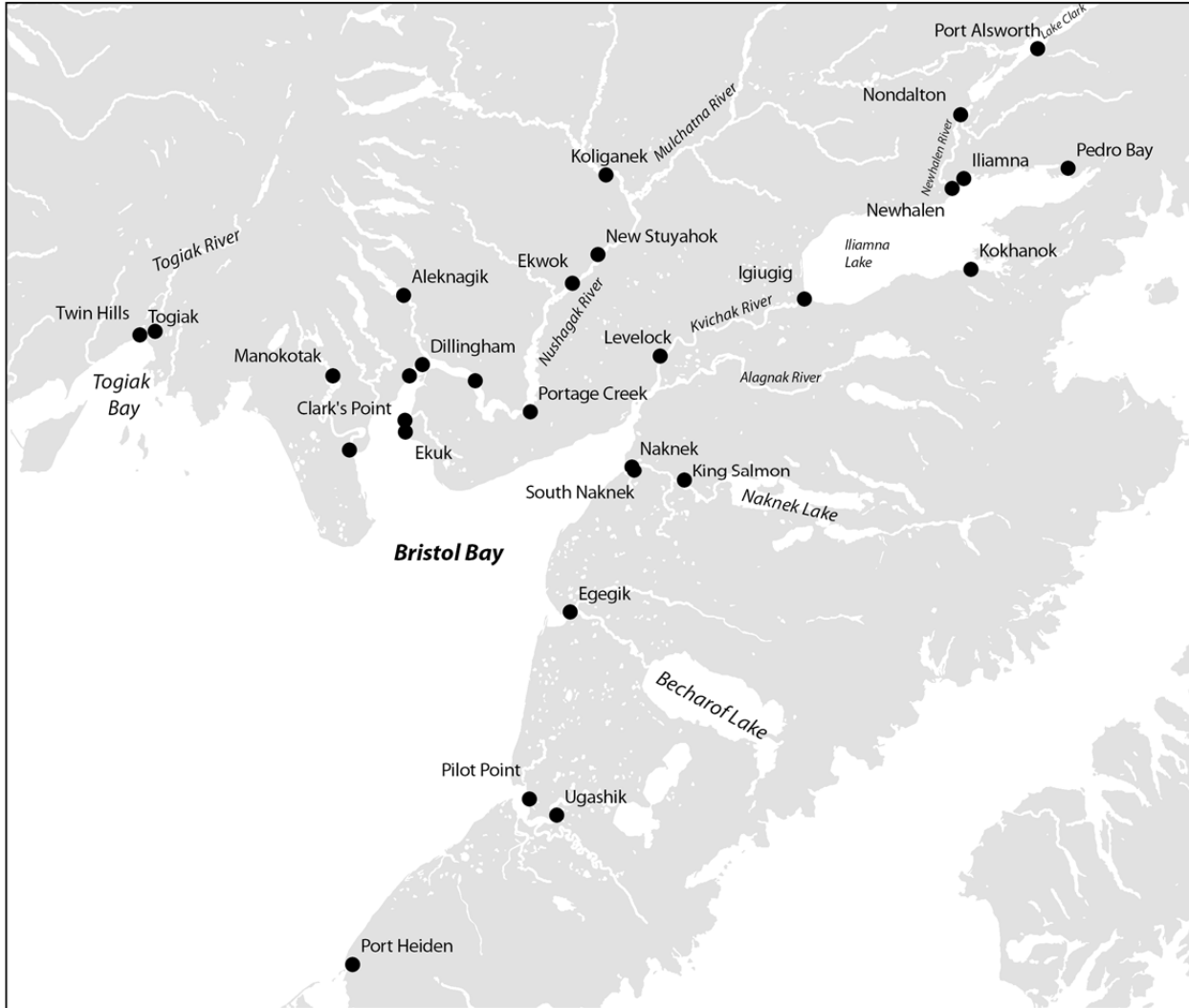


Figure 1  
●  
Communities in the  
Bristol Bay Management Area

An inset map of the state of Alaska, with a small rectangular box highlighting the location of the Bristol Bay region on the western coast of the state.

Figure 1.—The Bristol Bay region.

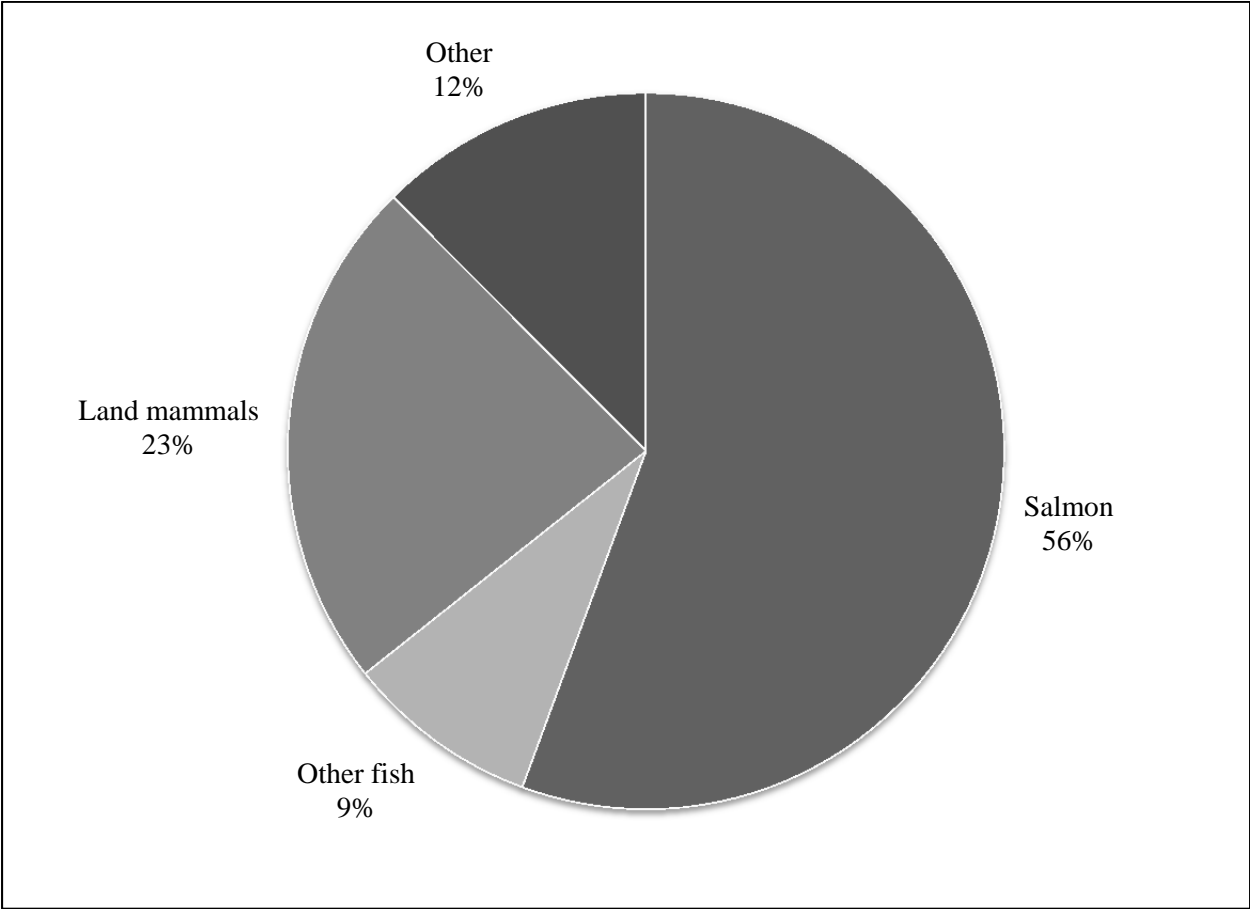


Figure 2.—Composition of Bristol Bay subsistence harvests, 1980s–2000s.

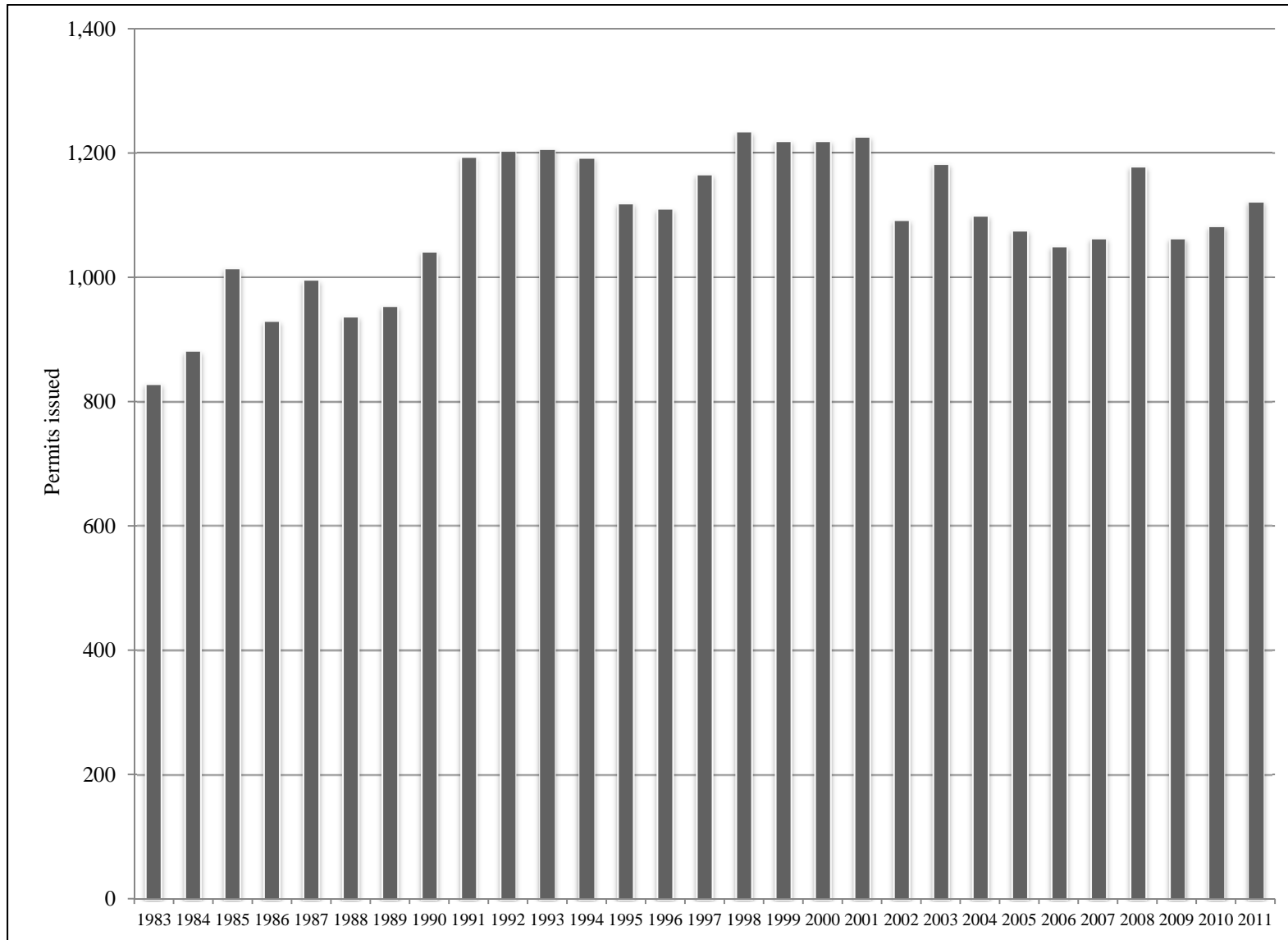


Figure 3.—Subsistence salmon permits issued, Bristol Bay Area, 1983–2011.

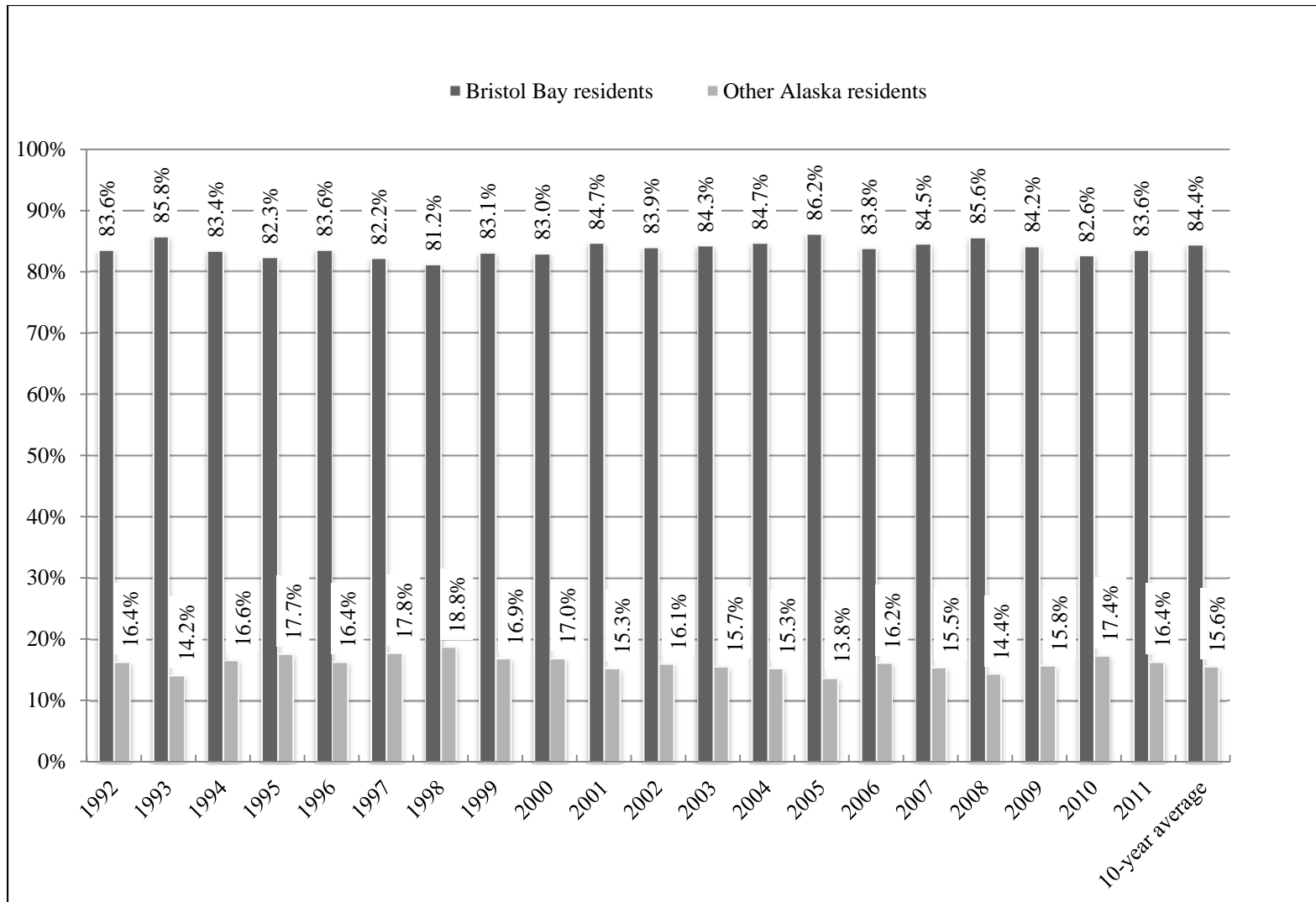


Figure 4.—Percentage of Bristol Bay subsistence salmon permits issued by area of residence of permit holder, 1992–2011.

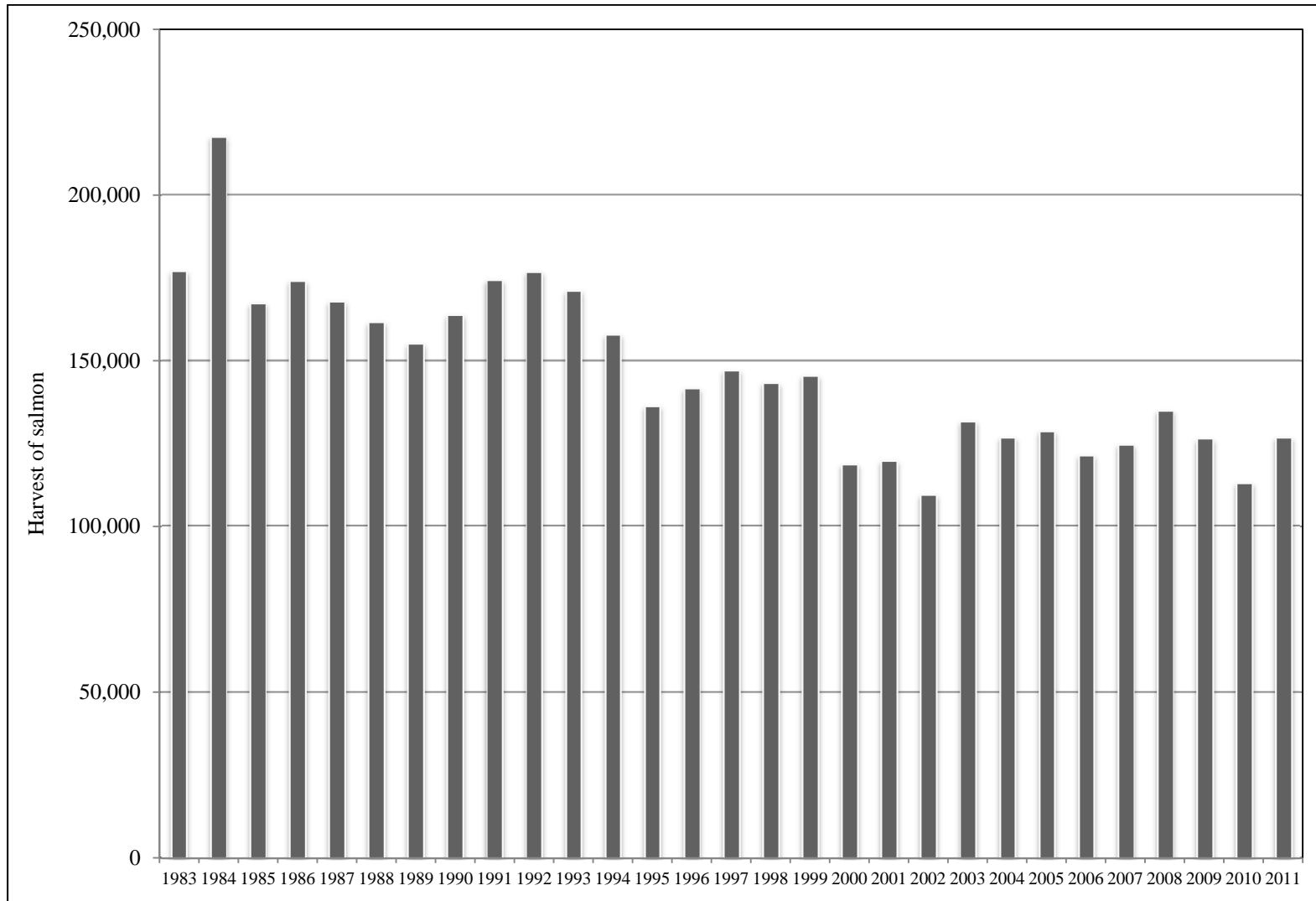


Figure 5.—Estimated subsistence salmon harvests, Bristol Bay Management Area, 1983–2011.

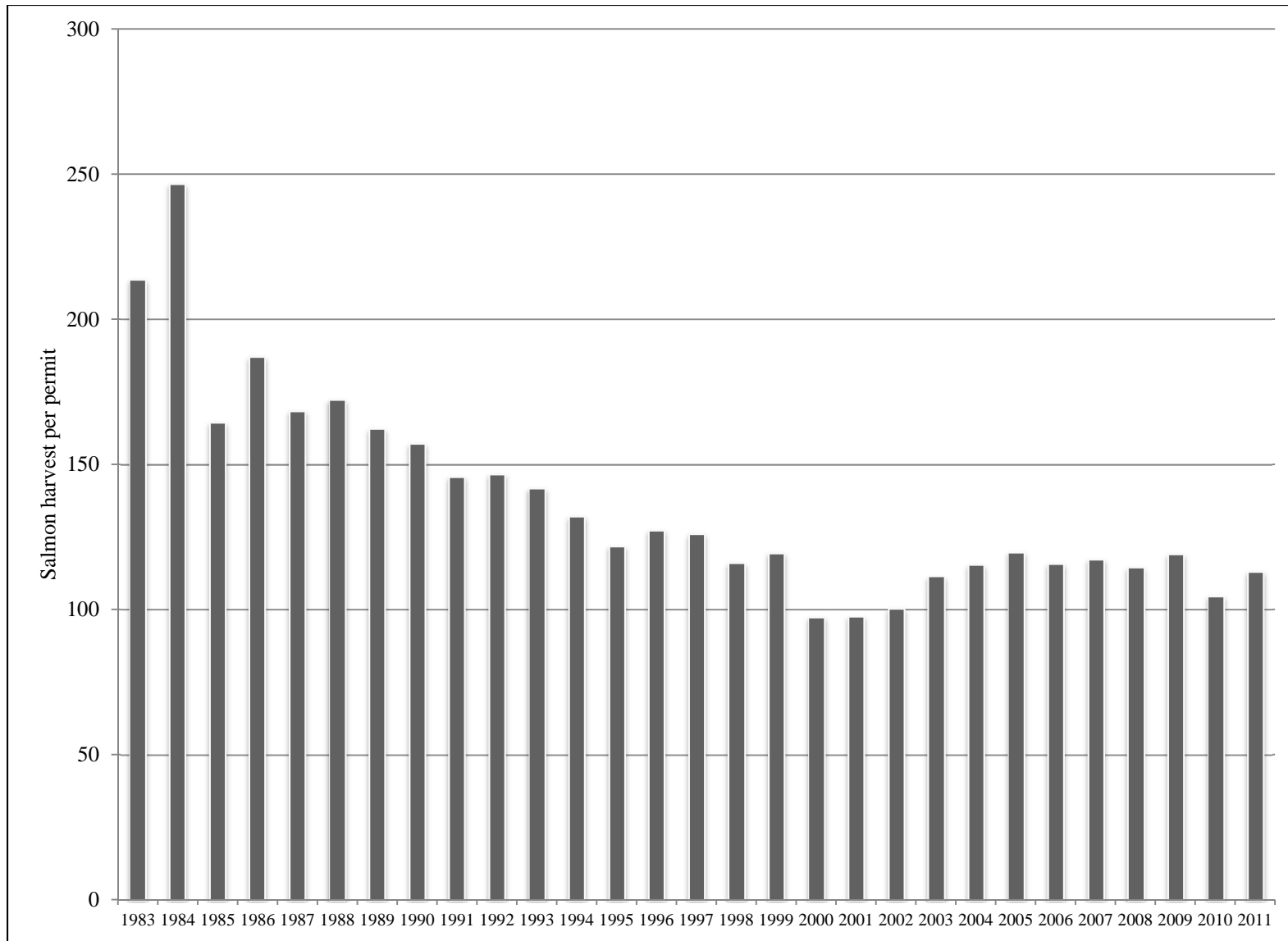


Figure 6.—Average harvests per permit, Bristol Bay Management Area, 1983–2011.

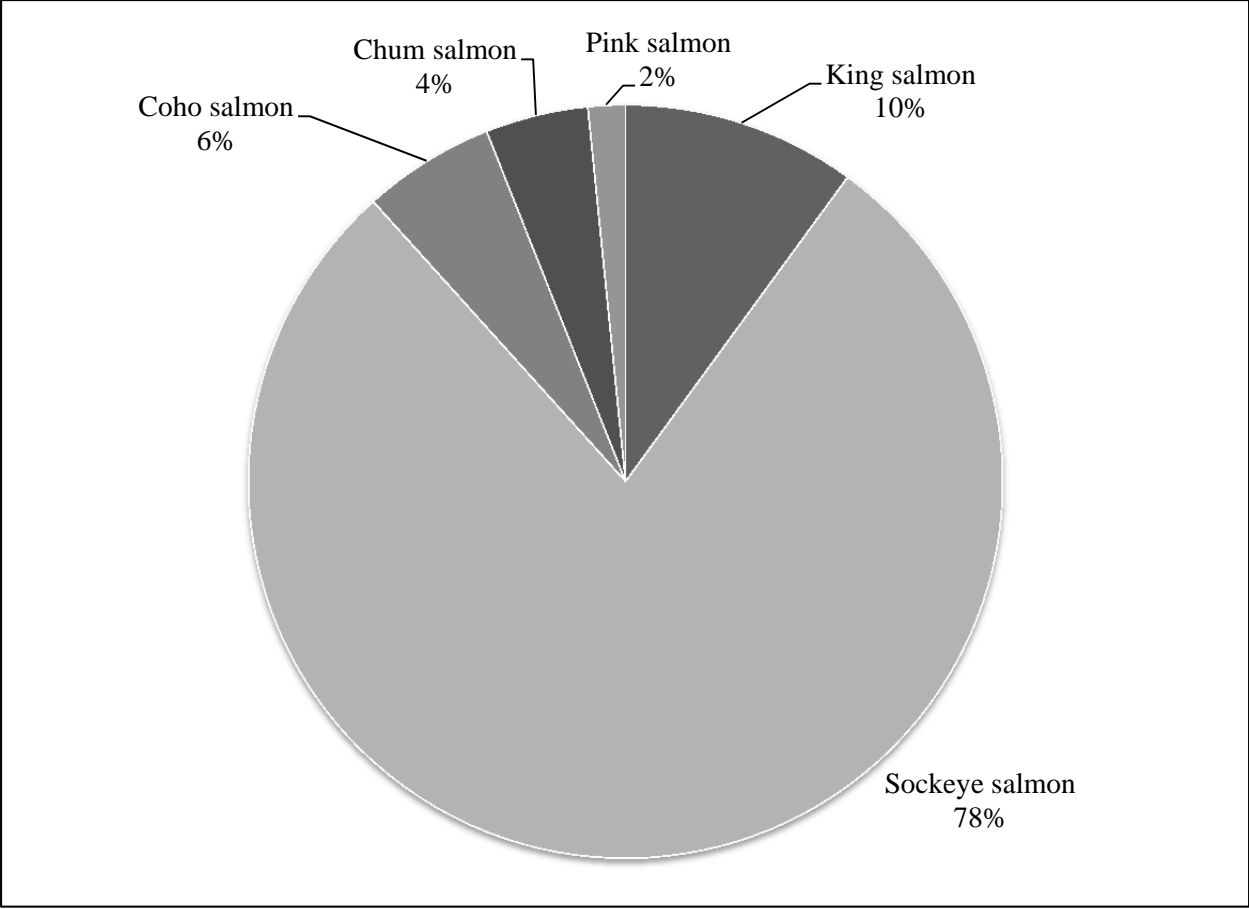


Figure 7.—Composition of total subsistence salmon harvest, Bristol Bay Management Area, 1983–2011.

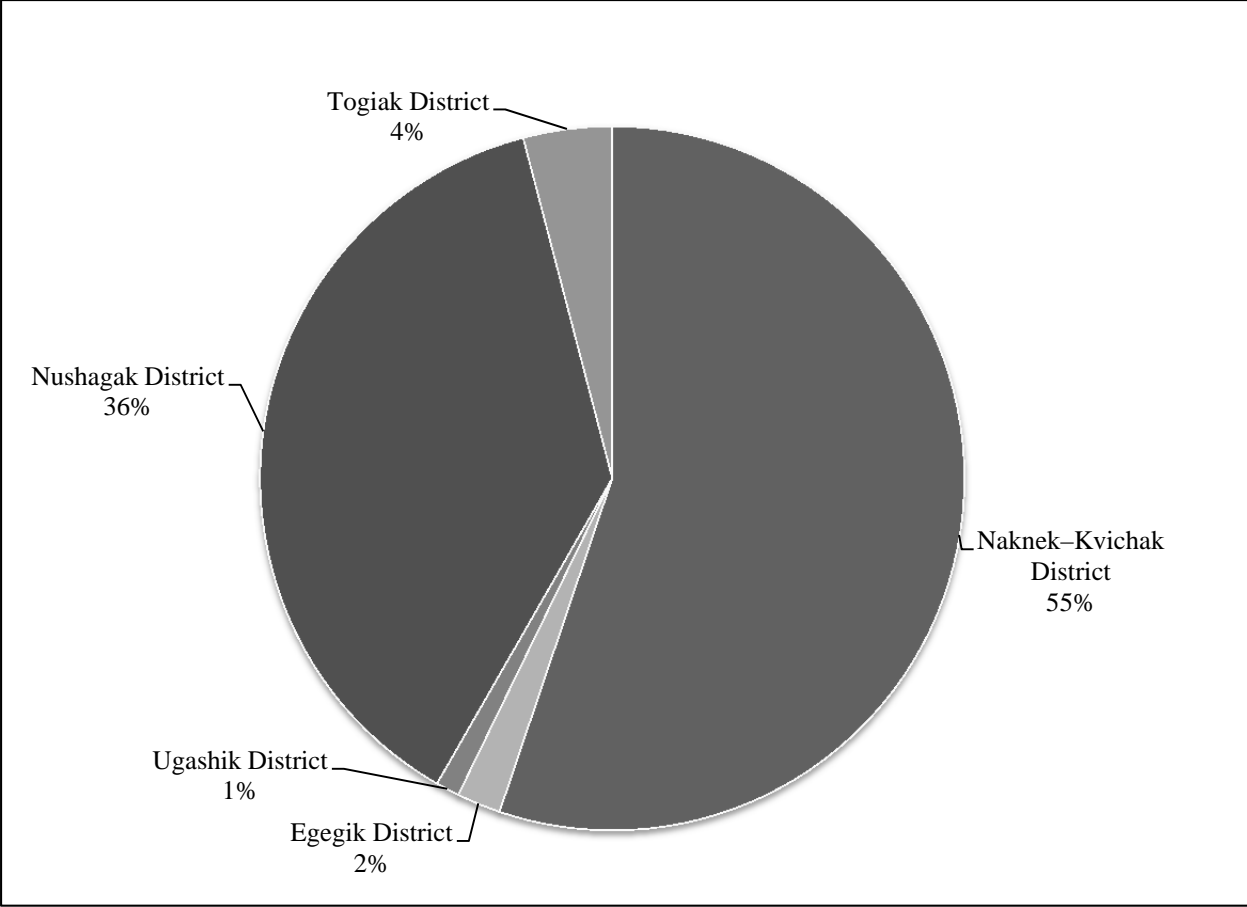


Figure 8.—Composition of Bristol Bay subsistence salmon harvest by district, 2002–2011.



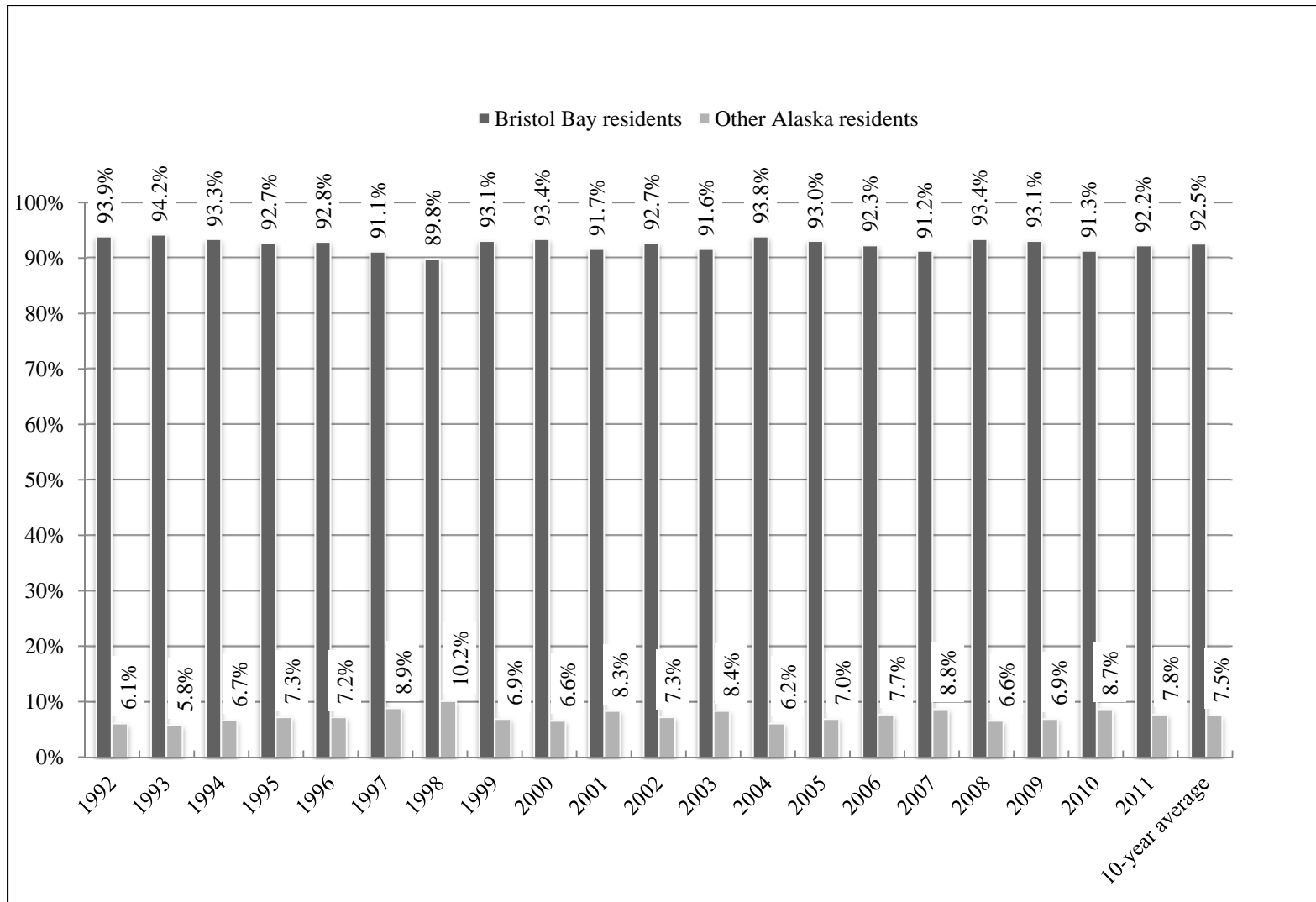


Figure 9.—Percentage of Bristol Bay subsistence harvest by area of residence, 1992–2011.

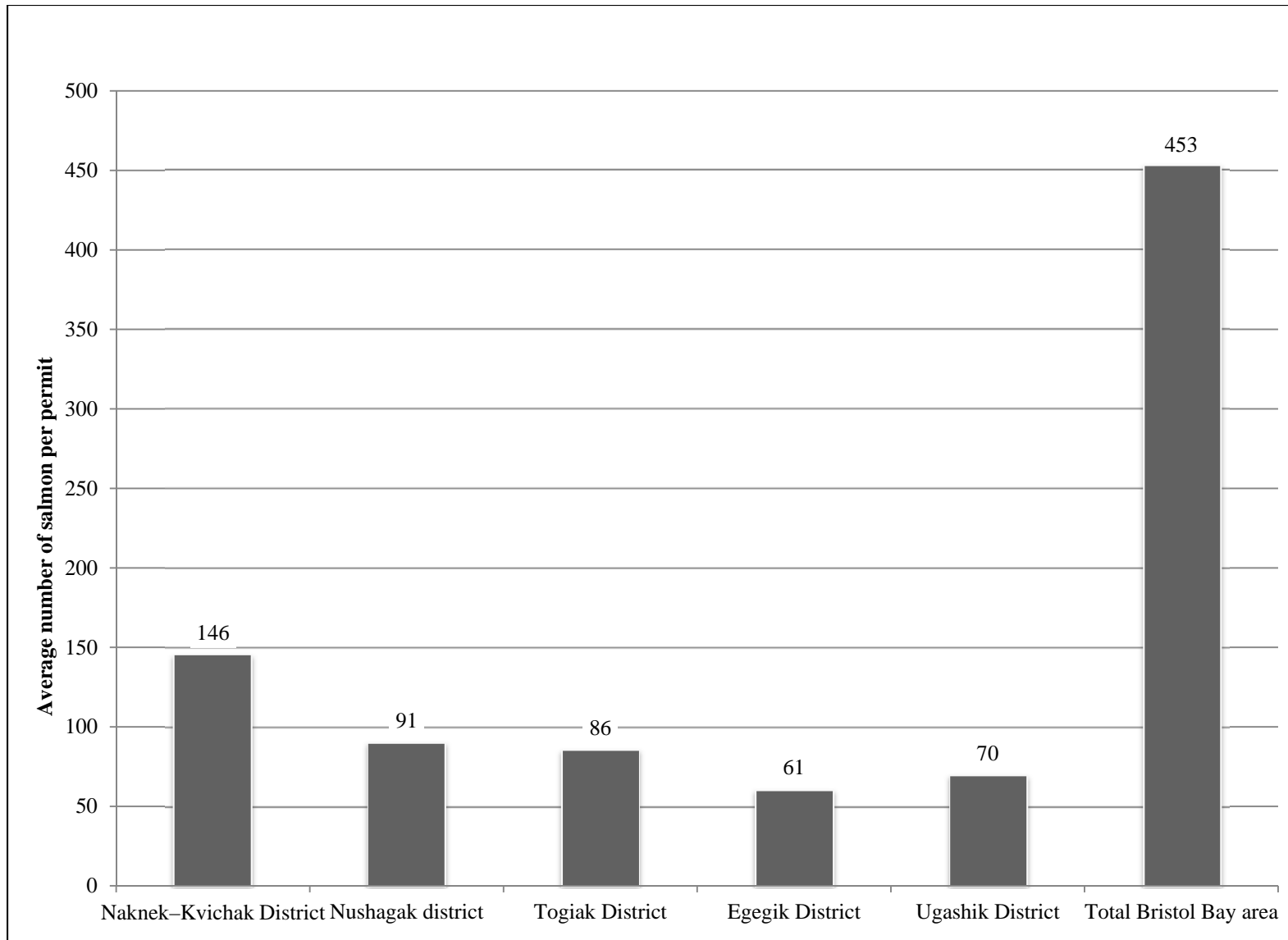


Figure 10.—Average subsistence salmon harvest per permit, 10-year average, 2002–2011, Bristol Bay area, by district.

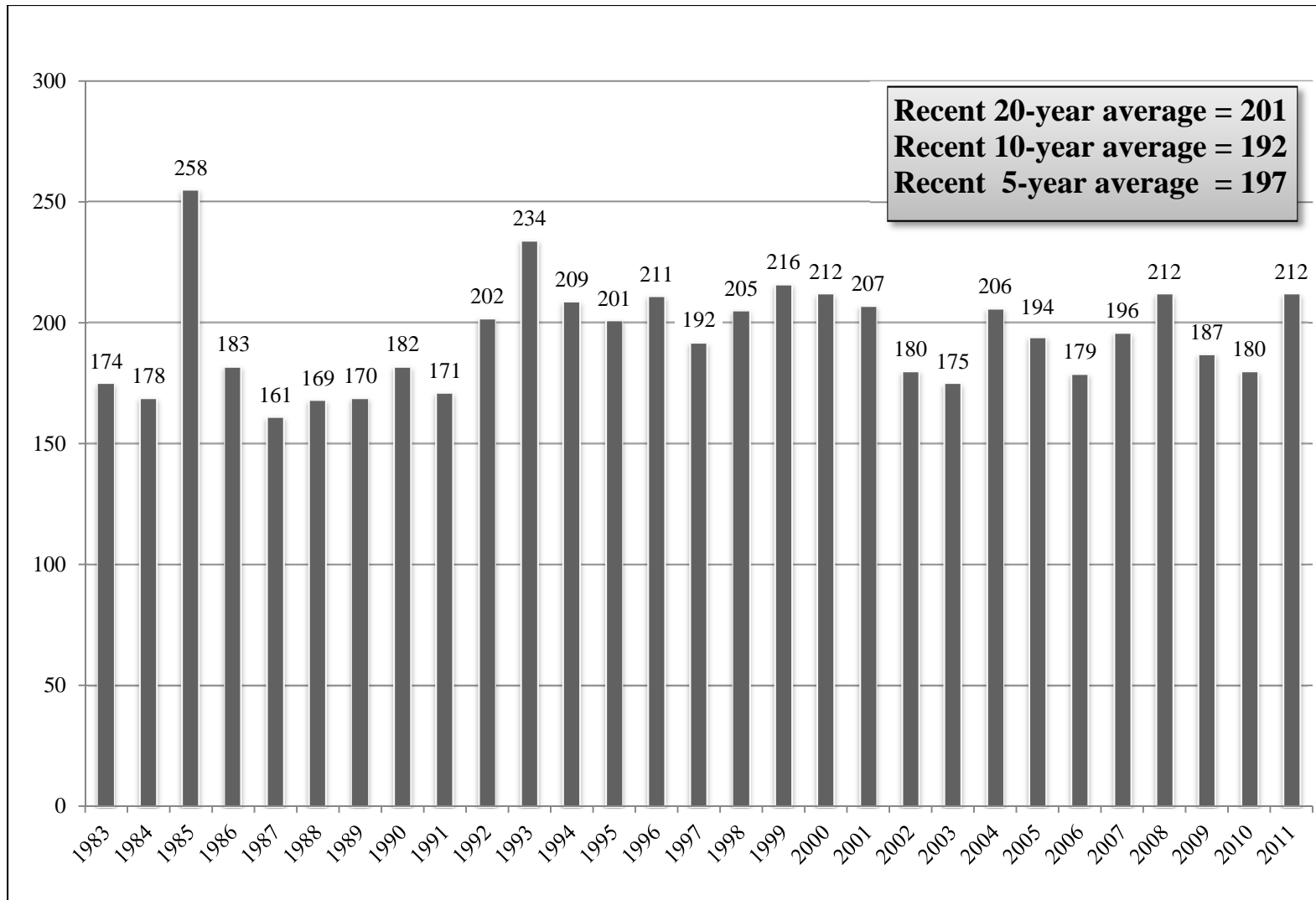


Figure 11.—Number of subsistence salmon permits issued, Kvichak Watershed, Bristol Bay area, 1983–2011.

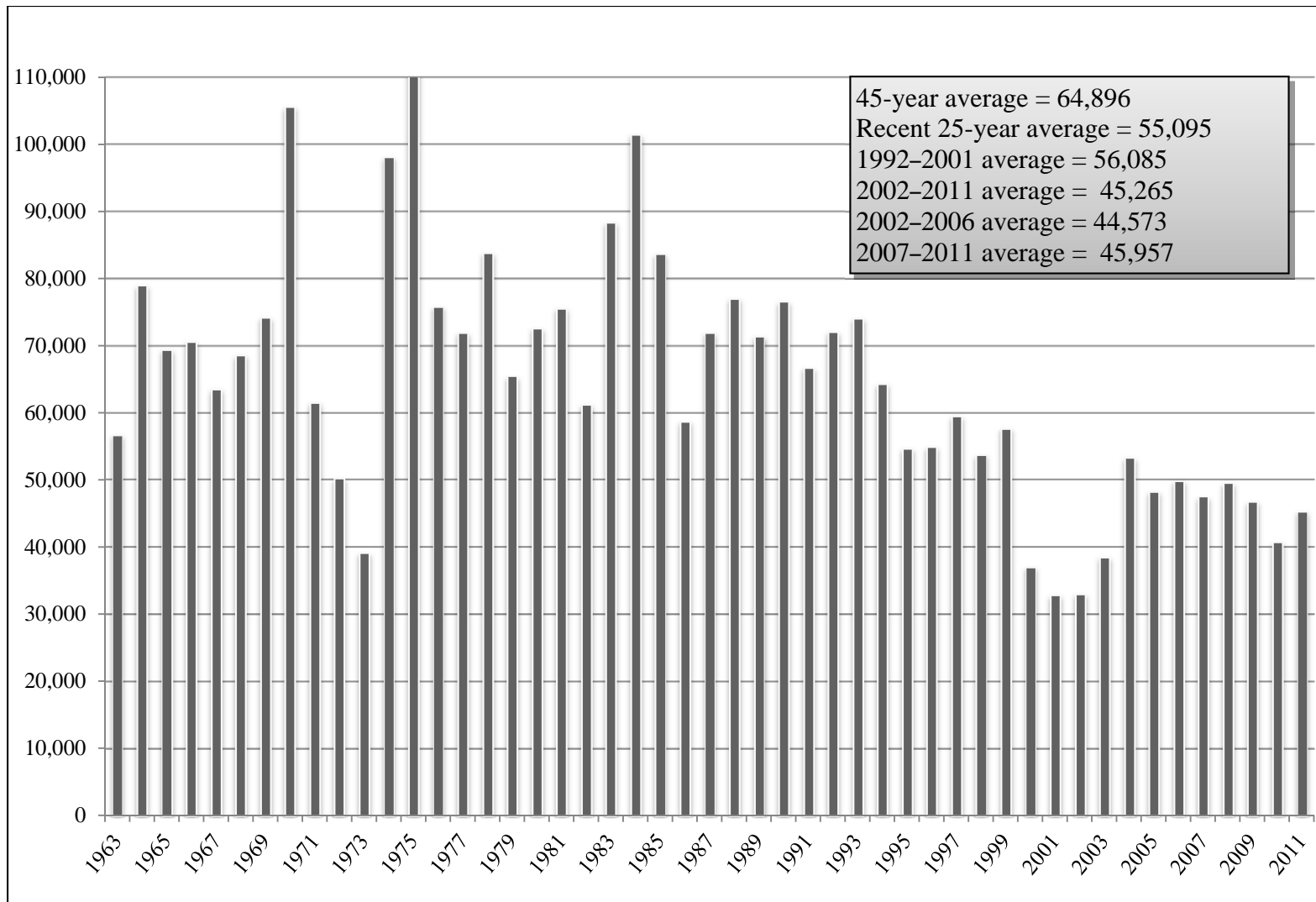


Figure 12.—Estimated subsistence harvests of sockeye salmon, Kvichak Watershed, 1963–2011.

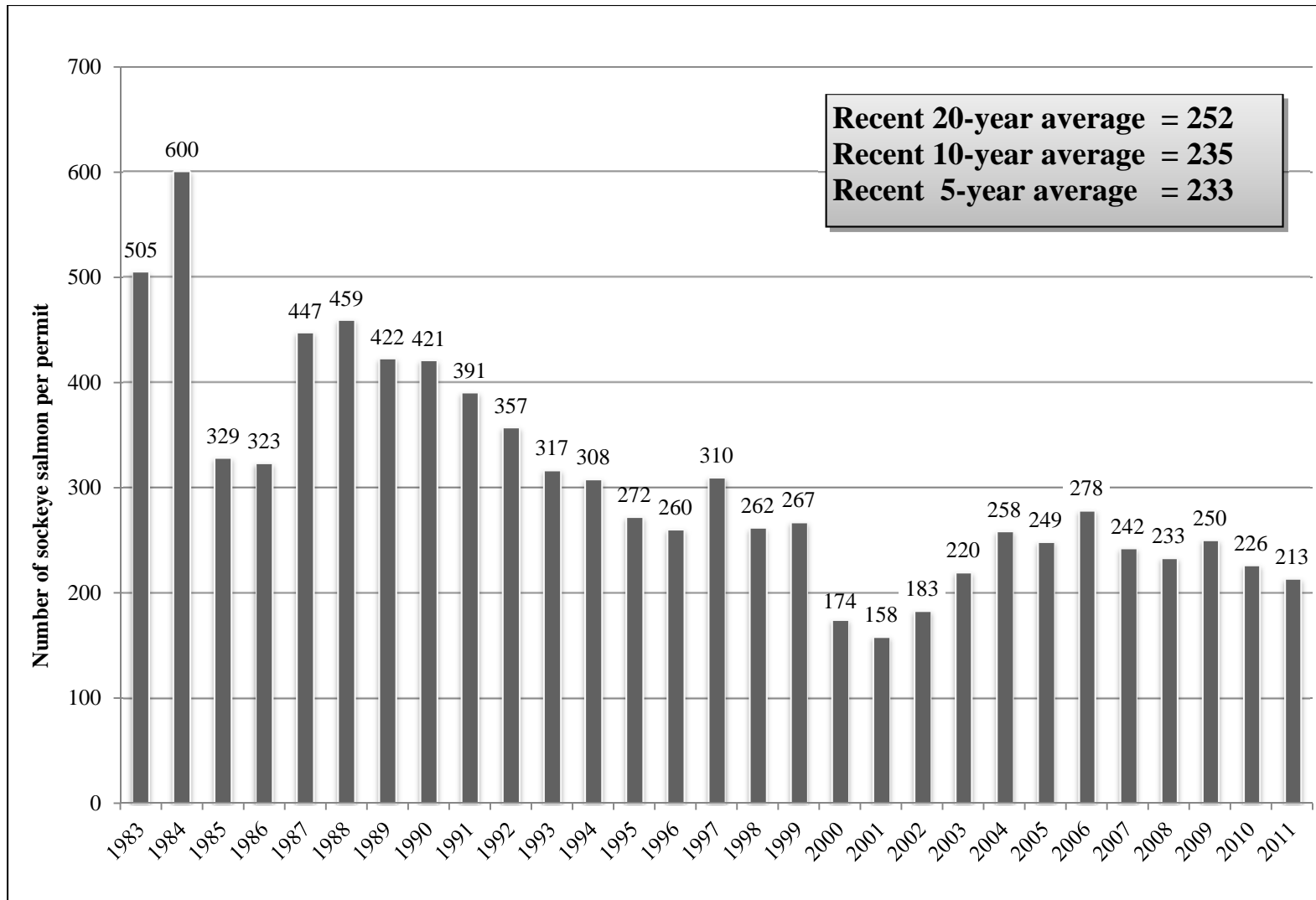


Figure 13.—Average subsistence sockeye salmon harvest per permit, Kvichak Watershed, 1983–2011.

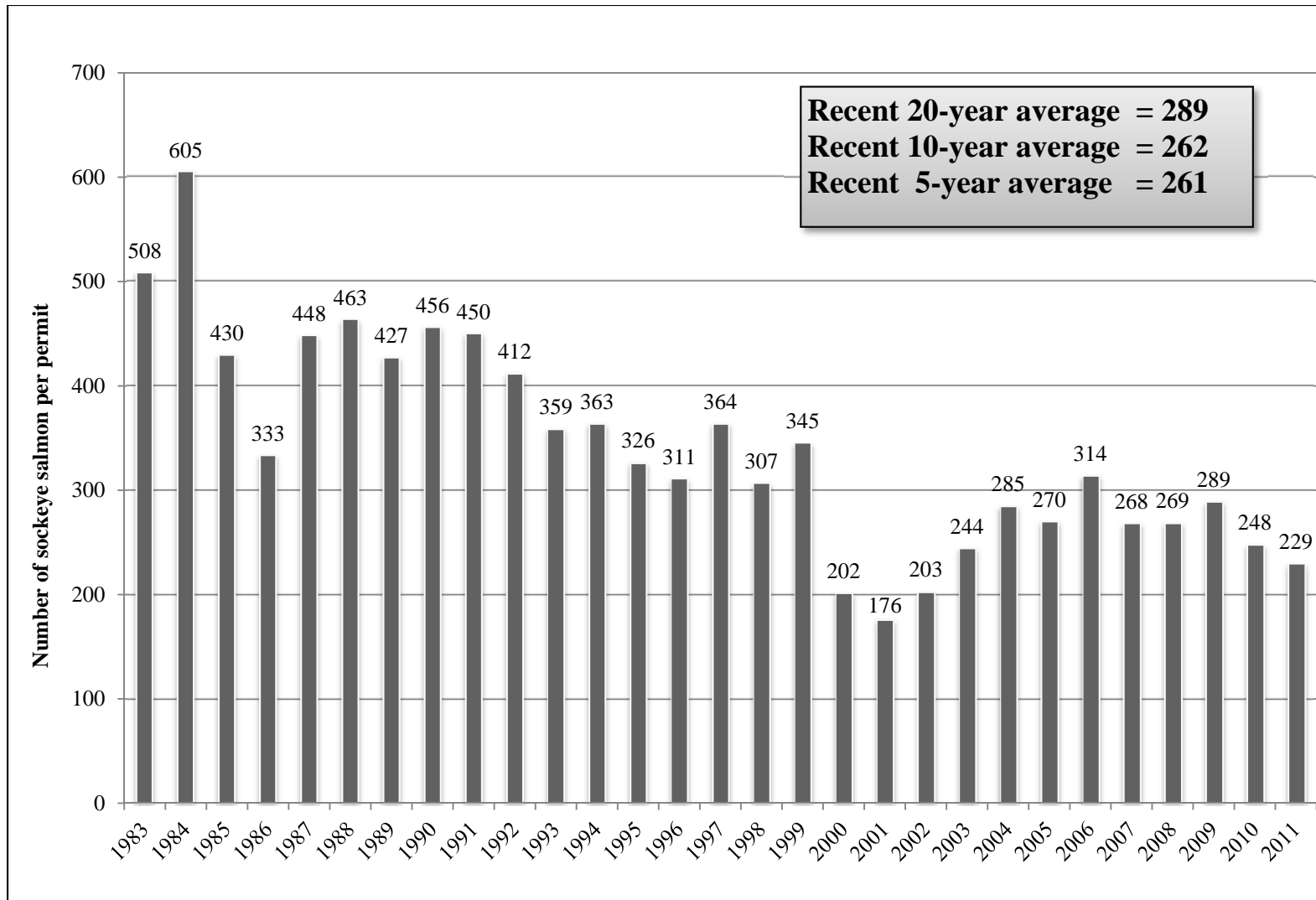


Figure 14.—Average subsistence sockeye salmon harvest per permit, local community residents, Kvichak Watershed, 1983–2011.

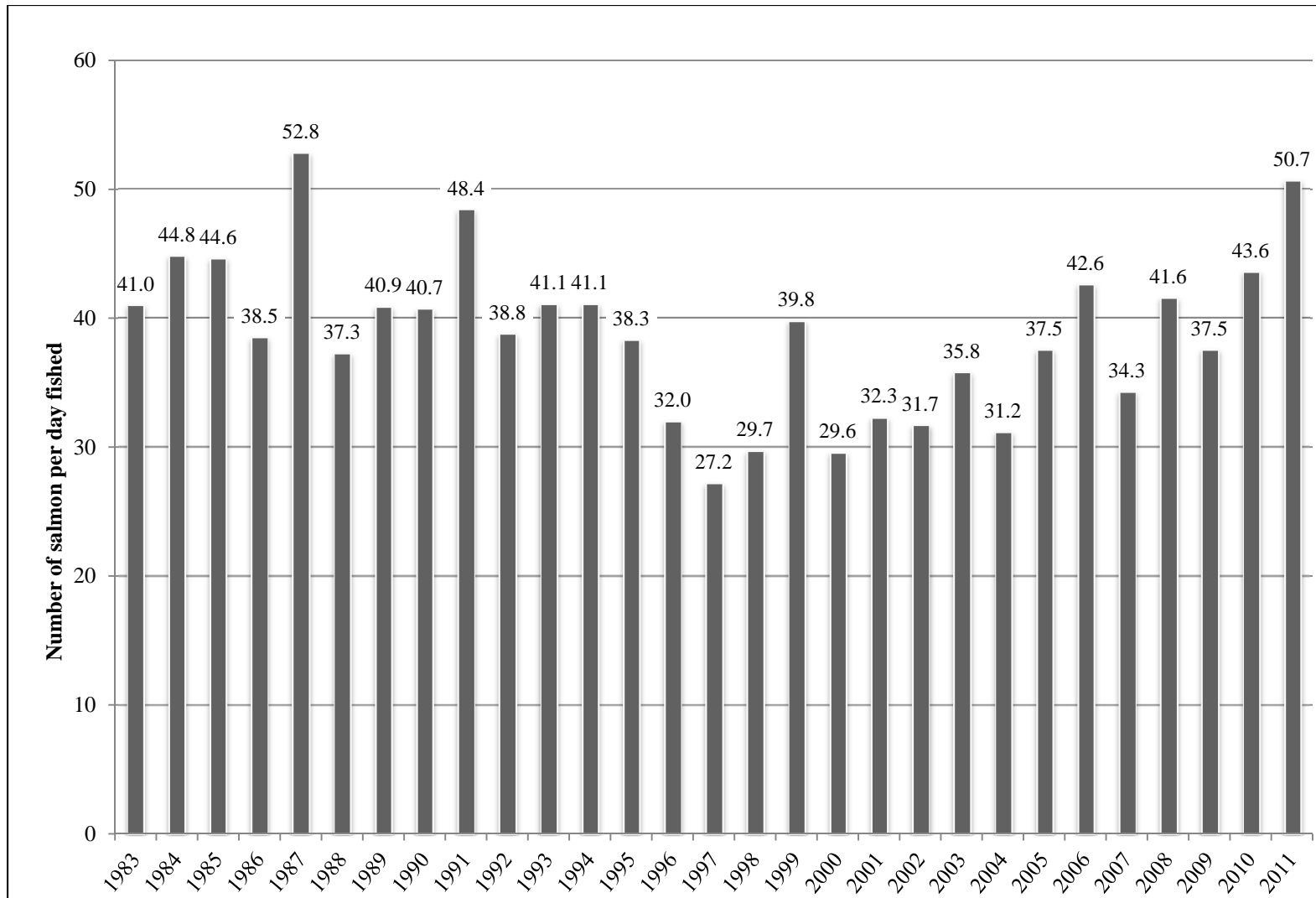


Figure 15.—Kvichak Watershed subsistence fishery: harvest of sockeye salmon per day fished, 1983–2011.

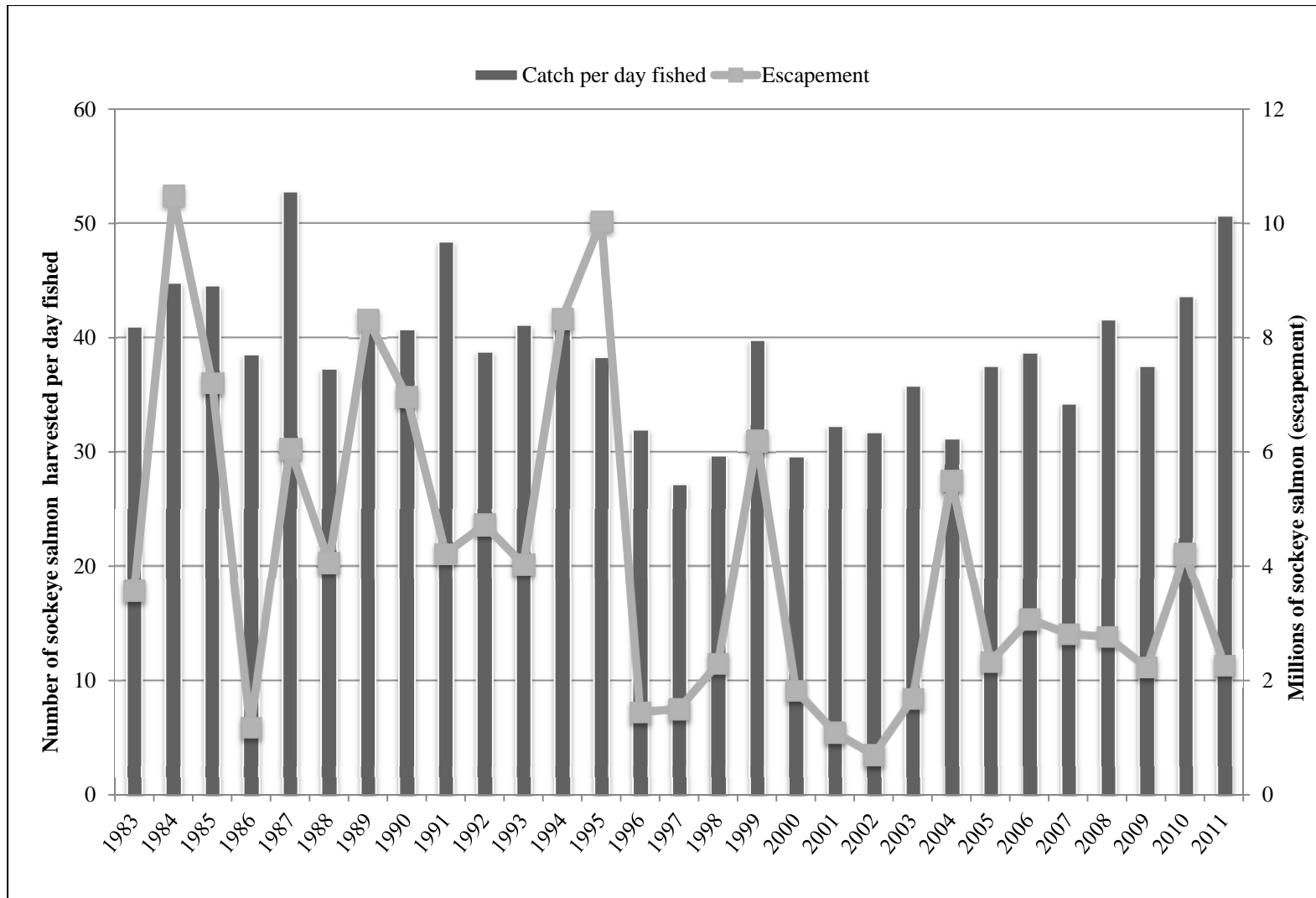


Figure 16.—Escapement of sockeye salmon into the Kvichak Watershed compared to average subsistence harvest per day fished, 1983–2011.



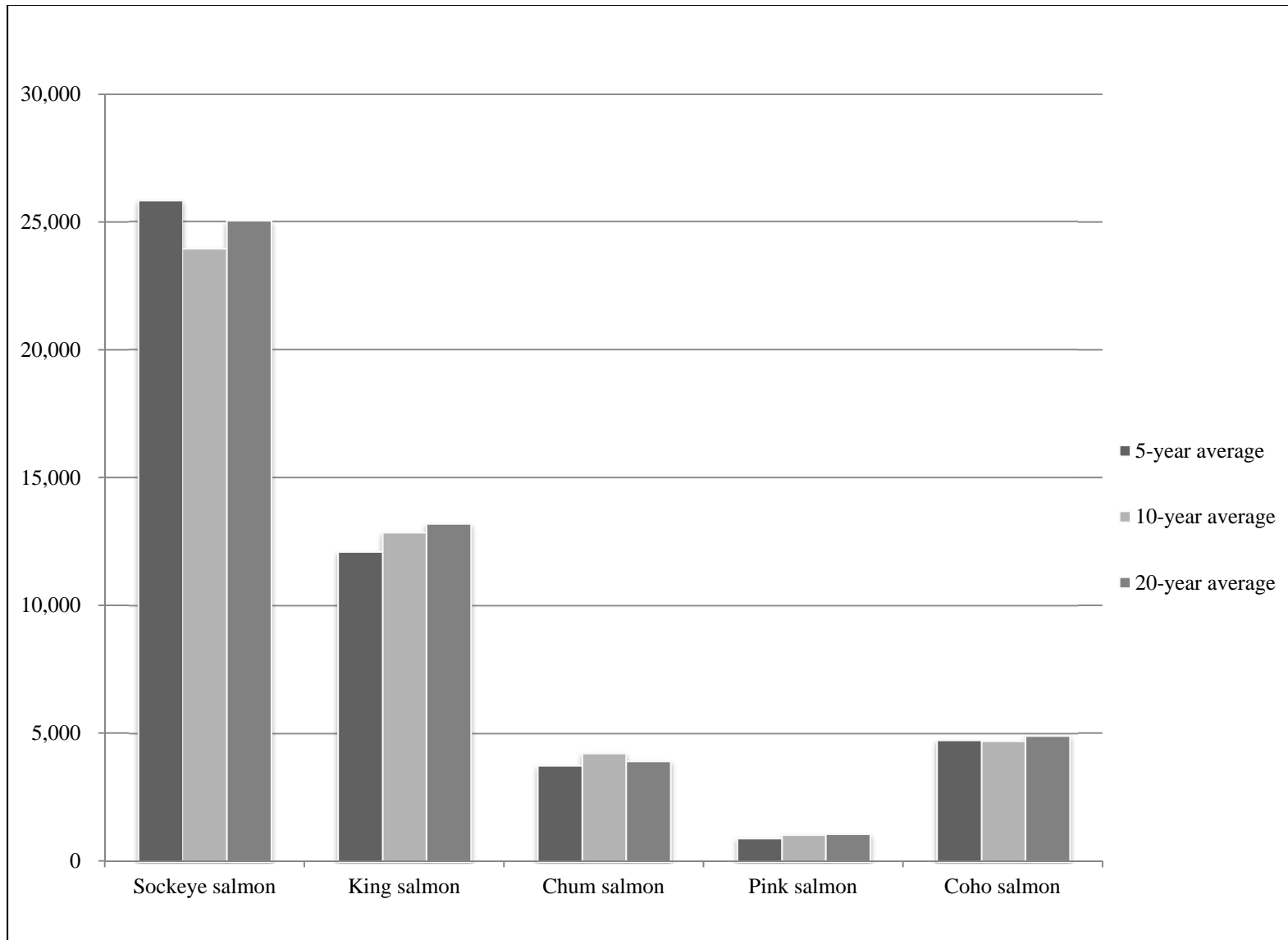


Figure 17.—Average number of salmon harvested in the Nushagak District, 1992–2011.

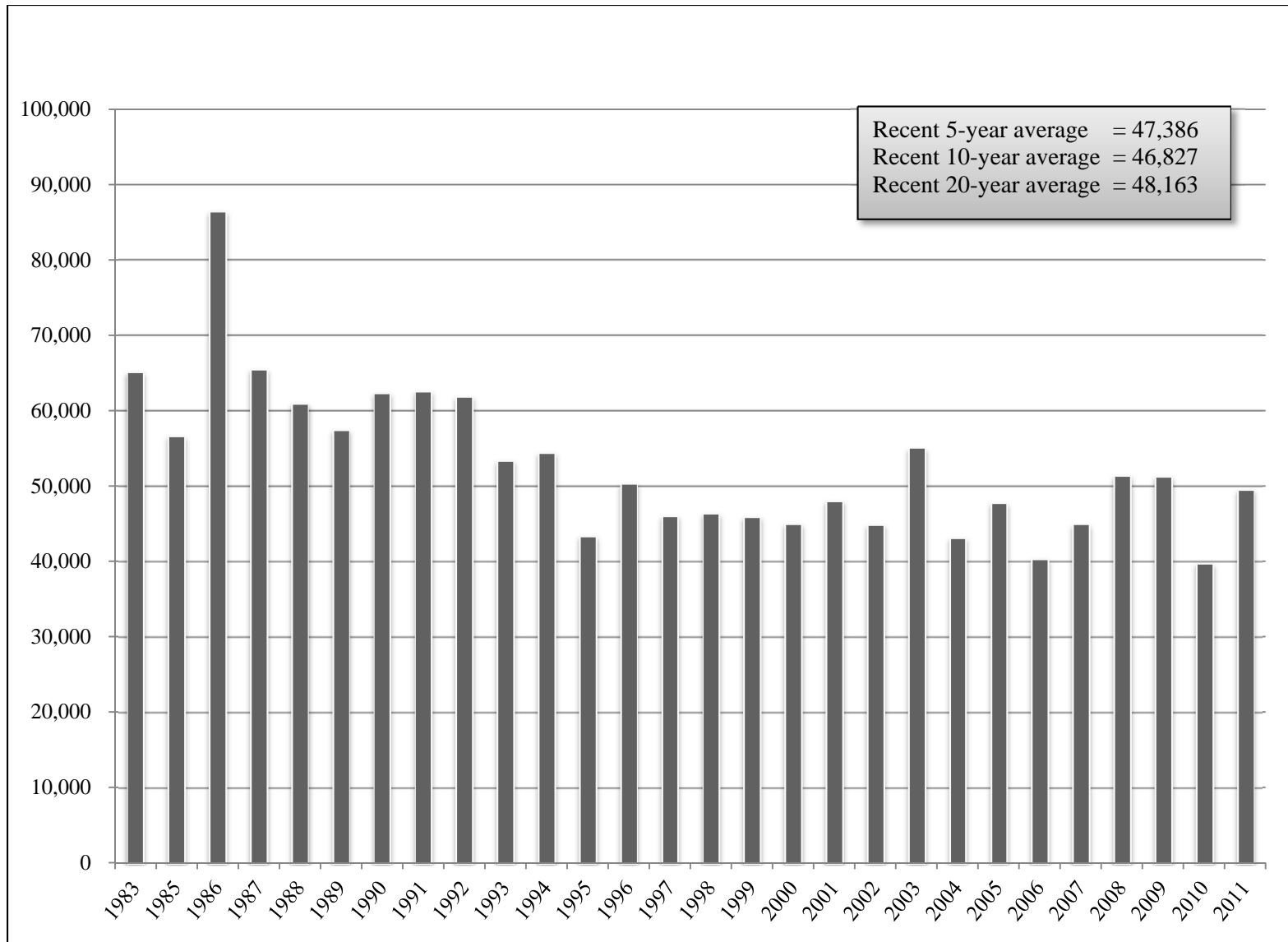


Figure 18.—Estimated subsistence harvests of salmon, Nushagak District, 1983–2011.

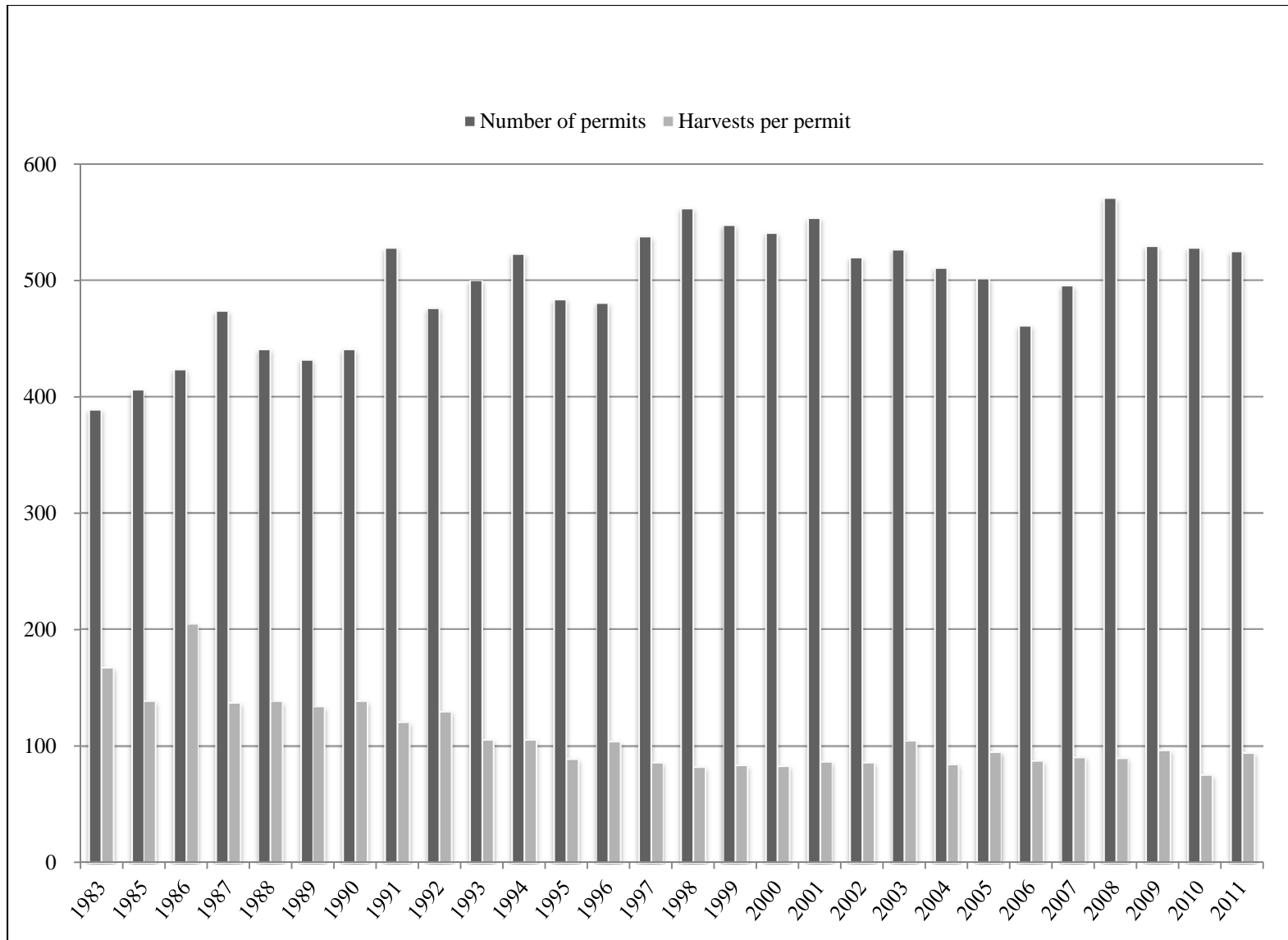


Figure 19.—Number of permits issued in the Nushagak District, 1983–2011.

**APPENDIX TABLES**

Appendix Table 1.—Subsistence salmon harvest by district and species, Bristol Bay, 1985–2011.

Year	Permits issued	Sockeye salmon	King salmon	Chum salmon	Pink salmon	Coho salmon	Total
<b>Naknek-Kvichak District</b>							
1983	385	107,900	1,000	400	300	900	110,500
1985	544	107,543	1,179	540	27	1,103	110,392
1986	412	77,283	1,295	695	2,007	650	81,930
1987	407	86,706	1,289	756	490	1,106	90,347
1988	391	88,145	1,057	588	917	813	91,520
1989	411	87,103	970	693	277	1,927	90,970
1990	466	92,326	985	861	1,032	726	95,930
1991	518	97,101	1,152	1,105	191	1,056	100,605
1992	571	94,304	1,444	2,721	1,601	1,152	101,222
1993	560	101,555	2,080	2,476	762	2,025	108,898
1994	555	87,662	1,843	503	460	1,807	92,275
1995	533	75,644	1,431	1,159	383	1,791	80,407
1996	540	81,305	1,574	816	794	1,482	85,971
1997	533	85,248	2,764	478	422	1,457	90,368
1998	567	83,095	2,433	784	1,063	1,592	88,967
1999	528	85,315	1,567	725	210	856	88,674
2000	562	61,817	894	560	845	937	65,053
2001	506	57,250	869	667	383	740	59,909
2002	471	52,805	837	909	1,137	943	56,632
2003	489	61,443	1,221	259	198	812	63,934
2004	481	71,110	1,075	469	1,080	566	74,300
2005	462	69,211	1,047	546	275	1,224	72,302
2006	468	69,097	881	341	757	720	71,796
2007	480	69,837	672	405	262	1,104	72,280
2008	481	69,823	719	404	801	1,437	73,184
2009	461	67,970	392	167	36	669	69,235
2010	437	62,309	422	233	835	645	64,445
2011	484	67,164	550	215	56	690	68,675
5-year average	469	67,421	551	285	398	909	69,564
10-year average (1992–2001)	546	81,320	1,690	1,089	692	1,384	86,174
10-year average (2002–2011)	471	66,077	782	395	544	881	68,678
20-year average	508	73,698	1,236	742	618	1,132	77,426
<b>Egegik District</b>							
1985	23	582	14	21	1	203	821
1986	41	1,052	69	58	21	319	1,519
1987	49	3,350	87	139	2	284	3,862
1988	52	1,405	97	87	54	333	1,976
1989	50	1,636	50	33	1	414	2,134
1990	61	1,105	53	85	39	331	1,613

-continued-

Appendix Table 1.–Page 2 of 5.

Year	Permits issued	Sockeye salmon	King salmon	Chum salmon	Pink salmon	Coho salmon	Total
1991	70	4,549	82	141	32	430	5,234
1992	80	3,322	124	270	51	729	4,496
1993	69	3,633	128	148	15	905	4,829
1994	59	3,208	166	84	153	857	4,468
1995	60	2,818	86	192	100	690	3,886
1996	44	2,321	99	89	85	579	3,173
1997	34	2,438	101	21	5	740	3,304
1998	36	1,795	44	33	52	389	2,314
1999	42	2,434	106	35	2	806	3,384
2000	31	842	16	11	0	262	1,131
2001	57	2,493	111	105	16	928	3,653
2002	53	1,892	65	34	12	356	2,359
2003	62	3,240	84	32	10	297	3,663
2004	46	2,618	169	410	91	1,423	4,711
2005	45	2,267	81	231	2	526	3,106
2006	41	1,641	94	34	7	641	2,418
2007	28	980	165	72	26	334	1,577
2008	37	1,502	91	35	4	295	1,928
2009	26	778	31	6	5	133	953
2010	37	1,657	93	59	8	275	2,091
2011	37	1,772	91	23	2	377	2,264
5-year average	33	1,338	94	39	9	283	1,763
10-year average (1992–2001)	51	2,530	98	99	48	689	3,464
10-year average (2002–2011)	41	1,835	96	94	17	466	2,507
20-year average	46	2,183	97	96	32	577	2,985
<b>Ugashik District</b>							
1985	9	233	17	7	0	143	400
1986	27	1,080	83	48	21	335	1,567
1987	22	892	104	51	29	272	1,348
1988	23	1,400	84	55	35	330	1,904
1989	22	1,309	32	35	2	214	1,592
1990	37	1,578	51	143	120	280	2,172
1991	38	1,403	121	168	42	614	2,348
1992	37	2,348	106	79	8	397	2,938
1993	39	1,766	86	107	24	495	2,478
1994	31	1,587	126	42	38	579	2,372
1995	20	1,513	56	18	6	290	1,883
1996	26	1,247	50	21	7	298	1,623
1997	28	2,785	169	39	23	311	3,327
1998	27	1,241	59	75	82	485	1,942

-continued-

Appendix Table 1.–Page 3 of 5.

Year	Permits issued	Sockeye salmon	King salmon	Chum salmon	Pink salmon	Coho salmon	Total
1999	25	1,365	35	5	0	271	1,675
2000	31	1,927	51	34	1	467	2,481
2001	24	1,197	61	8	2	357	1,624
2002	23	1,294	51	14	2	460	1,821
2003	23	1,113	31	30	0	392	1,567
2004	21	804	64	9	4	234	1,116
2005	22	818	27	18	2	249	1,114
2006	25	962	41	6	16	339	1,364
2007	17	1,056	43	88	79	281	1,546
2008	14	1,660	47	17	9	222	1,955
2009	15	1,061	33	4	41	131	1,270
2010	18	896	21	4	0	135	1,056
2011	15	531	15	3	2	136	687
5-year average	16	1,041	32	23	26	181	1,303
10-year average (1992–2001)	29	1,698	80	43	19	395	2,234
10-year average (2002–2011)	19	1,020	37	19	16	258	1,350
20-year average	24	1,359	59	31	17	326	1,792
<b>Nushagak District</b>							
1985	406	38,000	7,900	4,000	600	6,100	56,600
1986	424	49,000	12,600	10,000	5,400	9,400	86,400
1987	474	40,900	12,200	6,000	200	6,200	65,500
1988	441	31,086	10,079	8,234	6,316	5,223	60,938
1989	432	34,535	8,122	5,704	407	8,679	57,447
1990	441	33,003	12,407	7,808	3,183	5,919	62,320
1991	528	33,161	13,627	4,688	292	10,784	62,552
1992	476	30,640	13,588	7,076	3,519	7,103	61,926
1993	500	27,114	17,709	3,257	240	5,038	53,358
1994	523	26,501	15,490	5,055	2,042	5,338	54,426
1995	484	22,793	13,701	2,786	188	3,905	43,373
1996	481	22,935	15,941	4,704	1,573	5,217	50,370
1997	538	25,080	15,318	2,056	218	3,433	46,106
1998	562	25,217	12,258	2,487	1,076	5,316	46,355
1999	548	29,387	10,057	2,409	124	3,993	45,969
2000	541	24,451	9,470	3,463	1,662	5,983	45,029
2001	554	26,939	11,760	3,011	378	5,993	48,080
2002	520	22,777	11,281	5,096	1,179	4,565	44,897
2003	527	25,491	18,686	5,064	403	5,432	55,076
2004	511	17,491	15,610	3,869	1,944	4,240	43,154

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Appendix Table 1.–Page 4 of 5.

Year	Permits issued	Sockeye salmon	King salmon	Chum salmon	Pink salmon	Coho salmon	Total
2005	502	23,916	12,529	5,006	793	5,596	47,841
2006	461	20,773	9,971	4,448	1,591	3,590	40,373
2007	496	25,127	13,330	3,006	430	3,050	44,944
2008	571	26,828	12,960	4,552	1,923	5,133	51,395
2009	530	26,922	12,737	4,510	355	6,777	51,300
2010	528	22,326	9,150	3,660	1,672	2,983	39,791
2011	525	28,006	12,461	3,055	230	5,746	49,497
5-year average	530	25,842	12,128	3,757	922	4,738	47,385
10-year average (1992–2001)	521	26,106	13,529	3,630	1,102	5,132	49,499
10-year average (2002–2011)	517	23,966	12,872	4,227	1,052	4,711	46,827
20-year average	519	25,036	13,200	3,928	1,077	4,922	48,163
<b>Togiak District</b>							
1985	51	3,400	600	1,000	100	1,500	6,600
1986	29	2,400	700	800	100	500	4,500
1987	46	3,600	700	1,000	0	1,600	6,900
1988	29	2,413	429	716	45	792	4,395
1989	40	2,825	551	891	112	976	5,355
1990	37	3,689	480	786	60	1,111	6,126
1991	43	3,517	470	553	27	1,238	5,805
1992	40	3,716	1,361	626	135	1,231	7,069
1993	38	2,139	784	571	8	743	4,245
1994	25	1,777	904	398	77	910	4,066
1995	22	1,318	448	425	0	703	2,894
1996	19	662	471	285	59	199	1,676
1997	31	1,440	667	380	0	260	2,747
1998	42	2,211	782	412	76	310	3,791
1999	76	3,780	1,244	479	84	217	5,804
2000	54	3,013	1,116	569	90	342	5,130
2001	92	4,162	1,612	367	61	388	6,590
2002	36	2,319	703	605	10	241	3,878
2003	92	4,403	1,208	483	451	883	7,428
2004	46	1,795	1,094	383	108	204	3,584
2005	45	2,299	1,528	301	26	295	4,448
2006	61	2,728	1,630	492	354	408	5,612
2007	48	2,548	1,234	420	19	110	4,332
2008	91	3,770	1,337	701	114	541	6,463
2009	40	2,220	827	365	5	272	3,689
2010	64	3,256	1,162	735	113	514	5,779
2011	68	3,462	966	497	42	545	5,512

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Appendix Table 1.–Page 5 of 5.

Year	Permits issued	Sockeye salmon	King salmon	Chum salmon	Pink salmon	Coho salmon	Total
5-year average	62	3,051	1,105	544	59	396	5,155
10-year average (1992–2001)	44	2,422	939	451	59	530	4,401
10-year average (2002–2011)	59	2,880	1,169	498	124	401	5,073
20-year average	52	2,651	1,054	475	92	466	4,737
<b>Total Bristol Bay area</b>							
1985	1,033	149,758	9,710	5,568	728	9,049	174,813
1986	933	130,815	14,747	11,601	7,549	11,204	175,916
1987	998	135,493	14,356	7,895	689	9,453	167,886
1988	936	124,449	11,746	9,680	7,367	7,491	160,733
1989	955	127,408	9,725	7,356	799	12,210	157,498
1990	1,042	131,701	13,976	9,683	4,434	8,367	168,161
1991	1,197	139,731	15,452	6,655	584	14,122	176,544
1992	1,204	134,330	16,623	10,772	5,314	10,612	177,651
1993	1,206	136,207	20,787	6,559	1,049	9,206	173,808
1994	1,193	120,735	18,529	6,082	2,770	9,491	157,607
1995	1,119	104,086	15,722	4,580	677	7,378	132,443
1996	1,110	108,470	18,136	5,915	2,518	7,775	142,813
1997	1,166	116,991	19,159	2,974	668	6,201	145,992
1998	1,234	113,560	15,576	3,792	2,349	8,093	143,368
1999	1,219	122,281	13,009	3,653	420	6,143	145,506
2000	1,219	92,050	11,547	4,637	2,599	7,991	118,824
2001	1,226	92,041	14,412	4,158	839	8,406	119,856
2002	1,093	81,088	12,936	6,658	2,341	6,565	109,587
2003	1,182	95,690	21,231	5,868	1,062	7,816	131,667
2004	1,100	93,819	18,012	5,141	3,225	6,667	126,865
2005	1,076	98,511	15,212	6,102	1,098	7,889	128,811
2006	1,050	95,201	12,617	5,321	2,726	5,697	121,564
2007	1,063	99,549	15,444	3,991	815	4,880	124,679
2008	1,178	103,583	15,153	5,710	2,851	7,627	134,924
2009	1,063	98,951	14,020	5,052	442	7,982	126,447
2010	1,082	90,444	10,852	4,692	2,627	4,623	113,238
2011	1,122	101,017	14,106	3,794	333	7,493	126,744
5-year average	1,102	98,709	13,915	4,648	1,414 <sup>a</sup>	6,521	125,206
10-year average (1992–2001)	1,190	114,075	16,350	5,312	1,920 <sup>a</sup>	8,130	145,787
10-year average (2002–2011)	1,101	95,785	14,958	5,233	1,752 <sup>a</sup>	6,724	124,453
20-year average	1,145	104,930	15,654	5,273	1,836 <sup>a</sup>	7,427	135,120

Notes Harvests are extrapolated for all permits issued, based on those returned. Harvests prior to 1985 are rounded to the nearest 100 fish. Permit and harvest estimates prior to 1989 are based on the community where the permit was issued; estimates from 1989 to the present are based on the area fished, as first recorded on the permit.

a. Includes even years only.

Appendix Table 2.—Estimated subsistence salmon harvests by district and location fished, Bristol Bay Management Area, 2011.

Area and river system	Number of permits issued <sup>a</sup>	Estimated salmon harvest					
		King	Sockeye	Coho	Chum	Pink	Total
<b>Naknek-Kvichak District</b>	484	550	67,164	690	215	56	68,675
Naknek River subdistrict	272	525	21,938	666	208	55	23,392
Kvichak River - Iliamna Lake subdistrict:	212	25	45,226	24	7	1	45,283
Alagnak (Branch) River	1	4	49	0	1	0	54
Igiugig	11	8	835	13	0	1	857
Iliamna Lake - general	39	0	9,246	0	0	0	9,246
Kokhanok	22	6	6,300	0	0	0	6,306
Kvichak River	19	0	4,123	0	0	0	4,123
Lake Clark	53	0	5,593	0	0	0	5,593
Levelock	7	7	606	11	6	0	630
Newhalen River	32	0	11,572	0	0	0	11,572
Pedro Bay	17	0	2,973	0	0	0	2,973
Pile Bay	1	0	179	0	0	0	179
Six Mile Lake	18	0	3,751	0	0	0	3,751
<b>Egegik District</b>	37	91	1,772	377	23	2	2,264
<b>Ugashik District</b>	15	15	531	136	3	2	687
<b>Nushagak District</b>	525	12,461	28,006	5,746	3,055	230	49,497
Igushik-Snake River	17	101	1,663	127	13	0	1,904
Nushagak Bay commercial	36	365	1,539	533	136	35	2,609
Nushagak Bay noncommercial	234	4,163	9,758	2,812	1,153	166	18,052
Nushagak River	124	5,595	7,428	1,035	1,333	25	15,416
Site unknown	1	20	42	12	4	1	79
Wood River	154	2,216	7,576	1,227	415	3	11,438
<b>Togiak District</b>	68	966	3,462	545	497	42	5,512
<b>Total</b>	<b>1,122</b>	<b>14,106</b>	<b>101,017</b>	<b>7,493</b>	<b>3,794</b>	<b>333</b>	<b>126,744</b>

Source ADF&G Division of Subsistence, ASFDB 2012 (ADF&G 2012).

Notes Harvests are extrapolated for all permits issued, based on those returned and on the area fished as reported on the permit. Due to rounding, the sum of columns and rows may not equal the estimated total. Of 1,063 permits issued for the management area, 1,039 were returned (92.6%).

a. Sum of sites may exceed district totals, and sum of districts may exceed area total, because permittees may use more than one site.

Appendix Table 3.—Subsistence harvest of sockeye salmon by community, in numbers of fish, Kvichak River drainage, Bristol Bay, 1985–2011.

Year	Levelock	Igiugig	Pedro Bay	Kokhanok	Iliamna– Newhalen <sup>c</sup>	Nondalton	Port Alsworth	Other <sup>d</sup>	Total
1985	6,600	3,400	12,900	21,900	22,300	14,900	4,500	ND	86,500
1986	6,400	1,600	6,700	18,300	17,000	6,600	3,300	ND	59,900
1987	5,700	a.	7,300	16,500	27,500	11,800	3,200	ND	72,000
1988	3,500	a.	5,500	14,400	29,800	20,700	3,200	b.	77,100
1989	5,100	1,200	6,700	13,000	24,700	18,500	2,200	b.	71,400
1990	4,700	2,200	6,600	12,400	18,800	27,300	3,200	1,400	76,600
1991	1,029	1,712	9,739	17,184	29,094	4,163	2,755	1,110	66,786
1992	4,374	1,056	6,932	11,477	29,633	13,163	2,954	2,559	72,148
1993	4,699	1,397	6,226	18,810	19,067	17,890	3,254	2,780	74,123
1994	1,467	1,201	8,747	15,771	15,553	15,246	3,074	3,284	64,343
1995	3,756	497	5,359	14,412	20,134	4,188	2,892	3,441	54,679
1996	1,120	2,309	5,219	14,011	14,787	11,856	3,263	2,307	54,872
1997	1,062	2,067	5,501	8,722	19,513	17,194	2,348	3,101	59,508
1998	2,454	1,659	3,511	10,418	16,165	13,136	2,678	3,635	53,656
1999	1,276	1,608	5,005	10,725	14,129	17,864	4,282	2,834	57,723
2000	1,467	1,981	1,815	7,175	6,679	11,953	3,200	2,720	36,990
2001	908	779	2,118	9,447	8,132	7,566	1,958	1,901	32,808
2002	625	2,138	2,687	9,847	9,417	5,508	1,201	1,578	33,001
2003	737	1,081	2,135	9,771	13,824	8,016	1,370	1,591	38,495
2004	1,000	1,026	4,803	11,869	21,652	8,789	2,455	1,631	53,225
2005	914	1,017	4,162	16,801	12,010	8,824	2,457	2,078	48,263
2006	0	1,252	4,319	19,028	11,488	8,885	2,418	2,460	49,850
2007	102	1,803	5,487	15,106	11,453	7,902	3,211	2,474	47,538
2008	30	1,558	4,884	14,755	13,569	8,917	3,307	2,543	49,563
2009	759	1,457	7,802	15,759	9,871	5,709	3,155	2,260	46,771
2010	940	2,901	2,609	13,973	8,815	3,185	3,250	5,015	40,688
2011	933	1,931	3,898	9,895	15,433	7,947	4,026	1,164	45,226

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Appendix Table 3.–Page 2 of 2.

Year	Levelock	Igiugig	Pedro Bay	Kokhanok	Iliamna– Newhalen <sup>c</sup>	Nondalton	Port Alsworth	Other <sup>d</sup>	Total
5-year average	553	1,930	4,936	13,898	11,828	6,732	3,390	2,691	45,957
10-year average (1992–2001)	2,258	1,455	5,043	12,097	16,379	13,006	2,990	2,856	56,085
10-year average (2002–2011)	604	1,616	4,279	13,680	12,753	7,368	2,685	2,279	45,262
20-year average	1,431	1,536	4,661	12,889	14,566	10,187	2,838	2,568	50,674

*Notes* Harvests are extrapolated for all permits issued, based on those returned. Harvest estimates from 1991 are rounded to the nearest 100 fish. Harvest estimates prior to 1990 are based on the community where the permit was issued; estimates from 1990 to the present are based on community of residence and include fish caught only in the Kvichak District.

- a. No permits issued.
- b. No permits issued. Only residents of the Naknek-Kvichak watershed could obtain subsistence permits.
- c. Includes Chekok.
- d. Subsistence harvests by non-Kvichak River watershed residents.

ND = no data available.

Appendix Table 4.–Subsistence salmon harvest by community, Nushagak District, Bristol Bay, 1985–2011.

Year	Dillingham <sup>c</sup>	Manokotak	Aleknagik	Ekwok	New Stuyahok	Koliganek	Other <sup>d</sup>	Total
1985	22,900	3,600	1,600	7,000	14,500	6,800	ND	56,400
1986	31,900	5,500	6,900	7,800	26,400	8,200	ND	86,700
1987	33,500	5,900	3,100	6,400	11,400	4,900	ND	65,200
1988	29,600 b.	5,500	2,400	6,100	11,700	5,700	a.	61,000
1989	31,800 b.	5,800	2,000	4,700	9,700	3,800	a.	57,800
1990	28,860 b.	6,600	2,300	4,900	9,900	8,000	700	61,260
1991	34,399 b.	5,873	3,043	4,532	8,326	5,438	2,163	63,774
1992	31,702 b.	4,317	2,184	5,971	11,325	3,708	2,635	61,842
1993	25,315 b.	3,048	2,593	2,936	12,169	4,180	2,538	52,779
1994	30,145 b.	3,491	2,289	4,343	8,056	4,513	2,322	55,159
1995	24,998 b.	2,453	1,468	2,046	6,911	2,983	2,406	43,265
1996	27,161 b.	3,883	1,733	2,866	8,892	3,319	2,113	49,967
1997	23,255 b.	3,988	1,989	1,797	6,427	4,179	4,598	46,233
1998	24,072 b.	4,069	1,112	3,555	5,419	3,166	4,958	46,351
1999	26,502 b.	3,413	1,532	1,805	4,556	2,772	5,389	45,969
2000	27,931 b.	3,173	1,111	3,946	3,715	2,792	2,362	45,029
2001	26,435 b.	3,700	2,129	2,218	7,294	2,209	4,096	48,080
2002	25,004 b.	3,254	1,517	2,735	6,043	3,098	3,247	44,897
2003	26,955 b.	4,214	2,044	2,291	10,817	5,721	3,034	55,076
2004	23,308 b.	2,052	2,206	1,891	6,714	3,619	3,364	43,154
2005	21,898 b.	1,576	1,795	1,388	9,673	8,422	3,088	47,841
2006	22,081 b.	1,654	2,047	1,499	6,160	3,885	3,047	40,373
2007	25,190 b.	2,443	1,382	1,267	8,284	3,054	3,324	44,944
2008	27,388	5,429	3,309	1,902	5,690	4,423	3,255	51,395
2009	30,117	2,068	2,646	2,345	6,855	3,700	3,568	51,300
2010	22,842	2,665	1,570	1,380	5,608	2,406	3,320	39,791
2011	26,850	1,433	3,016	1,805	7,980	3,539	4,875	49,498

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Appendix Table 4.–Page 2 of 2.

Year	Dillingham <sup>c</sup>	Manokotak	Aleknagik	Ekwok	New Stuyahok	Koliganek	Other <sup>d</sup>	Total
5-year average	26,477	2,808	2,385	1,740	6,883	3,424	3,668	47,385
10-year average (1992–2001)	26,752	3,553	1,814	3,148	7,476	3,382	3,342	49,467
10-year average (2002–2011)	25,163	2,679	2,153	1,850	7,382	4,187	3,412	46,827
20-year average	25,957	3,116	1,984	2,499	7,429	3,784	3,377	48,147

*Notes* Harvests are extrapolated for all permits issued, based on those returned. Harvest estimates prior to 1991 are rounded to the nearest 100 fish. Harvest estimates prior to 1990 are based on the community where the permit was issued; estimates from 1990 to the present are based on community of residence and include fish caught only in the Nushagak District.

- a. No permits issued. Only residents of the Nushagak watershed could obtain subsistence permits.
- b. Includes permits issued in Clarks Point and Ekuk.
- c. Includes the village of Portage Creek and Clarks Point.
- d. Subsistence harvests by non-Nushagak watershed residents.

ND = no data.