

# Chapter Five: Current and Projected Uses in the Cook Inlet Area

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## Chapter Five: Current and Projected Uses in the Cook Inlet Area

AS 38.05.035(g) directs that best interest findings consider and discuss the current and projected uses in the area, including uses and value of fish and wildlife. The Cook Inlet area provides important habitat for moose, black and brown bear, caribou, and waterfowl, and many fish species that form the resource base for subsistence and sport fishing, hunting and gathering, and for commercial, personal use, and educational fishing. These activities are integral to the history and culture of the area, as well as contributing significantly to the economy. Residents and visitors use the area extensively for recreation and tourism. The surface waters and groundwater of the area provide area residents, businesses, and industry with public water supplies. Other abundant natural resources support forestry, agriculture, mining, and oil and gas industries.

### A. State Game Refuges, Wildlife Refuges, Critical Habitat Areas, and Other Designated Areas

A number of state and federal wildlife refuges, critical habitat areas, recreation areas, and parks exist within or near the lease sale area. These areas have significant scenic and recreational value, provide important habitat for fish and wildlife populations, and are used extensively by recreationists, fishers, and hunters. This section focuses on uses of these areas; additional information about the areas, including background and purposes for their designations, is found in Chapter 4, Section A4.

**Susitna Flats State Game Refuge** produces about 10 percent of the statewide waterfowl harvest. Many hunters land float planes to access the refuge's lakes. The Theodore and Lewis rivers are popular fly-in fishing streams for Chinook salmon from late May through June. Boaters access Susitna Flats from Ship Creek in Anchorage. Producing gas fields within the Susitna Flats include Pretty Creek, Lewis River, Ivan River, and Stump Lake. Natural gas from these fields is used to generate electricity and heat energy for Southcentral Alaska communities.



Little Susitna River boat launch.

**Palmer Hay Flats State Game Refuge** is important wetland habitat, and also provides recreation, horseback riding, skiing, snow machining, and hunting opportunities for residents. Currently there is no oil or gas activity in the refuge.

**Goose Bay State Game Refuge** is located in on the west side of upper Cook Inlet. It provides important wetland habitat for waterfowl, and is a moose calving area. In the fall, waterfowl hunting takes place in the refuge. Currently there is no oil or gas activity in the refuge.

**Anchorage Coastal Wildlife Refuge** is heavily used by residents of Anchorage and visitors to the area. Thousands of people use the refuge each year to view wildlife. Waterfowl hunting is allowed in portions of the refuge. Area residents also enjoy the refuge for other seasonal activities such as ice skating and cross-country skiing.

Oil and gas leases were issued in **Trading Bay State Game Refuge** in 1961, prior to designation of the area as a state game refuge in 1976. It is an important habitat area for waterfowl. Oil and gas

activities are permitted by statute within the refuge, when compatible with the purpose for which the state game refuge was established, but restrictions on activities in this special area apply. Current producing fields near the refuge include Nikolai Creek, Trading Bay, and McArthur River. The Trading Bay production facility is sited just south of the refuge. Oil and gas are also produced from about 10 platforms offshore.

Oil and gas leases were issued in **Redoubt Bay Critical Habitat Area** in 1961. Although this critical habitat area was established to protect a variety of fish and wildlife species, it is best known for its prime waterfowl habitat. Oil and gas activities are permitted by statute within the Redoubt Bay Critical Habitat Area when compatible with the purpose for which the area was established although there are restrictions on activities. Current producing fields near the Redoubt Bay Critical Habitat Area include West Forelands and West McArthur River. The Drift River oil storage and transfer terminal is located adjacent to the critical habitat area boundary on the south side of the Drift River.

**Kalgin Island Critical Habitat Area** receives few visitors, in part because of its remote and relatively inaccessible location. However, setnet fishing for salmon occurs along the shore in summer, and boaters enjoy opportunities for wildlife watching and beach combing. Currently there is no oil and gas activity on Kalgin Island, however some exploration has occurred.

Some lands in the **Clam Gulch Critical Habitat Area** are currently leased and companies are exploring the area's petroleum potential. The Falls Creek gas field is located within the critical habitat area, although it is not currently producing.

About 60 percent of the **Anchor River and Fritz Creek Critical Habitat Area** is included in the lease sale area. No oil or gas production exists in the critical habitat area. The North Fork gas field, located to the north, was delineated in the 1960s but is not a producing field.

A few tracts of the Cook Inlet lease sale area are within the **Kenai National Wildlife Refuge** and **Chugach State Park**. BLM manages federal oil and gas leases in the Swanson River and Beaver Creek oil fields, located north of Soldotna within the Kenai National Wildlife Refuge. Chugach State Park provides unique recreation, camping, hunting, and mining opportunities for residents and tourists.

Other areas with special designations are located near the lease sale area, including the Matanuska Valley Moose Range, Willow Mountain Critical Habitat Area, Kachemak Bay Critical Habitat Area, Homer Airport Critical Habitat Area, Fox River Flats Critical Habitat Area, Tuxedni National Wildlife Refuge, Lake Clark National Park and Preserve, and Nancy Lakes State Recreation Area. Oil and gas development is prohibited in the waters of Kachemak Bay

## **B. Fish and Wildlife Uses and Value**

### **1. Commercial Fishing**

The State of Alaska has primary jurisdiction for managing fish in Alaska; this includes commercial, sport, personal use, and educational fisheries. State jurisdiction includes freshwaters, and marine waters within 3 miles of shore (Clark et al. 2006b). Article 8 of the Alaska Constitution mandates that state fish resources be managed under the sustained yield principle. The Alaska Board of Fisheries sets fishing regulations and management guidelines. Advisory committees are local groups that make recommendations to the Board; there are 81 advisory committees statewide, and nine in the Cook Inlet area. ADF&G implements regulations passed by the Board, manages the state's fisheries according to management guidelines, and provides information and recommendations on fish populations and harvest through research.

There are a few exceptions to state fisheries management. NMFS manages fisheries in federal waters, from 3 miles to 200 miles off shore, as well as most groundfish fisheries. Similar to the

Alaska Board of Fisheries, the North Pacific Fishery Management Council sets regulations and management guidelines for federal marine fisheries (Clark et al. 2006b). The USFWS, with the Federal Subsistence Board, manages subsistence fisheries on waters in which the federal government has reserved water rights.

Cook Inlet is frequently divided into two main management areas: Upper Cook Inlet and Lower Cook Inlet. The Upper Cook Inlet area includes waters north of Anchor Point; the Lower Cook Inlet area includes the remainder of Cook Inlet waters, Kachemak and Kamishak bays south to Cape Douglas, and the Barren Islands.

All five species of Pacific salmon are harvested commercially in Cook Inlet. Commercial fisheries for halibut, groundfish, herring, and razor clams also occur in Lower Cook Inlet and Kamishak Bay. Fish are delivered to docks at Anchorage, Nikiski, Ninilchik, Kenai, Kasilof and Homer for processing.

### **a. Salmon**

The most significant commercial fisheries in the Cook Inlet area are for salmon. Sockeye salmon are the most important economically, followed by coho, Chinook, chum, and pink (Shields 2007). In Lower Cook Inlet, commercial fisheries occur in four districts: Kamishak Bay; the Southern District, which includes portions of Kachemak Bay that are not included in the lease sale area; and the Outer and Eastern districts which are outside the lease sale area (Figure 5.1). In Upper Cook Inlet, commercial fisheries occur in the Central and Northern Districts. Cook Inlet districts are further divided into sub-districts. Three types of commercial fishing gear are allowed for salmon in Cook Inlet: set gillnets, drift gillnets, and seines. However, all gears are not allowed in all districts, and the locations, times, and other details of fishery prosecution are tightly controlled through fishing regulations and inseason emergency orders guided by management plans.



Drift gillnetter fishing for salmon.

ADF&G

In Cook Inlet, the east, middle, and west rip zones are important for drift gillnetting (Pettersen and Glazier 2004). Along the west side of Cook Inlet, drift gillnetting tends to follow the bottom contours around Kalgin Island to the Kalgin Island Buoy. A highly regulated area known as “the corridor” runs along the eastern shore of Cook Inlet from south of Point Nikiski to just north of Ninilchik, and three miles offshore. This area may be crowded at times with commercial fishing vessels. Most drift gillnetting occurs in relatively deep water, with shallow areas avoided because of the possibility of nets snagging and tearing (Pettersen and Glazier 2004). Defining specific patterns of fishing by location and time is not feasible because fishing strategies vary extensively across the fleet (Pettersen and Glazier 2004).

Cook Inlet commercial salmon fisheries are primarily mixed-stock, mixed-species fisheries, because the areas through which various Cook Inlet stocks and species migrate, and the timing of their migrations, overlap significantly (Shields 2007). Cook Inlet salmon harvests make up about 4 percent of the statewide catch (Clark et al. 2006a).

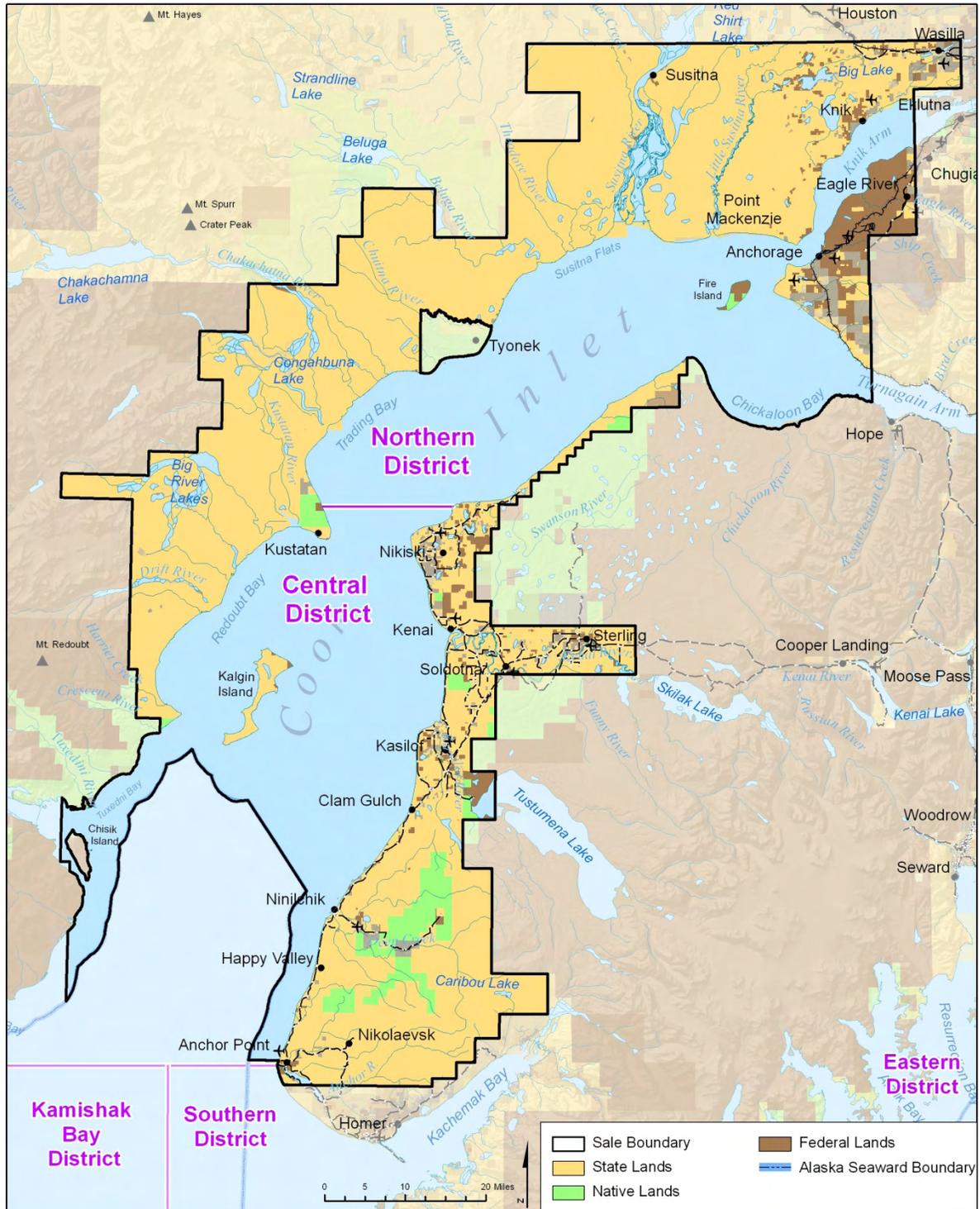


Figure 5.1. Map of commercial salmon fishing districts in the Cook Inlet area.

Since 1973, the number of participants in Alaskan salmon fisheries has been limited through the “limited entry program”. The purpose of the program is to stabilize the number of commercial fishers, and thus the total amount of fishing gear used in each fishery (Clark et al. 2006b). This type of fishery structure results in improved management effectiveness by giving managers greater ability to control the fisheries so that fish in excess of needs for spawning escapements can be harvested by the commercial fishery in an orderly and predictable manner (Clark et al. 2006b).

In 2006, 82 purse seine permits were issued for Cook Inlet, 77 held by Alaska residents and 5 held by non-residents; only 24 (about 30 percent) of the permits were fished (CFEC 2007). For the drift gillnet fishery, 570 permits were issued, 401 to residents and 169 to non-residents; 396 permits (about 70 percent) were fished. For the set gillnet fishery, 738 permits were issued, 616 to residents and 122 to non-residents; 482 permits (about 65 percent) were fished. There was little change in the number of permits issued in each fishery during the 10 years from 1997-2006: the number of purse seine permits issued varied from 81-85; drift gillnet permits from 570-582; and set gillnet from 737-745 (CFEC 2007). However, the value of permits decreased significantly, and the percent of permits not fished increased (CFEC 2007; Figure 5.2; Figure 5.3).

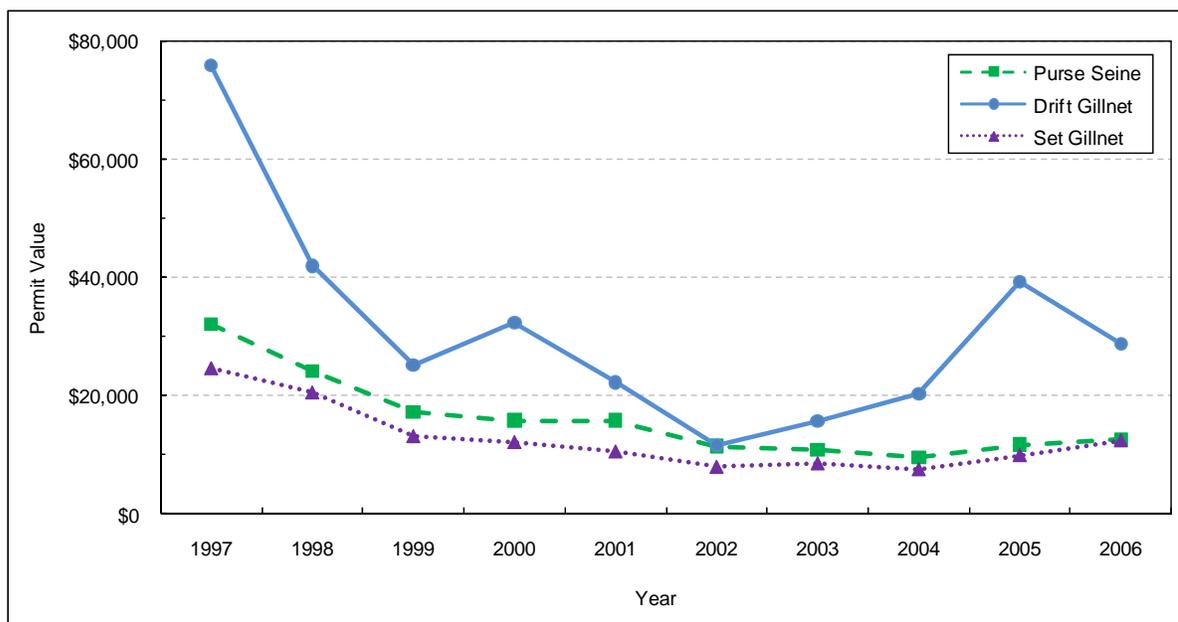
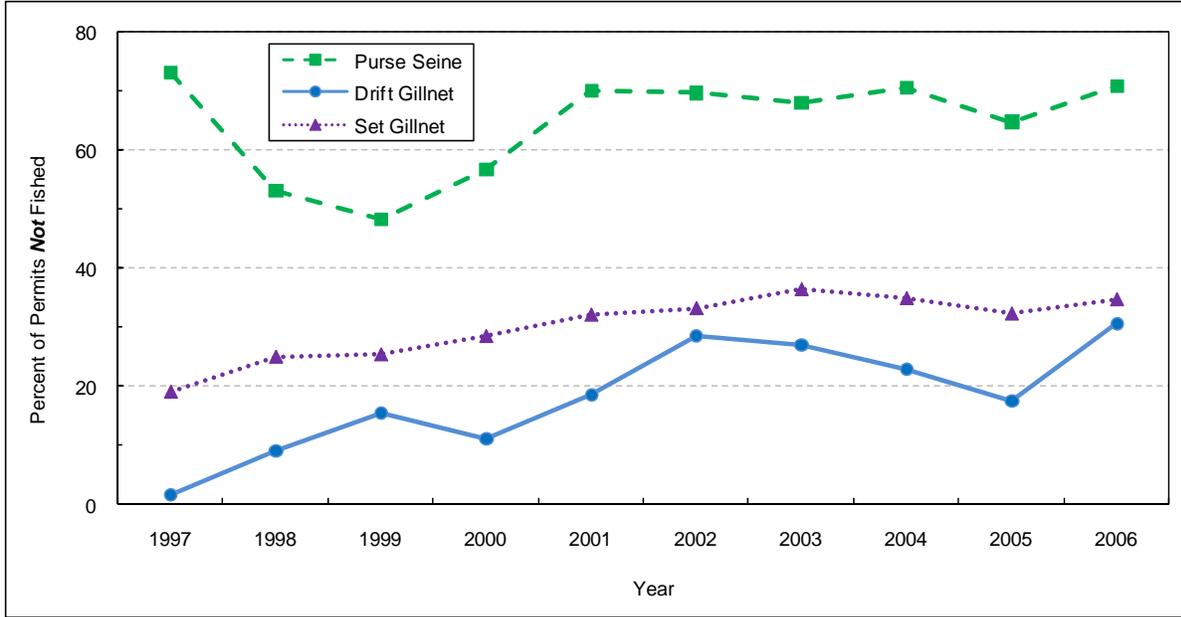


Figure 5.2. Value of Cook Inlet commercial salmon permits, 1997-2006.



**Figure 5.3. Percent of Cook Inlet commercial salmon permits not fished, 1997-2006.**

Commercial harvest and ex-vessel value of salmon in Upper Cook Inlet are dominated by sockeye salmon. In 2007, a total of about 3.7 million salmon were harvested, of which 3.3 million were sockeye; total ex-vessel value was about \$23.4 million for all salmon, and about \$21.9 million for sockeye (Shields 2007; Table 5.1). Harvest and ex-vessel value of sockeye salmon increased from 2000-2005, but decreased sharply in 2006 (Table 5.1). Pink salmon tend to bring the lowest price per pound and Chinook salmon the highest (Table 5.1).

In Lower Cook Inlet, commercial salmon harvests are generally composed predominantly of pink salmon, sockeye salmon tend to have the greatest ex-vessel value, and Chinook salmon bring the highest price per pound (Table 5.2). In 2007, pink salmon harvests were very low, not because of poor returns but because of very low prices paid for them, and in fact, almost all pink salmon escapement goals were met or exceeded in Lower Cook Inlet in 2007 (Hammarstrom et al. 2007). In 2007, total harvest of all salmon was less than 700,000, a sharp decrease from total harvest of about 1.8 million salmon in 2006; total ex-vessel value was about \$1.6 million in 2007 (Table 5.2).

**Table 5.1. Commercial harvest, ex-vessel value, and price per pound of salmon in Upper Cook Inlet, 1998-2007.**

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
<b>Harvest</b>						
1998	8,124	1,219,242	160,660	551,260	95,654	2,034,940
1999	14,383	2,680,510	125,908	16,174	174,541	3,011,516
2000	7,350	1,322,482	236,871	146,482	127,069	1,840,254
2001	9,295	1,826,833	113,311	72,559	84,494	2,106,492
2002	12,714	2,773,118	246,281	446,960	237,949	3,717,022
2003	18,490	3,476,159	101,756	48,789	120,767	3,765,961
2004	27,476	4,926,220	311,056	357,939	146,164	5,768,855
2005	28,171	5,238,168	224,657	48,419	69,740	5,609,155
2006	18,029	2,192,730	177,853	404,111	64,033	2,856,756
2007	17,625	3,316,779	177,339	147,020	77,240	3,736,003
<b>Ex-Vessel Value</b>						
1998	\$181,318	\$7,686,993	\$497,050	\$187,759	\$132,025	\$8,685,145
1999	\$337,482	\$20,095,838	\$329,164	\$5,995	\$265,026	\$21,033,505
2000	\$183,044	\$7,115,614	\$626,287	\$47,065	\$186,385	\$8,158,395
2001	\$169,593	\$7,135,690	\$297,387	\$20,312	\$111,028	\$7,734,010
2002	\$326,051	\$10,682,051	\$329,031	\$84,922	\$224,148	\$11,646,203
2003	\$358,688	\$11,659,037	\$132,079	\$8,660	\$99,850	\$12,258,314
2004	\$675,910	\$19,404,381	\$416,193	\$65,861	\$129,794	\$20,692,138
2005	\$575,082	\$31,316,655	\$720,766	\$13,971	\$101,917	\$32,728,391
2006	\$617,133	\$12,301,215	\$679,754	\$174,576	\$121,343	\$13,894,021
2007	\$629,643	\$21,916,852	\$682,747	\$53,029	\$141,097	\$23,423,367
<b>Price per Pound</b>						
1998	\$1.00	\$1.15	\$0.45	\$0.09	\$0.19	
1999	\$1.00	\$1.30	\$0.45	\$0.12	\$0.19	
2000	\$1.10	\$0.85	\$0.40	\$0.09	\$0.19	
2001	\$1.00	\$0.65	\$0.40	\$0.08	\$0.19	
2002	\$1.15	\$0.60	\$0.20	\$0.05	\$0.12	
2003	\$0.95	\$0.60	\$0.20	\$0.05	\$0.12	
2004	\$1.00	\$0.65	\$0.20	\$0.05	\$0.12	
2005	\$1.00	\$0.95	\$0.50	\$0.08	\$0.20	
2006	\$1.75	\$1.10	\$0.60	\$0.10	\$0.25	
2007	\$1.75	\$1.05	\$0.60	\$0.10	\$0.25	

Note: Ex-vessel value is the value paid to fishers; the total value of the fishery is considerably higher.  
Source: Shields 2007.

**Table 5.2 Commercial harvest, ex-vessel value, and price per pound of salmon in Lower Cook Inlet, 1998-2007.**

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
<b>Harvest</b>						
1998	1,071	284,029	16,653	1,457,819	4,647	1,764,219
1999	1,764	476,779	8,033	1,140,488	7,941	1,635,005
2000	1,188	240,932	8,203	1,387,307	73,254	1,710,884
2001	988	216,271	6,667	592,931	88,969	905,826
2002	1,553	290,654	8,329	1,970,061	43,259	2,313,856
2003	1,180	644,257	11,302	856,711	35,686	1,549,136
2004	1,658	130,083	12,426	2,517,555	206,679	2,868,401
2005	622	232,678	9,126	2,306,842	98,602	2,647,870
2006	639	224,345	32,230	1,471,578	71,954	1,800,746
2007	467	366,225	3,351	287,411	1,777	662,199
<b>Ex-Vessel Value</b>						
1998	\$20,000	\$1,224,000	\$37,000	\$712,000	\$9,000	\$2,002,000
1999	\$51,000	\$2,459,000	\$23,000	\$470,000	\$20,000	\$3,023,000
2000	\$31,000	\$1,112,000	\$19,000	\$431,000	\$192,000	\$1,786,000
2001	\$24,000	\$627,000	\$15,000	\$277,000	\$295,000	\$1,238,000
2002	\$24,000	\$817,000	\$18,000	\$441,000	\$58,000	\$1,359,000
2003	\$15,000	\$1,965,000	\$18,000	\$154,000	\$40,000	\$2,192,000
2004	\$32,000	\$503,000	\$40,000	\$352,000	\$339,000	\$1,266,000
2005	\$14,000	\$848,000	\$27,000	\$542,000	\$196,000	\$1,627,000
2006	\$19,000	\$1,018,000	\$124,000	\$576,000	\$185,000	\$1,922,000
2007	\$20,000	\$1,502,000	\$25,000	\$89,000	\$3,000	\$1,639,000
<b>Average Price per Pound</b>						
1998	\$1.45	\$0.96	\$0.36	\$0.16	\$0.27	
1999	\$1.96	\$1.22	\$0.45	\$0.16	\$0.32	
2000	\$1.86	\$0.87	\$0.60	\$0.12	\$0.28	
2001	\$1.76	\$0.62	\$0.41	\$0.15	\$0.28	
2002	\$1.11	\$0.55	\$0.33	\$0.07	\$0.16	
2003	\$1.03	\$0.60	\$0.28	\$0.06	\$0.16	
2004	\$1.56	\$0.77	\$0.47	\$0.04	\$0.20	
2005	\$1.54	\$0.86	\$0.53	\$0.07	\$0.23	
2006	\$2.25	\$1.01	\$0.54	\$0.11	\$0.31	
2007	\$2.62	\$0.91	\$0.60	\$0.10	\$0.25	

Sources: Harvest, ex-vessel value, and 2007 average price per pound from Hammarstrom et al. 2007; 1998-2006 average price per pound from Hammarstrom and Dickson 2007.

## **b. Other Commercial Fisheries**

**Pacific halibut** have been commercially harvested in Cook Inlet for many years. Halibut are managed by several different state, federal, and international agencies (ADF&G 2008f; Clark and Hare 2006; Meyer 2006; NMFS 2008; PFMC 2007). The International Pacific Halibut Commission (IPHC), created in 1923 by a convention between the U.S. and Canada, sets harvest strategies and total allowable harvest levels for the U.S. and Canada, and conducts studies on population dynamics of halibut. The North Pacific Fishery Management Council (NPFMC), a federal agency, deals with allocation issues within Alaska. The National Marine Fisheries Service (NMFS), another federal agency, manages individual fishing quotas for the commercial fishery. Although it does not have management jurisdiction over halibut, the Alaska Board of Fisheries has adopted sport fishing regulations that do not conflict with IPHC regulations to facilitate enforcement of regulations, and ADF&G monitors and conducts research on the sport fishery.

In 1995, an individual fishing quota (IFQ) system was implemented in Alaska for the commercial halibut fishery. Under this system, individual fishers are given a percentage share of the total commercial harvest that will be allowed each year. After implementation of IFQs, the commercial fishery was quickly transformed from a “derby fishery” in which the entire annual harvest was taken in a few days in chaos and danger, to a fishery that now extends through most of the year. In addition, the value of the harvest has increased, bycatch of other species has decreased, and the fishery is much less dangerous (ADF&G 2008f; Clark and Hare 2006; Meyer 2006; NMFS 2008; PFMC 2007). Including the guided (charter) sport fishery in the IFQ program has been debated for many years, but although the NPFMC has developed a framework and recommendations, a final decision has not been made yet (Alaska Sea Grant 2007).

From 1997-2006, commercial harvest of halibut ranged from about 700,000 lbs in 2000 to over one million lbs in 1997, 1998, 2004 and 2005 (Table 5.3). These harvests came from IPHC statistical area 261 which includes Kachemak Bay, which is outside the lease sale area.

**Table 5.3. Commercial harvest of Pacific halibut from Cook Inlet (IPHC statistical area 261 of Area 3A), 1997-2006.**

Year	Harvest Net wt (lbs)
1997	1,135,921
1998	1,033,844
1999	934,833
2000	706,941
2001	934,965
2002	790,775
2003	939,164
2004	1,168,140
2005	1,181,746
2006	984,662

Note: Catch is net weight pounds (head-off, dressed, ice/slime deducted); may include landings from Kachemak Bay which is not included in the lease sale area.

Source: IPHC 2008.

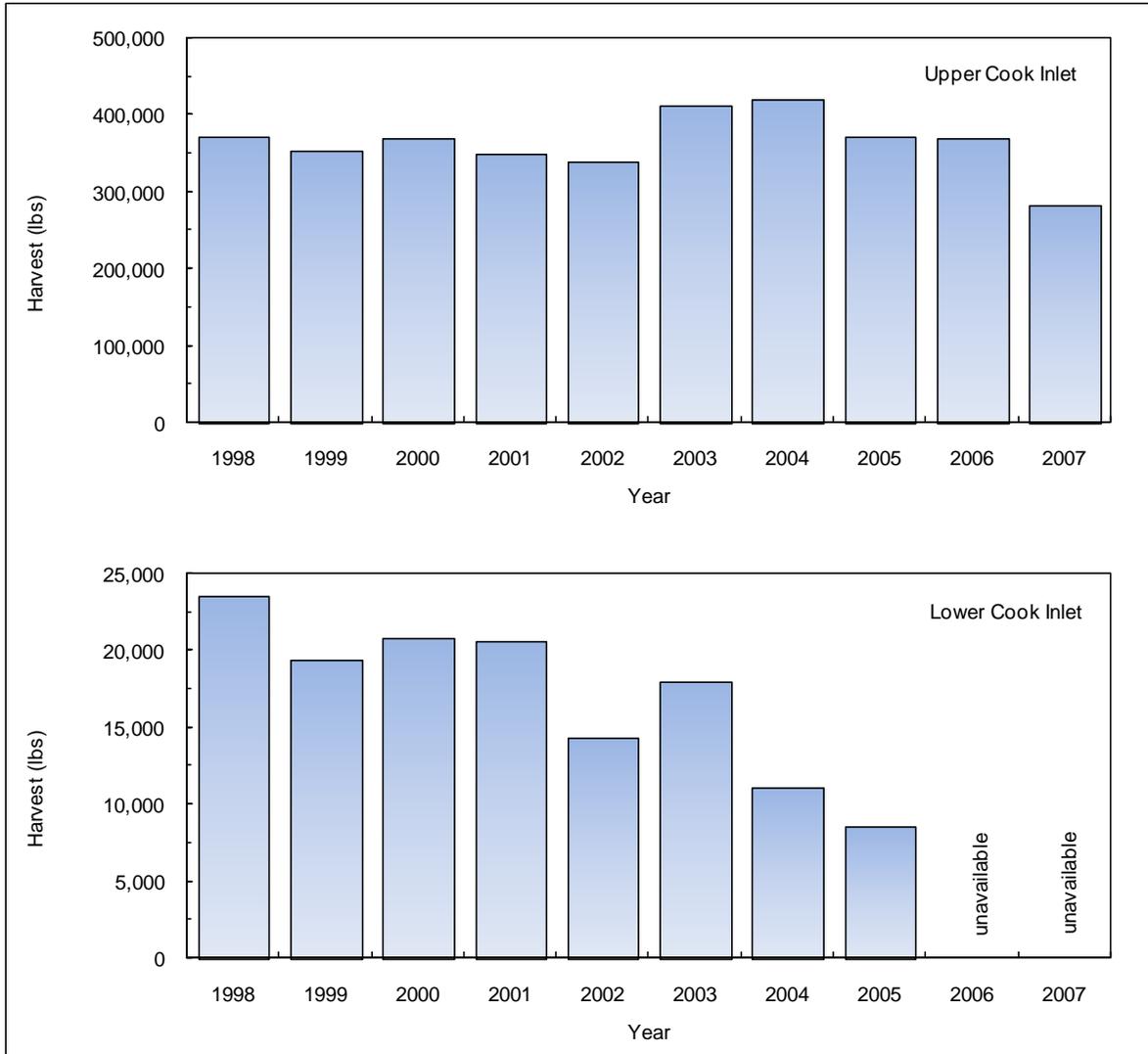
**Pacific herring** were harvested at varying levels in the Cook Inlet area from the early 1900s through the 1990s, primarily in Kamishak Bay on the west side of Lower Cook Inlet. Declines in abundance, as well as market conditions, resulted in decreased harvests, and herring fisheries in Lower Cook Inlet were completely closed in 1980-1984, and 1999 through the present (Hammarstrom et al. 2007). The commercial herring fishery in Upper Cook Inlet dates from 1973, but decreases in abundance and a shift in age structure were observed in 1988, leading to closures and additional restrictive seasons (Shields 2007). Harvest, abundance and closures have fluctuated widely. Although there is a herring management plan and commercial fisheries in several subdistricts were reopened in 2002, participation has been low (13.4 tons and 15 permit holders in 2007) (Shields 2007).

Other finfish species harvested in Cook Inlet include **lingcod**, **Pacific cod**, **sablefish**, **rockfish**, and **walleye pollock**. Harvest of these species totaled about 1.5 million pounds (round) in state-managed fisheries in 2007; ex-vessel value was about \$886,000 (ADF&G 2008a).

Several species of **clams** are harvested commercially in the Cook Inlet area. DEC is required to certify beaches for commercial clam harvest to ensure that clams are safe for human consumption (Trowbridge and Goldman 2006). Razor clams are harvested in Upper Cook Inlet, mainly from the Polly Creek area on the west side of Cook Inlet between Crescent River and Redoubt Point; beaches on the east side of Upper Cook Inlet are open to sport harvest only (Shields 2007). In Lower Cook Inlet, littleneck clams, butter clams, and cockles are harvested commercially, but all commercial harvest occurs in Kachemak Bay (Trowbridge and Goldman 2006) which is not included in the Cook Inlet lease sale area. Kachemak Bay beaches are opened for commercial clam harvests on an alternating schedule, with half the certified beaches open in even years and the other half in odd years. Commercial harvests of clams have decreased recently (Figure 5.4) because of competition with farmed clams (Trowbridge and Goldman 2006). The ex-vessel value of razor clams was \$175,000 in 2007 (Shields 2007).

**King, Tanner and Dungeness crab** stocks have been harvested in the Cook Inlet area since the early 1900s. Crab fisheries in the Cook Inlet area are managed as part of ADF&G shellfish Area H which is divided into Central, Southern (includes Kachemak Bay), Kamishak Bay, Barren Islands, Outer, and Eastern districts (Figure 5.5). The Barren Islands, Outer, and Eastern districts are outside the lease sale area; and Kachemak Bay, which is within the Southern District, is not included in the lease sale area.

Commercial fisheries for king crab in Cook Inlet began in 1937, peaking at 8 million lbs per year in the 1960s and ranging from 2.5-4.8 million lbs annually during the late 1960s and early 1970s (ADF&G 2002). Red king crab was the primary king crab species harvested commercially, and most of the harvest came from the Southern District and Kamishak/Barren Islands districts (Figure 5.5). After 1976, harvests declined and the commercial fishery was closed during the 1981-1982 season in the Southern District and during the 1983-1984 season in the Kamishak/Barren Islands districts because of low abundance, and the fishery has remained closed since. Causes for the decline in abundance and subsequent failure of the population to recover, even after the fishery has been closed for many years, are poorly understood, but overfishing and environmental conditions are considered likely explanations (ADF&G 2002). The commercial king crab fishery will remain closed until stocks recover sufficiently for a harvest strategy to be developed by the department and adopted by the Alaska Board of Fisheries (5 AAC 34.310).



Sources: Shields 2007; Trowbridge and Goldman 2006.

Notes: Upper Cook Inlet harvests are razor clams; Lower Cook Inlet harvests are littleneck clams, butter clams, and cockles. Lower Cook Inlet harvest estimates are unavailable for 2006 and 2007. Note that Upper Cook Inlet and Lower Cook Inlet scales are different.

**Figure 5.4. Commercial harvest of clams in Upper Cook Inlet and Lower Cook Inlet, 1998-2007.**

Commercial fisheries for Tanner crab developed during the mid-1960s in Kachemak Bay as they were harvested incidentally to red king crab (ADF&G 2002). However, the fishery soon expanded to other areas of Cook Inlet and harvests increased rapidly, peaking at 8.0 million lbs in 1973-1974. The commercial fishery was closed in 1989, and has remained closed since 1995 in the Southern District and since 1992 in the Kamishak Bay/Barren Islands districts (ADF&G 2002), and non-commercial fisheries have been closed since 2002 (Szarzi et al. 2007), due to low abundance. Possible causes for the collapse of the stock and its continued depression, despite many years of the fishery remaining closed, include warm ocean conditions that favor production of predators and suboptimal environmental conditions for crab larvae survival, overfishing of legal crabs, high incidental handling-induced mortality of non- and sub-legal crabs, and mortality from lost and

derelict crab fishing pots (ADF&G 2002). The Alaska Board of Fisheries adopted conditions under which the commercial Tanner crab fishery could be reopened, in particular, setting specific abundance levels (5 AAC 35.408). Trawl surveys in 2006 suggested that abundance of Tanner crabs might be increasing (Szarzi et al. 2007).

During the late 1970s, a commercial fishery for Dungeness crab developed in the Cook Inlet area, primarily in the Southern District, with harvests averaging 1.0 million lbs from 1978-1991 (Trowbridge and Goldman 2006). As with other crab fisheries in the Cook Inlet area, abundance decreased sharply, and in 1991 the commercial fishery was closed and has remained closed since. In addition to natural fluctuations, the sharp decrease in abundance is due to three primary factors: “1) depression of the stock due to handling and trapping mortality that was the result of fishing during and immediately after the molting period; 2) extremely high effort over long seasons with the resultant high annual fishing mortality due to ease of access by both commercial and recreational fishermen; 3) violation of the 150 pot limit by a portion of the fleet” (ADF&G 2002).

The Cook Inlet Area Dungeness Crab Fisheries Management Plan specifies that fisheries will not be reopened until crab stocks recover and the Alaska Board of Fisheries adopts a further management plan that addresses 14 factors such as allowable exploitation rates, biological composition of the stock, reporting requirements, and ecosystem functions (5 AAC 32.390). Despite the long-term, continued fishery closure, Cook Inlet Dungeness crab stocks remain depressed and increases in abundance are considered unlikely in the near future (Trowbridge and Goldman 2006).

**Shrimp** were harvested commercially with trawls and pots in the Cook Inlet area from 1970 through the mid-1980s, primarily in Kachemak Bay (Trowbridge and Goldman 2006) which is not included in the lease sale area. Annual harvests averaged over 5 million lbs, but abundance declined and the fishery was closed in 1987 and has remained closed since (Trowbridge and Goldman 2006). Causes for the collapse of shrimp stocks and subsequent continued lack of recovery is unknown, but it is suspected that stocks were overfished during the 1970s and 1980s, and that failure of the stocks to recover despite long-term fishery closures may be due to changing environmental conditions which could result in greater mortality of shrimp larvae, greater mortality of the forage base, and increased production of shrimp predators (ADF&G 2002). Shrimp stocks remain at low levels but show signs of recovery in some locations (Trowbridge and Goldman 2006).

**Other shellfish** species that are harvested commercially in the Cook Inlet area include weathervane scallops, octopus, green sea urchins, and sea cucumbers. Weathervane scallops are harvested from two beds located in the Kamishak Bay District, just east of Augustine Island (Figure 5.5). Development of the fishery began in 1983, harvest and participation in the fishery has been variable, and regulations and management of the fishery have become increasingly restrictive and complex (Trowbridge and Goldman 2006).

Although fisheries for octopus are closed, they are harvested incidentally to other commercial fisheries, particularly the Pacific cod pot fishery, and harvests are highly variable, ranging from 435 lbs to 48,067 lbs (Trowbridge and Goldman 2006). Small commercial fisheries for green sea urchins and sea cucumbers have also occurred in the Cook Inlet area. From 1987-1996, harvest ranged from 80 lbs to 195,403 lbs; in some years there was no participation in the fishery (Trowbridge and Goldman 2006). From 1990-1996, sea cucumbers were harvested in four years, and harvest ranged from 22,525-30,940 lbs (Trowbridge and Goldman 2006).

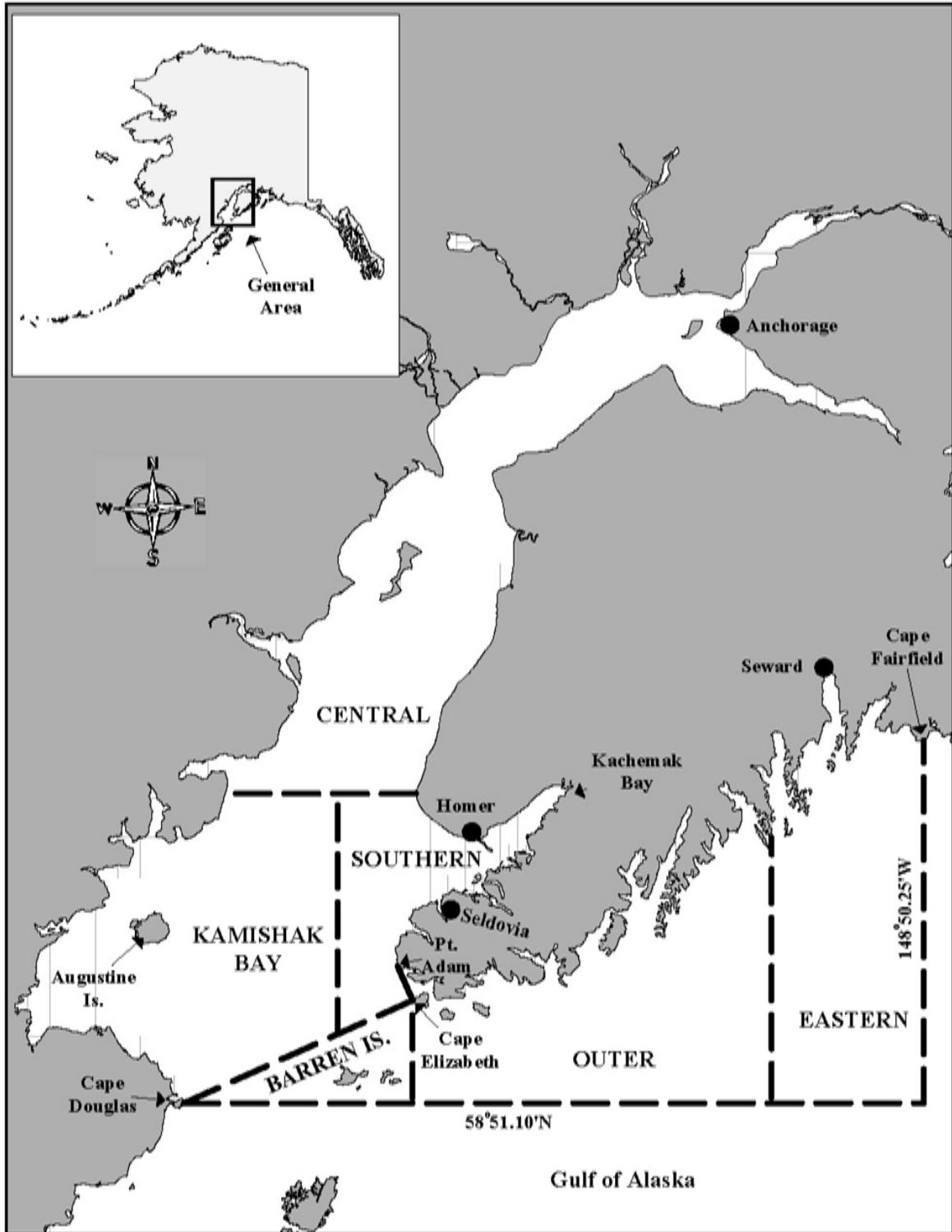


Figure 5.5. Map of the six districts of ADF&G shellfish management Area H that encompasses Cook Inlet and Prince William Sound.

In 1997, the commercial fisheries for green sea urchins and sea cucumbers, as well as other miscellaneous shellfish, were closed when the Alaska Board of Fisheries adopted the Cook Inlet Miscellaneous Shellfish Management Plan (5 AAC 38.390) which closed all commercial fisheries for miscellaneous shellfish (not including shellfish which have other plans or regulations) until the Board adopts another plan. Based on surveys conducted by ADF&G in several locations in Kachemak Bay (outside the lease sale area) in 2004 and 2005, fisheries for green sea urchins and sea cucumbers are expected to remain closed (Trowbridge and Goldman 2006).

### **c. Mariculture**

Mariculture, or the farming of shellfish in marine waters, began in Southeast Alaska in the early 1900s. In 1988, passage of the Aquatic Farm Act was intended to encourage development of an Alaskan shellfish industry that would increase competitiveness of the Alaska seafood industry (Timothy and Petree 2003). Mariculture fisheries are managed by DNR and ADF&G, but finfish farming is prohibited in Alaska. From 1997-2006, the number of farms in Southcentral Alaska (including Kodiak, Resurrection Bay and Prince William Sound in addition to Cook Inlet) ranged from 27-37, sales of oysters ranged from about \$96,000 to \$333,000; and sales of mussels ranged from about \$1,000 to \$13,000 (ADF&G 2007). In April 2004, there were 17 aquatic farms, all located in Kachemak Bay (Timothy and Petree 2003). Two shellfish nurseries in Cook Inlet provide seedstock to shellfish growers (Timothy and Petree 2003). Both are located in Kachemak Bay, which is not included in the lease sale area.

## **2. Sport Fishing**

Sport fishing is an important part of the culture and economy of the Cook Inlet area, providing recreation, food, and jobs to both residents and visitors. However, results of recent research show that people are increasingly disconnected with the outdoors, and that there is a “fundamental and pervasive shift away from nature-based recreation” (Pergams and Zaradic 2008). This shift is not restricted to just the U.S. but “extends beyond U.S. political and cultural boundaries” to other countries as well (Pergams and Zaradic 2008).



Sport angler with Chinook salmon, Cook Inlet.

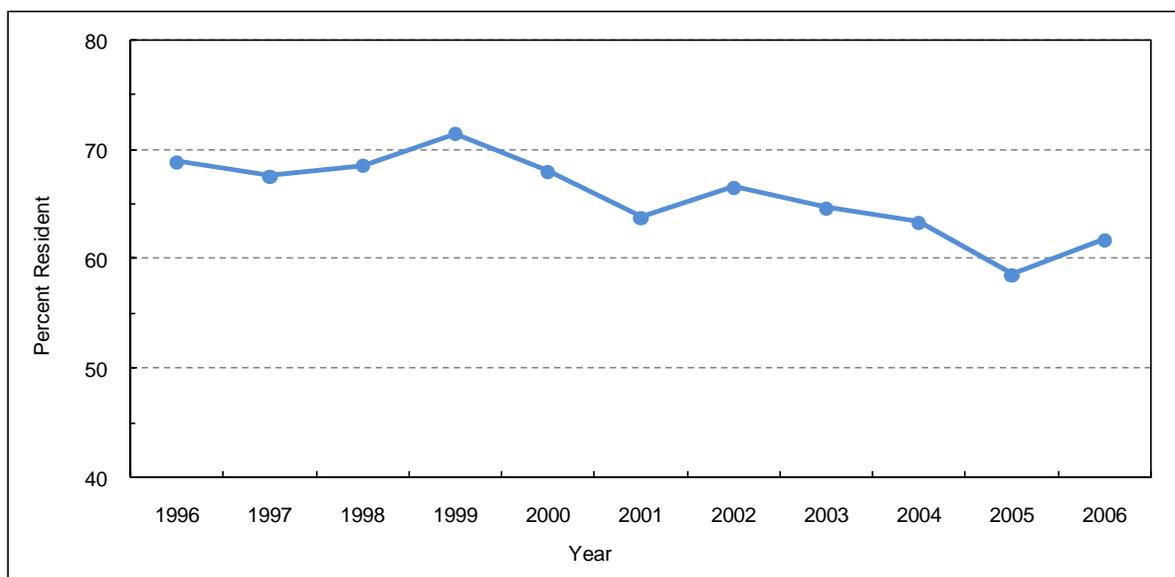
In the U.S., declining trends in sport fishing have prompted concerns that decreasing license sales will translate to decreased funding for conservation efforts and less support for policies that support conservation (Southwick Associates 2007). In Alaska, statewide decreasing sales of sport fishing licenses to Alaska residents since 1999 have caused ADF&G to be alarmed that resultant decreased revenue from license sales could affect the ability of ADF&G to effectively manage the state’s sport fisheries (Romberg 2006). In addition to decreasing license sales, the percent of resident sport fishing effort out of total effort has also decreased in Southcentral Alaska (Figure 5.6). In fact, in an effort to reverse the decline in resident anglers, ADF&G has joined a national marketing effort to increase license sales to lapsed anglers (RBF 2008).

Nationally, many studies have shown that the motivations people have for sport fishing are complex and diverse and include factors beyond simply catching fish (Fedler and Ditton 1994). In Alaska as well, research has shown that factors affecting sport fishing participation are “complex” and “multi-dimensional”, but research also indicates that crowding, and lack of interest, time, partners to fish with, and personal resources such as equipment are important constraints for many people (Romberg 2006). Specific to Southcentral Alaska, which includes the Cook Inlet area, crowding, lack of

facilities and access to fishing locations, and complicated fishing regulations are also important issues (Romberg 2006).

In the Cook Inlet area, sport fishing, as measured by effort in angler-days, increased steadily during the late 1970s through 1995 to about 1.53 million angler-days, but then decreased sharply through 1998 (Figure 5.7; Mills 1987; Howe et al. 1996; ADF&G 2008k). From 1999-2006, sport fishing peaked in 2000 at 1.46 million angler-days, but otherwise ranged from about 1.11-1.30 million angler-days. In 2006, about 50 percent of the total statewide sport fishing effort occurred in the Cook Inlet area (ADF&G 2008k).

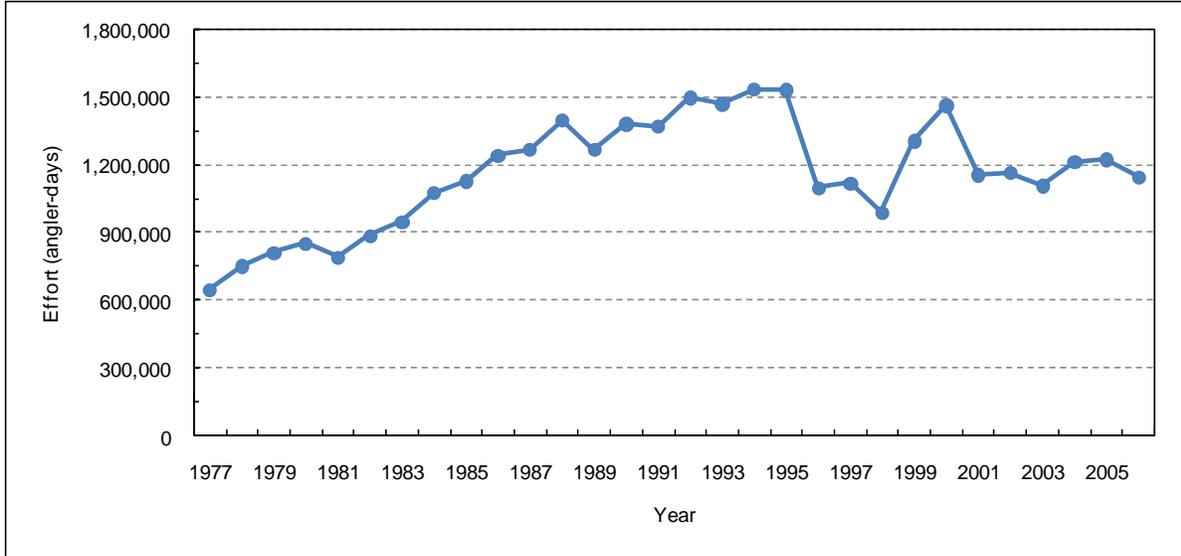
In 2006, statewide sport fishing in Alaska generated \$530 million in expenditures, \$253 million in wages and salaries, and 8,465 jobs. These expenditures rippled through the statewide economy resulting in an estimated impact of \$800 million (ASA 2006). This was a decrease from 2003 (Table 5.4). It should be noted that these estimates, which use data from the U.S. Fish and Wildlife Service’s National Survey of Fishing, Hunting and Wildlife-Associated Recreation, probably underestimate the total economic impact of sport fishing in Alaska because they do not include expenditures made outside Alaska, for example on fishing equipment that was purchased in another state but was used for fishing in Alaska (ADF&G 2008d). Current economic estimates for sport fishing specific to the Cook Inlet area are unavailable, although a study is underway by ADF&G (ADF&G 2008e).



Source: From query of online database ADF&G 2008k.<sup>1</sup>

**Figure 5.6. Percent of total sport fishing effort in Southcentral Alaska by resident anglers, 1996-2006.**

<sup>1</sup> Totals for Cook Inlet were calculated as the sum of ADF&G Statewide Harvest survey areas K (Knik Arm), L (Anchorage), E (East Susitna River Drainage), N (West Cook Inlet Drainage), and P (Kenai Peninsula). For 1996-2006, estimates for area P were calculated as the sum of subareas P0 (Kenai Peninsula Freshwater), P1 (Kenai Peninsula Saltwater non-guided), P2 (Kenai Peninsula Shellfish), P4 (Kenai River non-guided), P5 (Kenai River guided), and P6 (Kenai Peninsula saltwater guided).



Sources: Estimates for 1977-1986 from Mills 1987; 1987-1995 from Howe et al. 1996; 1996-2006 from query of online database ADF&G 2008k.<sup>1</sup>

**Figure 5.7. Sport fishing effort (angler-days) in the Cook Inlet area, 1977-2006.**

**Table 5.4. Economic impact of sport fishing in Alaska in 2001, 2003, and 2006.**

Year	Retail Sales	Output	Wages and Salaries	Jobs
2001	\$587,028,597	\$959,821,921	\$238,011,311	11,064
2003	\$640,167,515	\$1,046,706,782	\$259,556,537	12,065
2006	\$530,165,682	\$800,921,744	\$252,957,398	8,465

Sources: ASA 2001, 2003, 2006.

Notes: Estimates use data from the U.S. Fish and Wildlife Service's National Survey of Fishing, Hunting and Wildlife-Associated Recreation, and probably underestimate the total economic impact of sport fishing in Alaska because they do not include expenditures made outside Alaska (ADF&G 2008d).

An Alaska sport fishing license is generally required to sport fish in Alaska. License fees are more expensive for non-residents: for example, an annual license is \$24 for residents and \$140 for non-residents. Anglers under 16 years old are not required to have a license, and Alaska residents age 60 and older may apply for a free permanent identification card that replaces the fishing license; these anglers may be required to carry and fill out a free harvest record card for some fisheries. In addition to a fishing license, anglers fishing for Chinook (king) salmon must also purchase a king salmon stamp at an additional cost of \$10 for residents and \$100 for non-residents (ADF&G 2008g).

State of Alaska fishing regulations allow proxy fishing to provide food for Alaska residents who are unable to harvest fish for themselves. Only Alaska residents who are at least 65 years old, who are legally blind, or who are 70 percent or greater disabled are allowed to designate a proxy, and the proxy fisher must also be a licensed Alaska resident. A proxy form, certified by ADF&G, is

required. In 2007, proxies were certified for almost 3,000 elderly or disabled Alaskans in Southcentral (Table 5.5; ADF&G 2008c).

Many sport anglers, particularly non-residents, utilize the services of sport fishing guides and charters. The guided fishing industry provides significant economic benefits to Alaska and the Cook Inlet area by providing jobs and supporting tourism. Sport fishing guides are required to be licensed, and must meet minimum professional standards such as first aid, U.S. Coast Guard operator's license, business license, and proof of insurance (ADF&G 2008i). In 2007, over 1,500 guides were licensed in Southcentral (Table 5.6).

ADF&G, Division of Sport Fish operates a hatchery program to ensure adequate numbers of salmon and other species are available to meet sport fishing needs, and to protect wild fish stocks by providing alternate sport fishing opportunities (ADF&G 2008j). Over 1 million Chinook salmon were scheduled to be stocked in the Cook Inlet area in 2008 (ADF&G 2008i). Stocked Chinook salmon fisheries include Willow Creek in the Matanuska-Susitna area; the Eklutna Tailrace and Ship Creek in Anchorage; and the Kasilof River, Crooked Creek and the Ninilchik River on the Kenai Peninsula (ADF&G 2008i). Homer Spit, Halibut Cove, and Seldovia Bay, located outside the lease sale area, are also stocked. About 777,000 coho salmon were scheduled to be stocked, including fisheries at the Eklutna Tailrace, and Bird, Campbell, and Ship creeks in the Anchorage area; and Homer Spit (outside the lease sale area). In addition, about 750,000 rainbow trout and other non-anadromous species are stocked in many lakes throughout the Cook Inlet area, including about 75 lakes in the Matanuska-Susitna area, about 17 lakes in the Anchorage area, and about 30 lakes on the Kenai Peninsula (ADF&G 2008i).

Although sport fisheries occur on many species throughout the fresh and marine waters of the Cook Inlet area, particularly prominent fisheries include wild salmon on tributaries of the Susitna River; wild coho salmon on the Little Susitna River and Knik Arm tributaries; stocked Chinook and coho salmon at Ship Creek and Bird Creek in the Anchorage area; wild Chinook, coho, and sockeye salmon on the Kenai, Russian, Anchor, and Kasilof rivers of the Kenai Peninsula; stocked rainbow trout in lakes throughout the Cook Inlet area; halibut in marine waters; and clams from beaches of Lower Cook Inlet. From 1997-2006, sport harvest for all species of salmon, including stocked landlocked salmon, varied between about 600,000 and 800,000 salmon (Figure 5.8). Harvest of halibut varied between about 150,000 and 250,000 fish (Figure 5.8). Detailed harvest by site and species is available in ADF&G Statewide Harvest Survey reports (for example, see Jennings et al. 2007 for the most recent published report).

**Table 5.5. Number of sport fish proxies issued in Southcentral Alaska, 2007.**

Beneficiary Residence	Proxies Issued
Mat-Su	609
Anchorage	1,742
Kenai Peninsula	584
<b>Total</b>	<b>2,935</b>

Source: ADF&G 2008c.

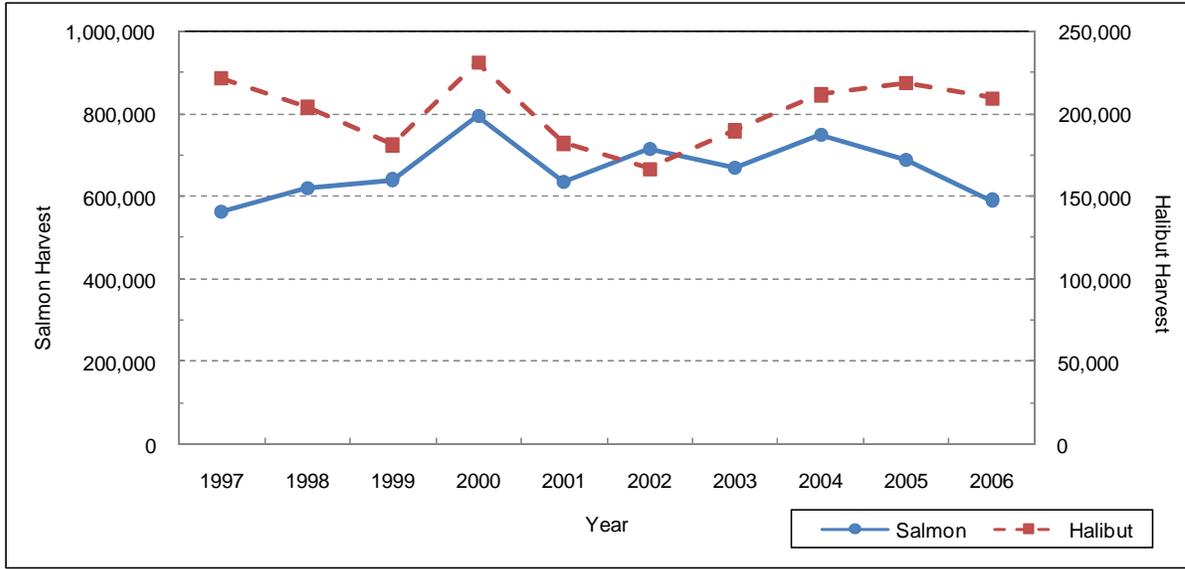
**Table 5.6. Number of registered or licensed guides in Southcentral Alaska and Cook Inlet, 1998-2007.**

Year	Southcentral Guides <sup>a</sup>	Active Guides in Cook Inlet <sup>b</sup>
1998	1,850	
1999	1,963	
2000	2,052	
2001	2,144	
2002	2,227	
2003	2,236	
2004	2,262	
2005	1,429	871 <sup>c</sup>
2006	1,521	1,001
2007	1,560	1,042

<sup>a</sup> Includes any person who was registered (prior to 2004) or licensed (after 2004) to guide with a permanent mailing address in Southcentral Alaska. This includes people registered or licensed as guides, and people registered or licensed as business/guide, as both groups are eligible to guide.

<sup>b</sup> Active guides in Cook Inlet includes licensed guides and business/guides that guided at least one trip in Cook Inlet in the year indicated. Cook Inlet is defined as ADF&G Sport Fish Division Statewide Harvest Survey Areas L, K, M, N and P. Includes all guides who guided a trip in Cook Inlet waters regardless of their permanent mailing address. Active guides can only be calculated back to 2005 because freshwater trip information was not collected prior to 2005.

<sup>c</sup> In 2005, the guide program changed from a registration requirement with no cost to guides, to a license program in which guides were required to pay a fee and meet minimum insurance and first aid requirements.



Sources: ADF&G 2008k.

**Figure 5.8. Harvest of salmon (all species) and halibut in the Cook Inlet area, 1997-2006.**

### 3. Personal Use Fishing

Personal use salmon fisheries in the Cook Inlet area are an important source of food for many Alaskans. These fisheries were authorized by the Alaska Board of Fisheries in 1982 as a substitute for subsistence fisheries for Alaska residents in urban areas where subsistence fishing is not allowed. Creation of these fisheries culminated from lengthy legal battles concerning definitions of subsistence, who had subsistence fishing rights in Alaska, where subsistence fishing could occur, and conflicts over state and federal fishery jurisdiction that resulted from discrepancies between the Alaska Constitution and the federal Alaska National Interest Lands Conservation Act. Four personal use fisheries were established in the Cook Inlet area: Kasilof River set gillnet, Kasilof River dip net, Kenai River dip net, and Fish Creek dip net. The Fish Creek dip net fishery has been closed since 2002 because of low numbers of sockeye salmon returning to the creek. An additional personal use set gillnet fishery is authorized for Kachemak Bay in Lower Cook Inlet; this fishery is outside the Cook Inlet lease sale area.



Personal use dip net fishery, Kenai River.

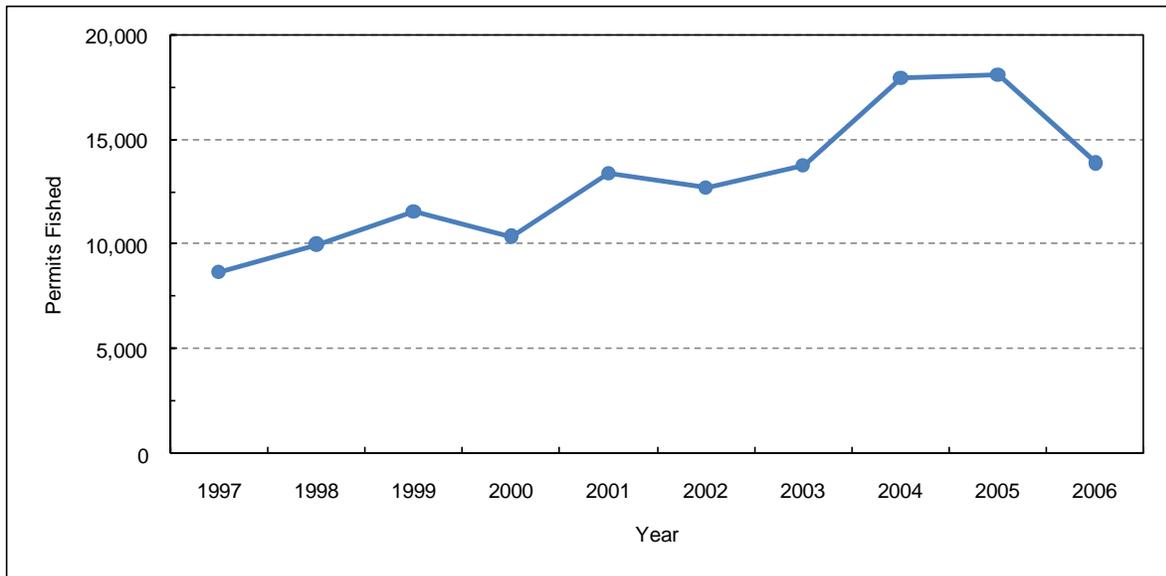
ADF&G

The primary purpose of personal use fisheries is to allow Alaskans to harvest fish for food. Therefore, regulations are structured to make harvesting highly efficient. Gear consists of dip nets or gillnets. Harvest limits are generous and based on household size. Households are allowed an annual limit of 25 fish for the first member and an another 10 fish for each additional member; thus the annual limit for a household of four is 55 salmon (Dunker and Lafferty 2007; Hammarstrom and

Dickson 2007). Only Alaska residents may participate in these fisheries. A free personal use permit is required, issued to the household, and participants must have an Alaska sport fishing license or permanent identification card if they are 16 years old or older.

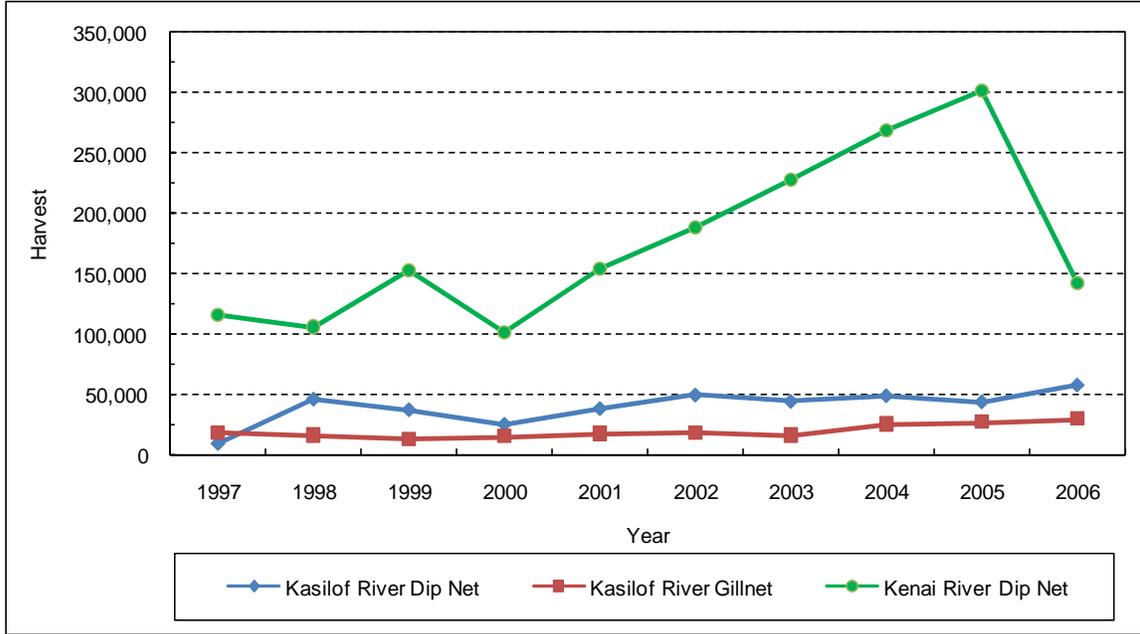
From 1997-2006, up to 18,000 Alaskan households were issued permits and fished in Upper Cook Inlet personal use fisheries (Figure 5.9). Harvest in these fisheries increased steadily through 2005 when a total of about 377,000 salmon were harvested (Figure 5.10). Harvests were composed primarily of sockeye salmon (97-99 percent in most years), and most of the harvest came from the Kenai River dip net fishery (Reimer and Sigurdsson 2004; Dunker and Lafferty 2007). The lower harvest in 2006 was a result of unusually late timing of the Kenai River sockeye salmon run and subsequent emergency closures of the fishery (Dunker and Lafferty 2007).

The number of permits fished in the Kachemak Bay set gillnet fishery decreased from 185 in 1997 to 62 in 2006, and total harvest of salmon also decreased (Figure 5.11; Figure 5.12). This fishery targets coho salmon, and the harvest was composed of 68-86 percent coho salmon (Hammarstrom and Dickson 2007).



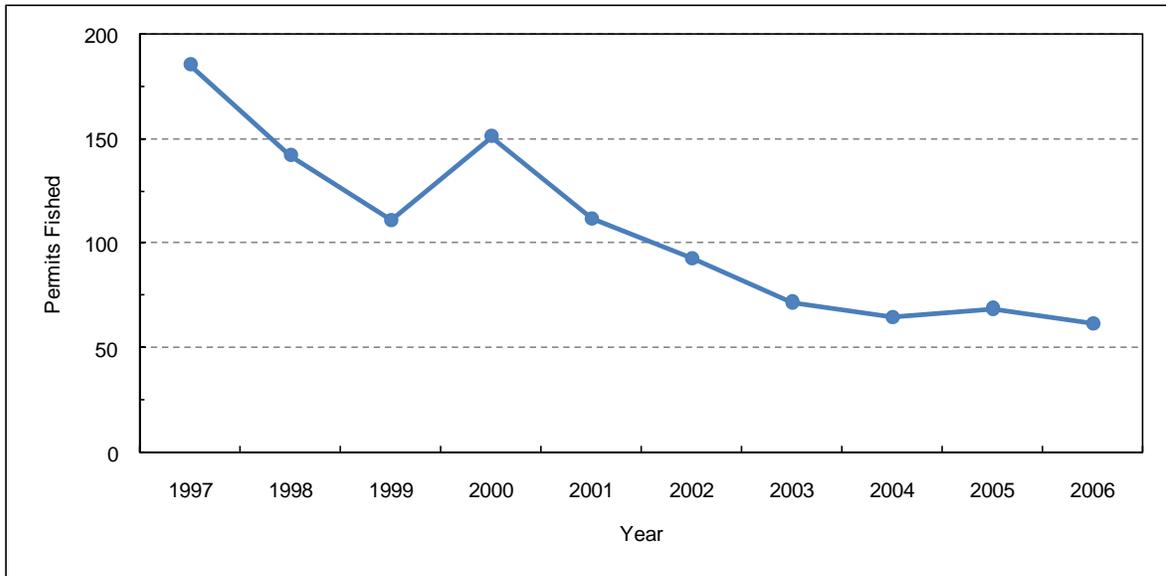
Sources: 1997-2003 Reimer and Sigurdsson 2004; 2004-2006 Dunker and Lafferty 2007.

**Figure 5.9. Number of permits that were issued and fished in Cook Inlet personal use fisheries, 1997-2006.**



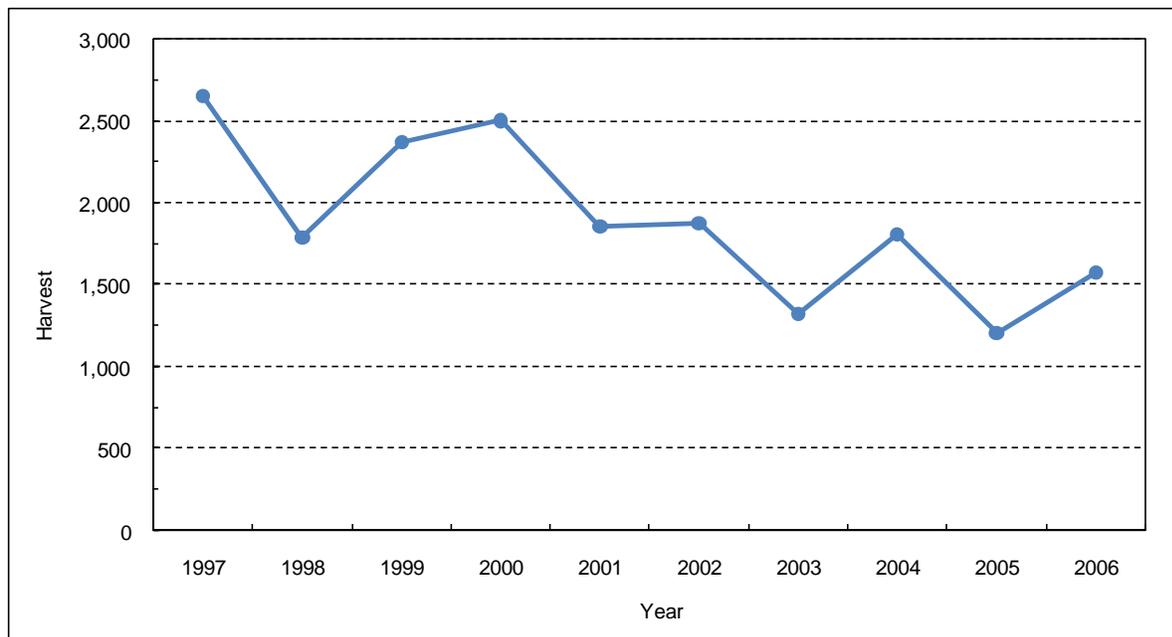
Sources: 1997-2003 Reimer and Sigurdsson 2004; 2004-2006 Dunker and Lafferty 2007.

**Figure 5.10. Harvest of salmon in three personal use fisheries in Cook Inlet, 1997-2006.**



Source: Hammarstrom and Dickson 2007.

**Figure 5.11. Permits fished in the set gillnet personal use fishery in Kachemak Bay, 1997-2006.**



Source: Hammarstrom and Dickson 2007.

**Figure 5.12. Harvest of salmon in the set gillnet personal use fishery in Kachemak Bay, 1997-2006.**

#### 4. Educational Fishing

Educational fisheries also originated out of the lengthy legal battles concerning subsistence in Alaska (Nelson et al. 1999). The first educational fishery was ordered by the Alaska Superior Court in 1993 for the Kenaitze Tribe on the Kenai Peninsula. The Alaska Board of Fisheries defined and set conditions for educational fisheries in 5 AAC 93.200-220, which specifies that educational fishery programs must have: instructors who are qualified to teach the subject matter; enrolled students; minimum attendance requirements; procedures for testing a student's knowledge of the subject matter or the student's proficiency in performing learned tasks; and standards for successful completion of the program. Educational fisheries require a permit that is issued by ADF&G and permittees are required to report the number and species of fish harvested, along with other fishery information.

In 2007, two educational fisheries in Lower Cook Inlet, operated by the Ninilchik Tribal Council and Ninilchik Native Descendants, harvested about 2,500 salmon (Szarzi et al. 2007). The most recent published data are for 2001 for Upper Cook Inlet (Gamblin et al. 2004) and 2002 for Northern Cook Inlet (Sweet et al. 2003). In Upper Cook Inlet, one educational fishery was operated, the Kenaitze Indian Tribe Educational Fishery, which harvested about 4,300 salmon. In Northern Cook Inlet, two educational fisheries, operated by the Knik Tribal Council and the Eklutna Native Village, harvested a total of about 1,100 salmon.

#### 5. Sport Hunting and Trapping

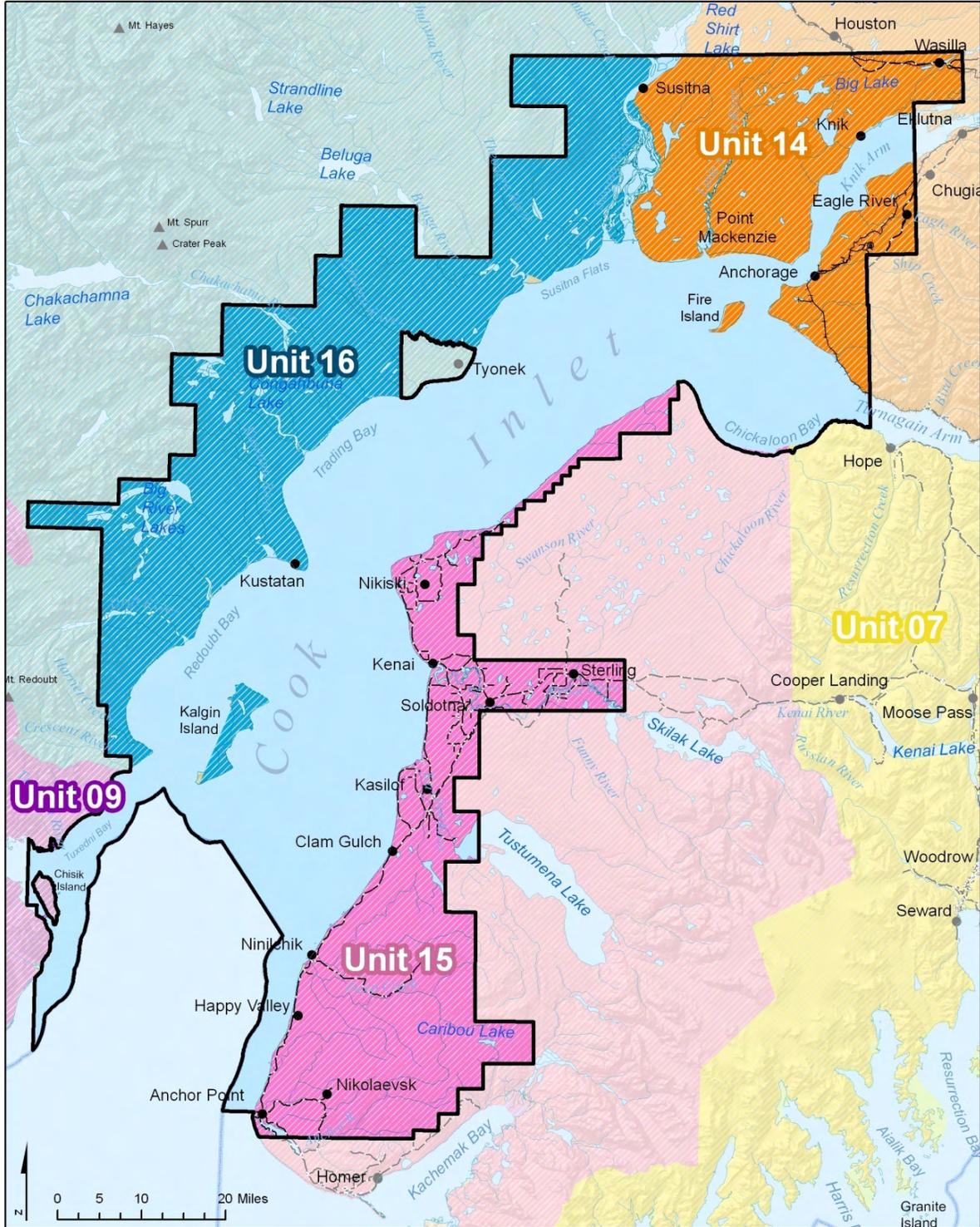
ADF&G manages and monitors sport harvest of wildlife in the Cook Inlet area, which encompasses most or parts of three game management units (GMUs), 14, 15, and 16, and a small portion of GMU 9a (Figure 5.13). Harvests are estimated by management year which is defined as July 1 through June 30, or by calendar year. Estimates of the number of hunters in the Cook Inlet area are

unavailable, but in 2001, there were 93,000 hunters 16 years old and older in Alaska; 72,000 were Alaska residents and 21,000 were non-residents (USFWS and USCB 2003). Hunters spent an estimated \$217 million on hunting trips, equipment, and other related expenditures in Alaska in 2001 (USFWS and USCB 2003).

Hunters and trappers harvest large and small mammals, furbearers, and waterfowl in the Cook Inlet area. During management year 2005-2006, hunters harvested an average of 563 black bears, 131 brown bears, and 1,512 moose from management units 14, 15, and 16, as well as mountain goats, sheep, wolves and caribou (Table 5.7). An average of 494 beavers, 112 land otters, 113 lynx, 28 wolverines, and 127 marten were harvested from the three GMUs (Table 5.8).

Waterfowl are harvested at several locations within the Cook Inlet lease sale area. Harvest of waterfowl, and hunting pressure (or “effort”) as measured by hunter days, were estimated by ADF&G through 1997 with a statewide hunter survey using a postal questionnaire; the survey provided estimates of harvest and effort by region and location (ADF&G 2008m). Beginning in 1998, Alaska joined the national Harvest Information Program that provided better estimates of harvest at the statewide level, but harvest estimates were no longer available at the regional and local levels. Therefore, harvest of waterfowl and hunting effort estimates specific to the Cook Inlet area are not available after 1997. However, harvest and effort levels prior to 1998 can be assumed to be reasonably representative of current levels, with the caveat that the number of hunters increased through 1975 as a result of an influx of workers on the Trans-Alaska Pipeline; and the number of hunters declined from 1988-1995 because of low duck populations and resultant hunting restrictions (ADF&G 2008m).

From 1971-1998, total annual harvest of ducks from three state game refuges in the Cook Inlet area (Palmer Hay Flats, Susitna Flats, and Trading Bay) ranged from 10,039-32,220 ducks and averaged 17,667 ducks (Figure 5.14). Hunter effort ranged from 4,960-17,134 hunter days and averaged 8,909 (Figure 5.15). For all of Cook Inlet, harvest ranged from 18,913- 56,899 ducks, average 31,683; 226-4,348 geese, average 1,658; 16-550 sandhill cranes, average 135; 353-4,146 common snipe, average 1,132; and 21,832-67,549 migratory birds combined, average 36,243 birds (Figure 5.16, Figure 5.17, Figure 5.18, Figure 5.19, Figure 5.20).



Source: ADF&G 2008b.

Figure 5.13. Map of ADF&G game management units in the Cook Inlet area.

**Table 5.7. Harvest of large mammal game species in ADF&G game management units (GMU) 14, 15, and 16, by management year (July 1 – June 30).**

GMU	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	5 Year Average
<b><u>Black Bear</u></b>						
14	105	135	143	172	170	145
15	247	179	196	176	293	218
16	<u>160</u>	<u>186</u>	<u>224</u>	<u>208</u>	<u>220</u>	<u>200</u>
Total	512	500	563	556	683	563
<b><u>Brown Bear</u></b>						
14	21	20	26	14	22	21
15	12	14	9	9	9	11
16	<u>88</u>	<u>70</u>	<u>91</u>	<u>126</u>	<u>126</u>	<u>100</u>
Total	121	104	126	149	157	131
<b><u>Moose</u></b>						
14	539	702	760	636	689	665
15	610	479	572	485	498	529
16	<u>308</u>	<u>258</u>	<u>399</u>	<u>358</u>	<u>269</u>	<u>318</u>
Total	1,457	1,439	1,731	1,479	1,456	1,512
<b><u>Mountain Goat</u></b>						
14	26	33	44	27	11	28
15	<u>27</u>	<u>29</u>	<u>23</u>	<u>20</u>	<u>28</u>	<u>25</u>
Total	53	62	67	47	39	54
<b><u>Sheep</u></b>						
14	96	120	111	119	115	112
15	16	17	20	16	10	16
16	<u>11</u>	<u>7</u>	<u>9</u>	<u>10</u>	<u>2</u>	<u>8</u>
Total	123	144	140	145	127	136
<b><u>Wolf</u></b>						
14	21	32	27	31	14	25
15	30	33	42	38	23	33
16	<u>88</u>	<u>47</u>	<u>70</u>	<u>127</u>	<u>60</u>	<u>78</u>
Total	139	112	139	196	97	137
<b><u>Caribou (by herd)</u></b>						
Kenai Mtns	23	21	22	19	19	21
Killy River	<u>53</u>	<u>46</u>	<u>17</u>	<u>12</u>	<u>3</u>	<u>26</u>
Total	76	67	39	31	22	47

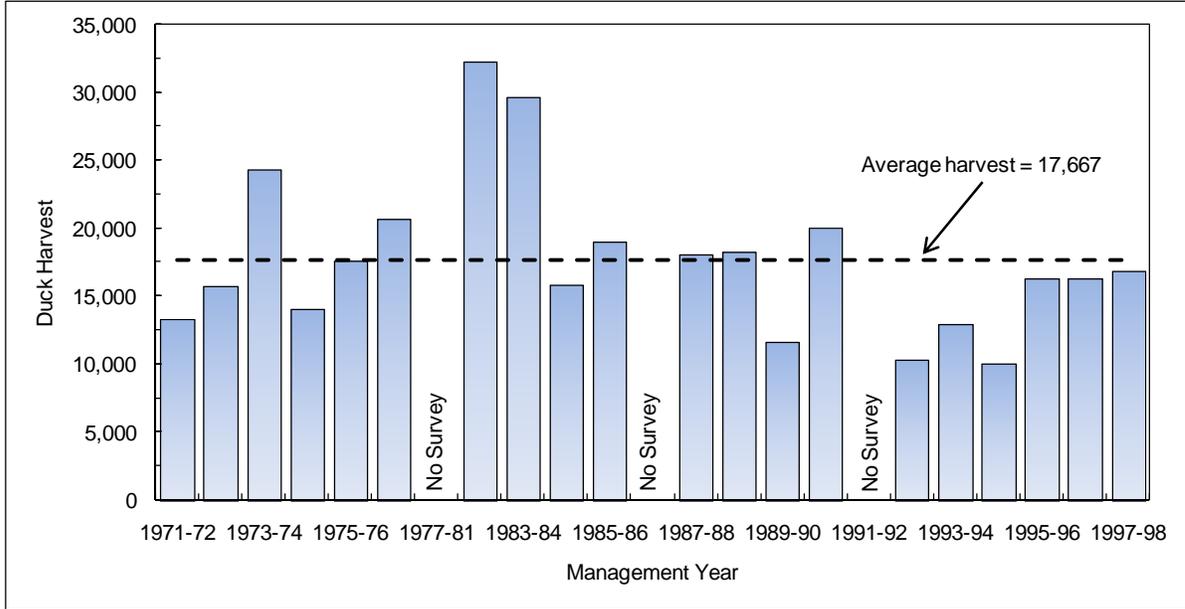
Source: ADF&amp;G 2006.

Notes: Estimates provided in this table are qualified by the following statement: "Most of these harvest totals do not include unreported harvest which may be substantial and can even exceed the reported harvest for black bear where sealing is not required, or for certain caribou herds. In addition most harvest totals do not include harvest from federal hunts. Information is from the harvest/sealing files posted on 7/31/06 by Information Management. Some of the numbers for caribou...are estimated harvest provided by area biologists. The harvest totals for the 2005-2006 regulatory year are considered preliminary" (ADF&G 2006).

**Table 5.8. Harvest of furbearer species in ADF&G game management units (GMU) 14, 15, and 16, by management year (July 1 – June 30).**

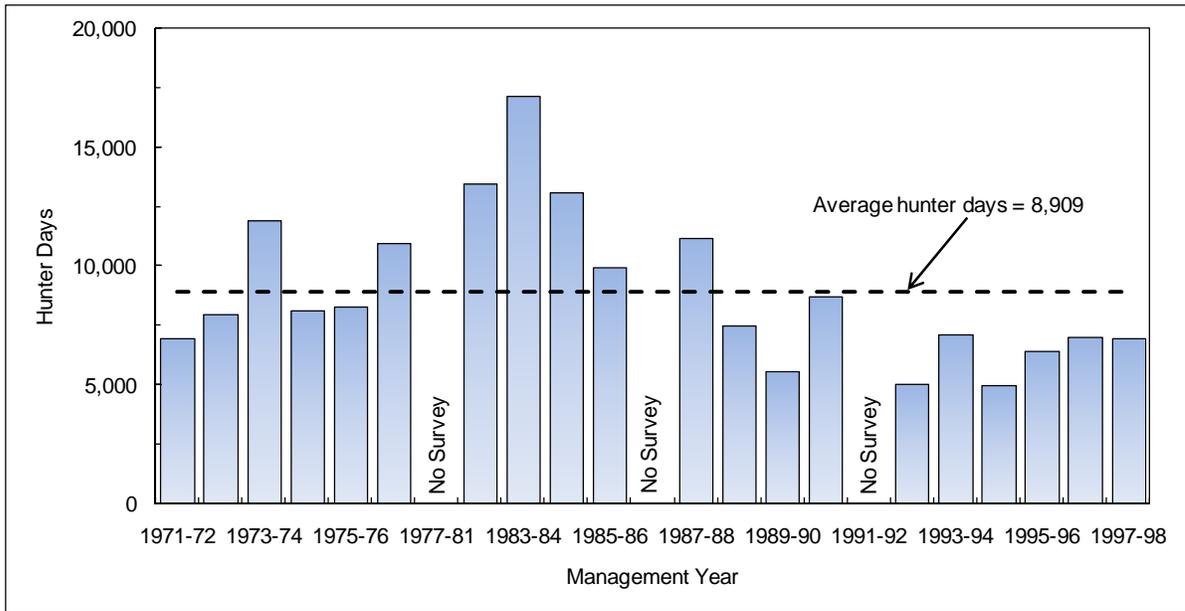
GMU	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	5 Year Average
<b>Beaver</b>						
14	192	173	241	147	219	194
15	65	94	171	94	134	112
16	<u>115</u>	<u>173</u>	<u>196</u>	<u>163</u>	<u>294</u>	<u>188</u>
Total	372	440	608	404	647	494
<b>Land Otter</b>						
14	33	30	32	32	53	36
15	33	33	37	27	41	34
16	<u>18</u>	<u>42</u>	<u>32</u>	<u>60</u>	<u>56</u>	<u>42</u>
Total	84	105	101	119	150	112
<b>Lynx</b>						
14	4	9	45	47	33	28
15	119	130	82	59	8	80
16	<u>1</u>	<u>2</u>	<u>2</u>	<u>16</u>	<u>6</u>	<u>5</u>
Total	124	141	129	122	47	113
<b>Wolverine</b>						
14	6	5	11	12	1	7
15	5	3	3	7	0	4
16	<u>12</u>	<u>20</u>	<u>17</u>	<u>28</u>	<u>11</u>	<u>18</u>
Total	23	28	31	47	12	28
<b>Marten</b>						
14	62	74	131	128	70	93
15	0	0	0	1	0	0
16	<u>33</u>	<u>31</u>	<u>29</u>	<u>40</u>	<u>35</u>	<u>34</u>
Total	95	105	160	169	105	127

Sources: Kavalok 2004a, b; Selinger 2004.



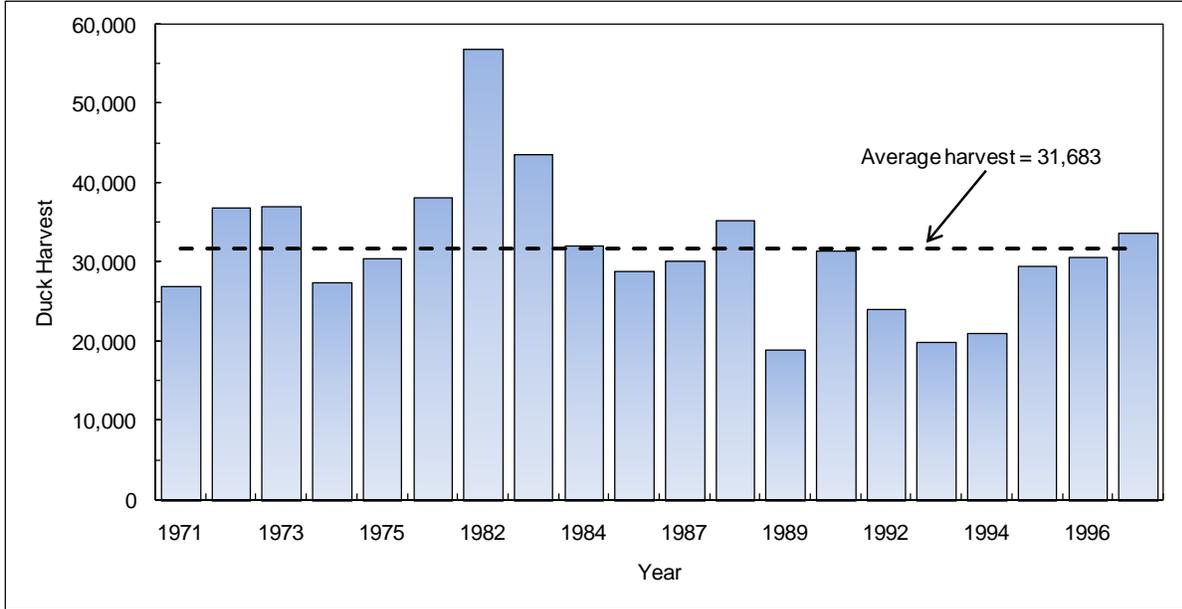
Source: ADF&G 2008m.

**Figure 5.14. Harvest of ducks on three state game refuges in the Cook Inlet area, for management years 1971-1972 through 1997-1998.**



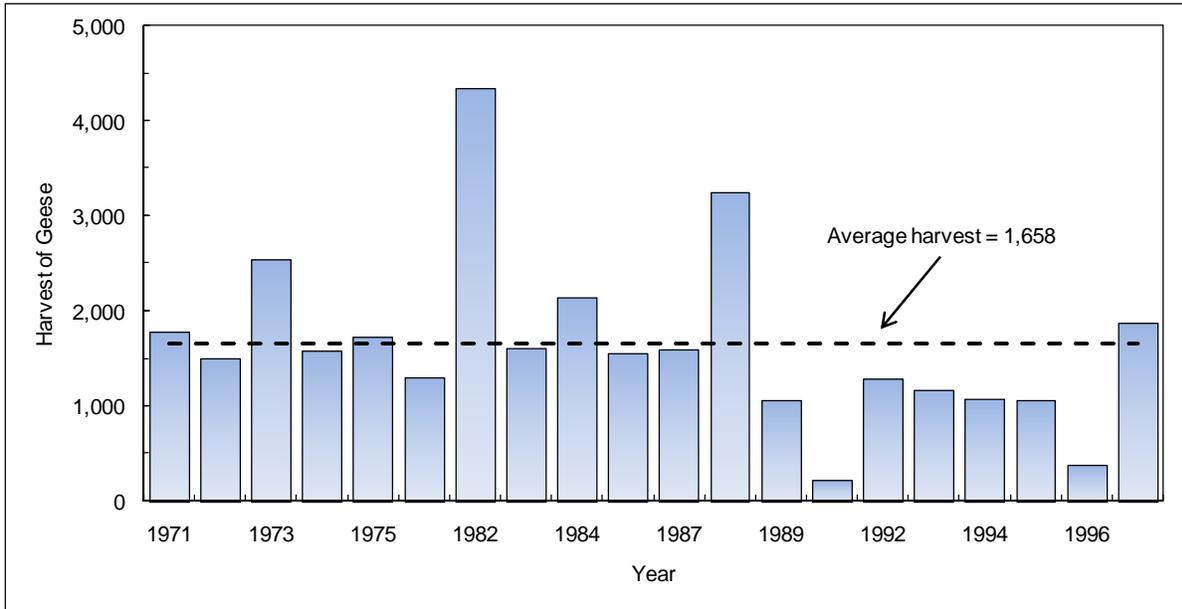
Source: ADF&G 2008m.

**Figure 5.15. Effort, as measured in hunter days, for ducks on three state game refuges in the Cook Inlet area, for management years 1971-1972 through 1997-1998.**



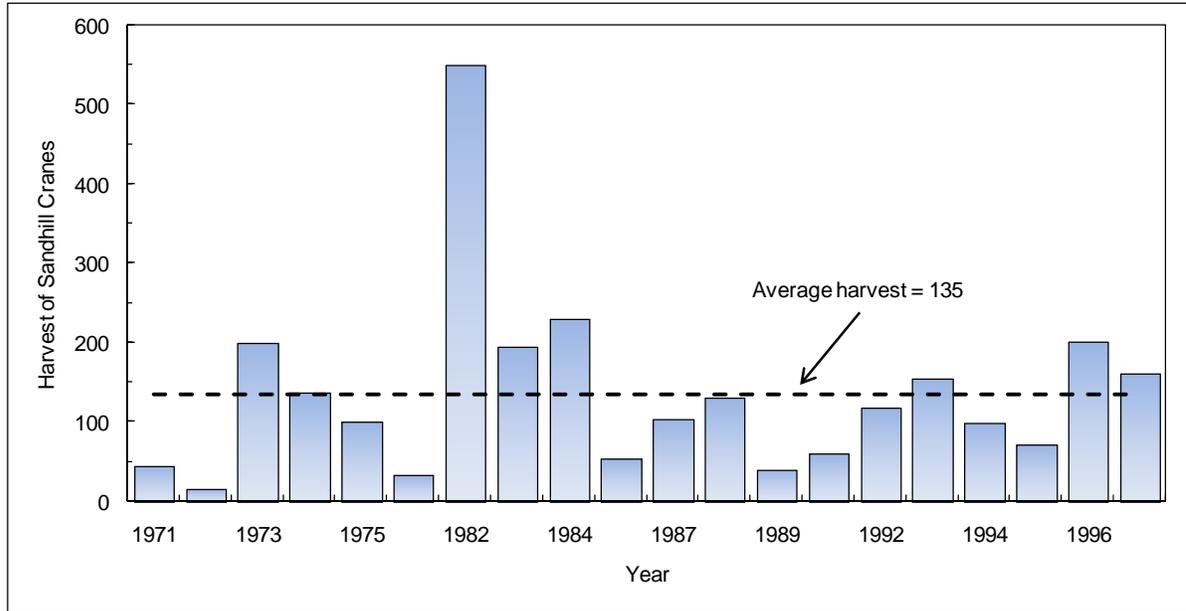
Source: ADF&G 2008m.

Figure 5.16. Total harvest of ducks from the Cook Inlet area, 1971-1997.



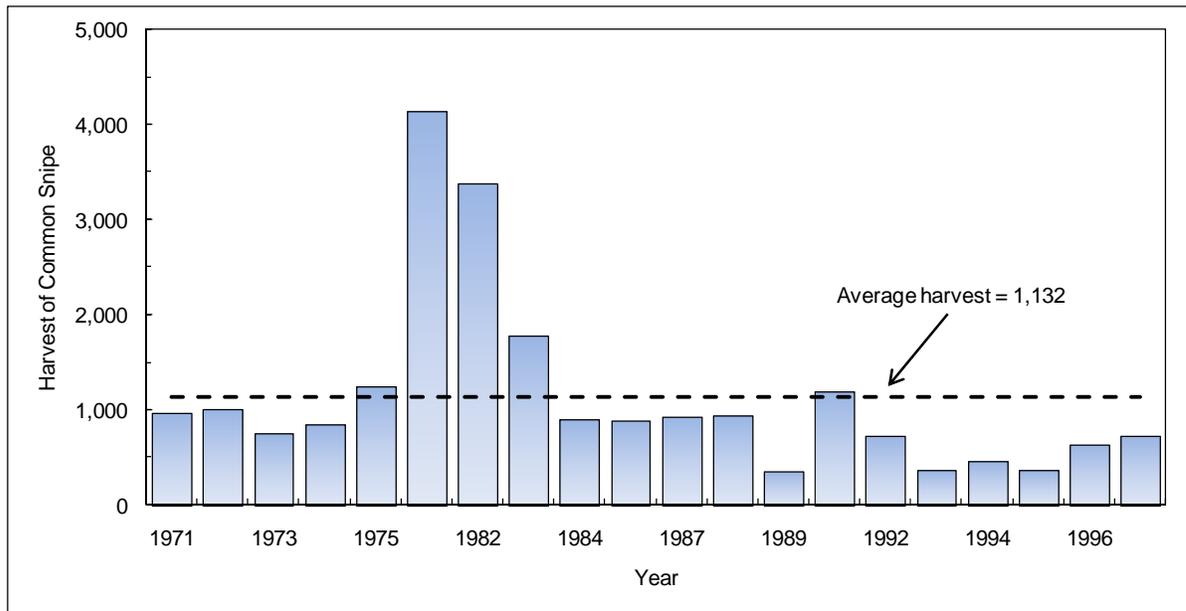
Source: ADF&G 2008m.

Figure 5.17. Total harvest of geese from the Cook Inlet area, 1971-1997.



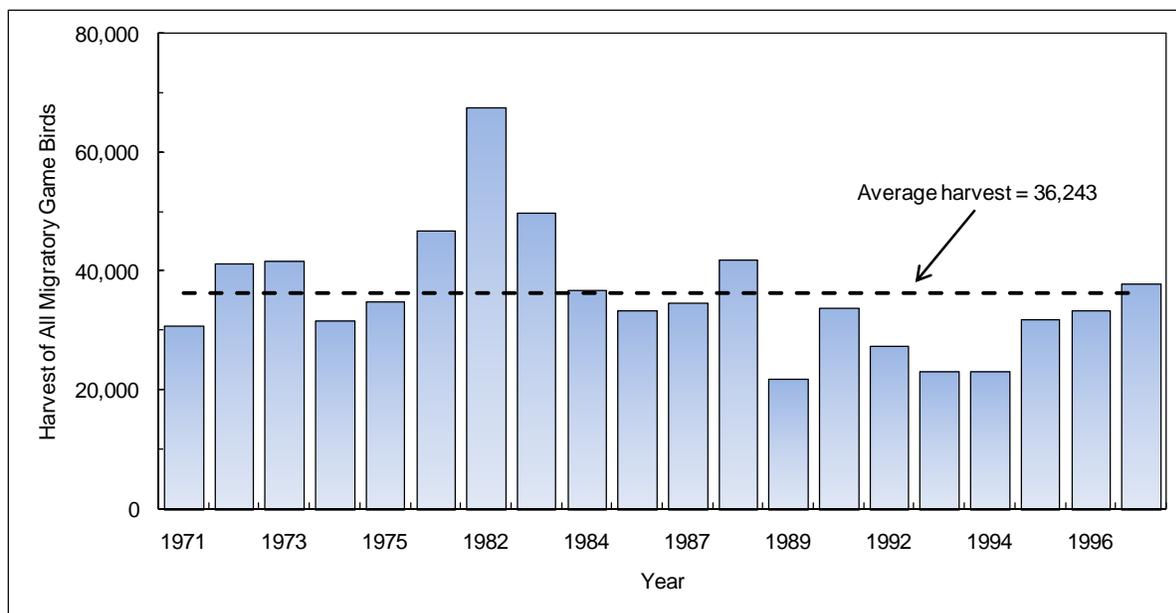
Source: ADF&G 2008m.

**Figure 5.18. Total harvest of sandhill cranes from the Cook Inlet area, 1971-1997.**



Source: ADF&G 2008m.

**Figure 5.19. Total harvest of common snipe from the Cook Inlet area, 1971-1997.**



Source: ADF&G 2008m.

**Figure 5.20. Total harvest of all migratory game birds from the Cook Inlet area, 1971-1997.**

## 6. Subsistence Fishing, Hunting, and Gathering

The fish, wildlife, and plant resources of the Cook Inlet area have been used for subsistence by area residents for centuries, including both Alaska Native populations and non-Natives (Fall et al. 2004b). In the broad sense, subsistence refers to “any harvest or use of fish, wildlife, and wild plants for home use. It also incorporates the noncommercial exchange or sharing of resources...” (Fall et al. 2004b). Under this general definition, detailed information about subsistence uses by residents of the Cook Inlet area is available for only a few selected communities with predominantly Alaska Native populations, but is not available for the broader Cook Inlet population, except for estimates of harvest from personal use fisheries, and sport fishing and hunting harvests provided above.



Men cleaning salmon in Southcentral Alaska, 1898.

Alaska State Library, ASL-P201-150

The subsistence uses of wild resources by residents of the communities of Tyonek and Beluga, which have predominantly Alaska Native populations, were profiled in a 2005-2006 study. In the study, Stanek et al. (2007) found that wild resources were used by 96 percent of Tyonek households, and 94 percent of residents had harvested at least one type of fish, wildlife or plant. Over 60 percent of Tyonek’s residents participated in gathering plants, 50 percent harvested and processed fish, 40 percent hunted birds and wild game, and 17 percent trapped or hunted furbearers. Based on self-reporting, the study indicated that about

half the Tyonek residents relied on wild sources for over half the meat, fish and birds they used annually, and 26 percent estimated that over 75 percent came from wild sources. Some of the wild resources used by the community include eulachon, black bear, beaver, muskrat, migrating waterfowl such as ducks and geese, Chinook salmon, fireweed, cow parsnip, bluebells, rainbow trout, Dolly Varden, blueberries, currants, highbush cranberries, beluga whales, moose, ruffed and spruce grouse, ptarmigan, marten, wolves, coyotes, and northern pike (Stanek et al. 2007). Relative to a study conducted in 1983-1984, residents harvested about 17 percent less wild resources per person in 2005-2006 (Stanek et al. 2007).

The study also found that 95 percent of Beluga residents participated in at least one resource activity, and that over 75 percent of residents participated in harvesting and processing fish, game birds, and mammals, and in gathering and processing plants. About half of Beluga households reported that more than half their supply of meat, fish, and birds came from wild sources (Stanek et al. 2007). Beluga residents used a variety of wild resources, including rainbow trout, pike, eulachon, brown and black bear, beaver, salmon, moose, ruffed and spruce grouse, ptarmigan, cranes, ducks, geese, beaver, red squirrels, plants, and berries (Stanek et al. 2007).

Since the 1970s, the broad definition of subsistence as “any harvest or use of fish, wildlife, and wild plants for home use” (Fall et al. 2004b) has become the subject of fierce debate, and the term “subsistence” is now frequently used in a legal or regulatory context. Disagreement about who has the right to participate in subsistence activities has grown increasingly contentious throughout Alaska, including in the Cook Inlet area as the population has increased and harvest of fish and game has become increasingly regulated.

A few studies have examined the perceptions, attitudes, and opinions about subsistence. A study looking at five small communities on the Kenai Peninsula found that a high percentage of residents were born in states other than Alaska or in other countries, ranging from 58 percent to 74 percent; and when only heads of household were considered (i.e., children were excluded), a very small portion of the population was born in Alaska, ranging from 9 percent to 23 percent (Fall et al. 2004b). In over half the communities studied, a majority of the household heads had lived in the community 10 years or less (Fall et al. 2004b). There was no significant difference found between per capita fish harvest for Alaska Native households and other households (Fall et al. 2004b). Another study found a wide divergence in the definitions of “subsistence” and “rural”, and concluded that the definition may be dependent on the person’s stake in subsistence rights (Wolfe 2003).



Blueberries.

Div. of Community & Business Development

The ensuing lengthy legal battles concerning the right to subsistence fish and hunt have brought about numerous and contentious regulatory changes to subsistence fishing and hunting. Issues have included the phrase “customary and traditional uses” in the definition of subsistence, and the use of “rural” as a criteria for a subsistence priority. Particularly important were conflicts between the federal Alaska National Interest Conservation Act and Article 8 of the Alaska Constitution, stating that “...fish, wildlife, and waters are reserved to the people for common use”, and state versus federal jurisdiction in fish and wildlife management. As a result of state and federal legal decisions, two management regimes currently exist for subsistence fishing and hunting in Alaska: a state system and a federal system.

## **a. State Subsistence Program**

Under Alaska law, subsistence is defined as “noncommercial, customary and traditional uses” of fish or game resources for a variety of purposes (ADF&G 2005). Only Alaska residents may participate in subsistence fishing and hunting, but local residency is not a criteria for determining eligibility for subsistence. Rather than defining subsistence areas, the Joint Board of Fisheries and Game identify “nonsubsistence areas” based on the economy, culture, and way of life of the area or community. Most of the Cook Inlet area is designated as “nonsubsistence”. Alaska law (AS 16.05.258) requires that subsistence uses must be consistent with sustained yield.

The Alaska Board of Fisheries and Alaska Board of Game are required to provide subsistence fishing and hunting opportunities when possible, and if harvests must be restricted, subsistence uses must be given priority over other uses. If a fish or game population cannot support harvests for all users, then other consumptive uses must be eliminated first before subsistence uses are limited. If the fish or wildlife population cannot support all subsistence users, then the Boards may distinguish among subsistence users through a system known as “Tier II”. In this situation, subsistence users are prioritized based on a point system that takes into account: “1) the customary and direct dependence on the fish stock or game population by the subsistence user for human consumption as a mainstay of livelihood; 2) the proximity of the domicile of the subsistence user to the stock or population; and 3) the ability of the subsistence user to obtain food if subsistence use is restricted or eliminated.”

### ***i. Subsistence Fisheries in the Cook Inlet Area***

Four state subsistence fisheries located outside the nonsubsistence area are authorized in the Cook Inlet area: a set gillnet fishery in the Port Graham and Koyuktolik subdistricts, a set gillnet fishery in the Seldovia area, a set gillnet fishery in the Tyonek subdistrict, and a fish wheel fishery on the upper Yentna River. Communities in these areas include Nanwalek, Port Graham, Seldovia, Tyonek, Alexander, and Skwentna.

It should be noted that despite the fact that most of the Cook Inlet area is defined by the Joint Alaska Boards of Fish and Game as “non-subsistence”, many Cook Inlet area residents takes part in other state personal use, sport, and commercial fisheries as a means of meeting their subsistence needs. Studies have found that these other fisheries meet most residents’ needs for subsistence uses, and that in fact, users feel that limits in many fisheries are too high, resulting in wasted fish (Fall et al. 2004b).

The state set gillnet fishery in the Port Graham and Koyuktolik subdistricts is located in Lower Cook Inlet, outside the lease sale area. This fishery was expanded to include Port Chatham and Windy Bay subdistricts in 2002. The fishery is open from April 1, and it closes on August 1 (Port Chatham and Windy Bay) or September 30 (Port Graham and Koyuktolik subdistricts). A household permit is required, issued by the local village council through a cooperative agreement with ADF&G, and it is mandatory to record harvests. There are no daily bag and possession limits, and participants are not limited on how many fish they can harvest for the season. Sockeye, pink and coho salmon are the primary species harvested (ADF&G 2005).

The Seldovia set gillnet fishery is also located outside the lease sale area. The fishery is open from April 1 – May 30, targeting Chinook salmon, and again for the first two weekends of August,



Subsistence gillnet fishery, Nanwalek.

V. R. Ciccone, ADF&G

targeting coho salmon. There is no annual household limit on salmon, except for an annual household limit of 20 Chinook salmon. Participants must report their harvest to ADF&G on a daily basis, as well as return their permit at the end of each segment of the season.

The Tyonek set gillnet fishery has an annual limit of 25 salmon for the head of household, and 10 for each dependent. In addition, households may take 70 Chinook salmon. A maximum of 4,200 Chinook salmon may be taken from the Tyonek subdistrict from May 15-June 30.

From 1997-2006, harvest of salmon in the Tyonek subsistence fishery ranged from 886-2,233, from 272-653 for the Yentna fishery, 274-3,153 for the Port Graham fishery, and 16-13,441 at Nanwalek, (Table 5.9, Table 5.10, Table 5.11, Table 5.12). For Seldovia, harvest of salmon ranged from 44-452 from 1997-2006, the most recent available data (Table 5.13). These harvests include only fish from these specific fisheries.

**Table 5.9. Permits issued and harvest of salmon in the state set gillnet subsistence fishery at Tyonek, 1998-2006.**

Year	Permits Issued	Chinook	Sockeye	Coho	Pink	Chum	Total
1998	74	978	163	64	1	2	1,208
1999	76	1,230	144	94	32	11	1,511
2000	60	1,157	63	87	6	0	1,313
2001	84	976	172	49	4	6	1,207
2002	102	1,080	209	115	9	4	1,417
2003	91	1,183	111	44	7	10	1,355
2004	97	1,345	93	130	0	0	1,568
2005	81	720	60	104	0	2	886
2006	81	904	21	36	0	0	961
2007	<sup>a</sup>	1,275	327	604	16	11	2,233

<sup>a</sup> Number of permits unavailable for 2007.

Source: Hammarstrom and Dickson 2007.

**Table 5.10. Permits issued and harvest of salmon in the state fish wheel subsistence fishery at Yentna, 1998-2006.**

Year	Permits Issued	Chinook	Sockeye	Coho	Pink	Chum	Total
1998	21	0	495	113	30	15	653
1999	18	0	516	48	18	13	595
2000	19	0	379	92	4	7	482
2001	16	0	545	50	10	4	609
2002	25	0	454	133	14	31	632
2003	19	0	553	67	2	8	630
2004	21	0	441	146	36	3	626
2005	18	0	181	42	25	24	272
2006	22	0	388	178	15	27	608
2007	21	0	367	66	17	18	468

Source: Hammarstrom and Dickson 2007.

**Table 5.11. Number of households reporting, and harvest of salmon, in the state set gillnet subsistence fishery at Port Graham, 1998-2006.**

Year	Households Reporting	Chinook	Sockeye	Coho	Pink	Chum	Total Salmon	Dolly Varden
1997	25	202	324	203	497	152	1,378	57
1998	16	164	271	243	459	240	1,377	20
1999	21	383	360	427	150	214	1,534	64
2000	35	241	784	252	355	483	2,115	
2001	15	104	176	57	20	32	389	
2002	23	250	417	90	150	74	981	
2003	16	321	1,991	425	266	150	3,153	87
2004	50	283	572	514	363	130	1,862	
2005	46	265	192	51	349	52	909	
2006	<sup>a</sup>	192	31	1	26	24	274	207

<sup>a</sup> Number of households reporting unavailable for 2007.

Source: Hammarstrom and Dickson 2007.

**Table 5.12. Number of households reporting, and harvest of salmon, in the state set gillnet subsistence fishery at Nanwalek, 1998-2006.**

Year	Households						Total Salmon	Dolly Varden
	Reporting	Chinook	Sockeye	Coho	Pink	Chum		
1997	1	0	1	0	14	1	16	0
1998	3	5	18	0	0	0	23	31
1999	32	102	2,755	1,320	1,873	890	6,940	631
2000	32	18	3,880	1,579	1,251	471	7,199	
2001	34	29	909	1,238	1,434	196	3,806	
2002	56	96	10,203	967	1,681	414	13,441	230
2003	35	144	3,221	513	1,306	381	5,565	102
2004	24	52	2,968	842	1,277	95	5,234	291
2005	23	27	1,934	1,142	1,259	128	4,490	605
2006 <sup>a</sup>								

<sup>a</sup> Number of household reporting unavailable for 2007.

Source: Hammarstrom and Dickson 2007.

**Table 5.13. Number of permits issued and fished, and harvest of salmon, in the state set gillnet subsistence fishery at Seldovia, 1998-2006.**

Year	Permits		Harvest					Total
	Issued	Fished	Chinook	Sockeye	Coho	Pink	Chum	
1997	20	12	44	19	0	0	0	63
1998	23	11	132	61	0	8	0	201
1999	16	12	150	130	0	0	38	318
2000	28	17	189	249	0	0	14	452
2001	19	14	134	124	0	0	0	258
2002	21	13	123	231	13	31	9	407
2003	20	11	67	220	1	13	55	356
2004	14	10	91	63	4	0	15	173
2005	18	6	46	70	13	93	12	234
2006	17	7	12	10	0	22	0	44

Source: Hammarstrom and Dickson 2007.

**ii. Subsistence Hunting in the Cook Inlet Area**

Although most of the Cook Inlet area falls within non-subsistence areas, there are two Tier II subsistence hunts in the area. One occurs in GMU 15C on the southern tip of the Kenai Peninsula (outside the lease sale area), and one occurs in GMU 16B on the west side of Cook Inlet in the Yentna and Beluga areas. Subsistence harvest of moose in GMU 15C ranged from 0-3 from 1998-2007, and harvest of mountain goats ranged from 0-10 (ADF&G 2008h; Table 5.14). Harvest of moose in GMU 16B ranged from 0-120, only 1 caribou was harvested, and no mountain goats (Table 5.14).

**Table 5.14. Subsistence harvests in Tier II hunts in the Cook Inlet area, 1998-2007.**

Regulatory Year	Moose	Caribou	Mountain Goat
<b>Game Management Unit 15C<sup>a</sup></b>			
1998	2	0	4
1999	0	0	5
2000	0	0	5
2001	0	0	4
2002	0	0	4
2003	2	0	7
2004	1	0	6
2005	3	0	8
2006	1	0	10
2007	2	0	0
<b>Game Management Unit 16B<sup>b</sup></b>			
1998	92	0	0
1999	103	0	0
2000	72	0	0
2001	120	0	0
2002	67	0	0
2003	79	0	0
2004	79	0	0
2005	77	1	0
2006	103	0	0
2007	0	0	0

Source: ADF&G 2008h.

<sup>a</sup> Southern Kenai Peninsula

<sup>b</sup> Includes Yentna, south Beluga, and north Beluga.

### **b. Federal Subsistence Program (Fish and Marine Mammals)**

In 1989, the Alaska Supreme Court ruled that giving rural residents priority for subsistence uses as mandated by the federal Alaska National Interest Lands Conservation Act (ANILCA) violated the Alaska Constitution, and the state's subsistence program was no longer in compliance with ANILCA. As a result, in 1990 the federal government took over management of subsistence hunting on federal lands, and fishing in non-navigable waters; federal management was expanded to include additional navigable waters adjacent to federal lands in 1999 (USFWS 2008b). The federal subsistence program is overseen by the Federal Subsistence Board, which includes the regional directors of the USFWS, NPS, BLM, BIA, and USDA Forest Service. The Board chair is appointed by the secretaries of the Interior and Agriculture. Ten Regional Advisory Councils make recommendations, provide information, review regulations and policy, and provide a public forum for federal subsistence issues (USFWS 2008b). The federal Southcentral Regional Advisory Council, which includes Prince William Sound, has 13 members.

Only residents of rural communities are allowed to subsistence fish and hunt under the federal subsistence program. The federal program defines rural areas where only rural residents may participate, and non-rural areas whose residents are excluded from participation, as opposed to the state program that designates subsistence and non-subsistence areas where all Alaskans can participate. Many communities of the Cook Inlet area are designated non-rural under the federal program, including Wasilla and Houston, the entire Municipality of Anchorage, and communities of the Kenai Peninsula on the road system such as Kenai and Soldotna, Kasilof, Kalifornsky, Clam Gulch, Anchor Point, Homer, and Fritz Creek (Figure 5.21 ;USFWS 2007). Ninilchik, Hope, and Cooper Landing are designated as rural.

In 2007, 112 individual Cook Inlet residents were granted federal subsistence permits: 72 from Cooper Landing, 8 from Hope, and 32 from Ninilchik (USFWS 2008a). These individuals received a total of 198 permits for fishing the Kenai and Kasilof rivers for salmon and resident species (Table 5.15). Federal subsistence fishers harvested 610 sockeye salmon from the Russian River, 66 from the upper Kenai River, 16 from the Moose Range Meadows area, and 30 from the Kasilof River, for a total of 722 sockeye salmon (Table 5.16). Additionally, 5 coho salmon from the Kenai River, 1 rainbow trout from the Russian River, and 6 Dolly Varden from the Kasilof River were harvested (USFWS 2008a).

A federal subsistence fishery for halibut, restricted to rural residents and members of Alaska Native tribes exclusively, occurs in Alaska marine waters including Cook Inlet (Fall et al. 2007). The fishery began in 2003. A Subsistence Halibut Registration Certificate (SHARC), obtained from the NMFS Restricted Access Management Program, is required to participate in the fishery. Although the fishery is managed by NMFS and the NPFMC, ADF&G conducted studies to estimate subsistence harvest of halibut, lingcod, and rockfish in 2003-2006 (Fall et al. 2004a, 2005-2007). In 2004, 251 SHARCs were fished in Cook Inlet; 210 in 2005; and 317 in 2006; the number of SHARCs fished in Cook Inlet was not available for 2003, but 360 were issued (Fall et al. 2004a, 2005-2007). Harvest in the federal subsistence fishery in Cook Inlet ranged from 2,955-4,646 halibut, 103-266 lingcod, and 330-934 rockfish (Table 5.17).

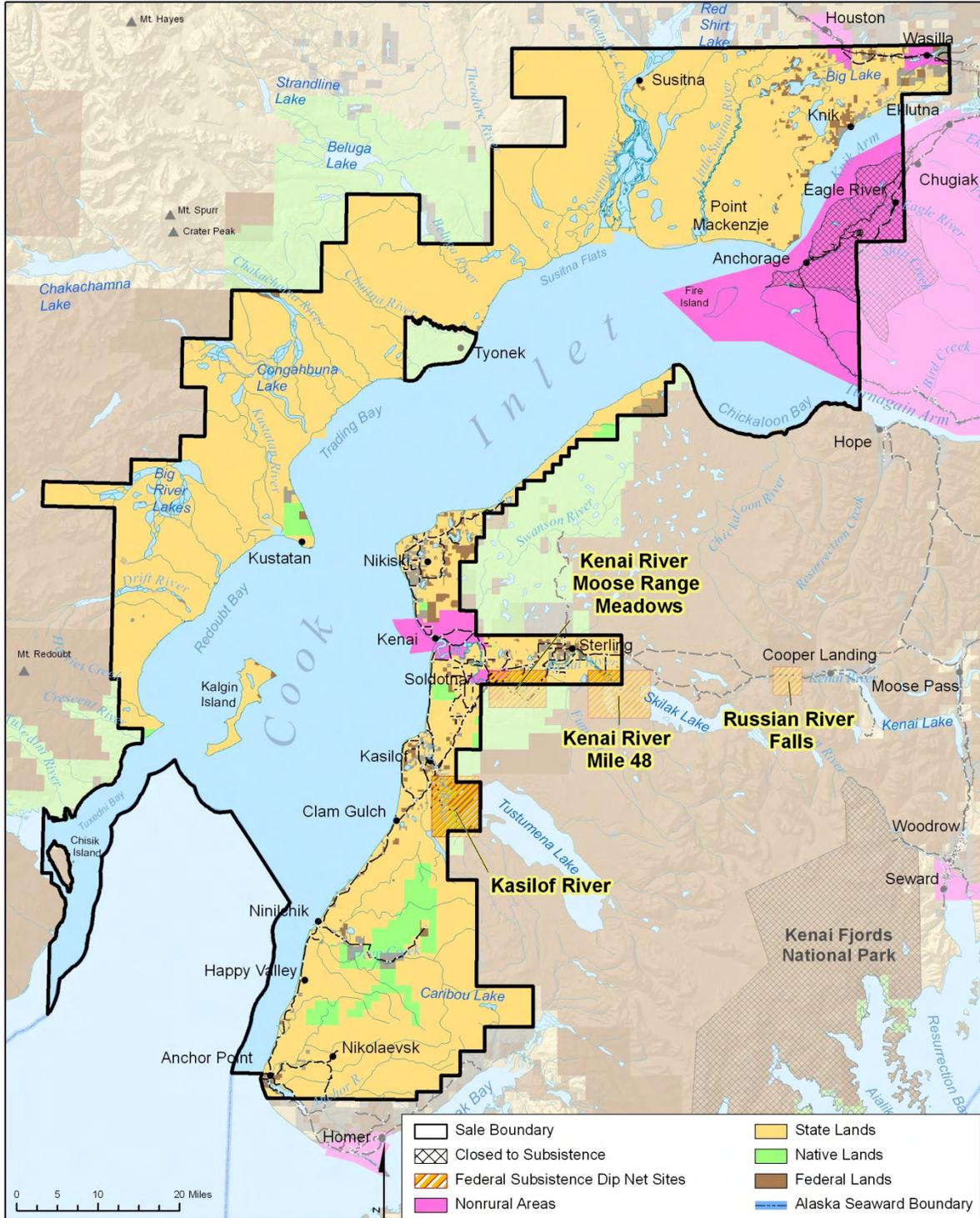


Figure 5.21. Areas determined to be non-rural, areas closed to subsistence, and subsistence dip net sites under federal subsistence rules in the Cook Inlet area.

**Table 5.15. Number of federal subsistence permits issued for the Kenai and Kasilof rivers, by permit type, 2007.**

Type of Permit	Issued	Returned
<b>Kenai River</b>		
Salmon	110	103
Resident Species	47	19
Total	157	122
<b>Kasilof River</b>		
Salmon	26	26
Resident Species	15	6
Total	41	32
Total Permits	198	154

Source: USFWS 2008a.

**Table 5.16. Harvest of sockeye salmon in federal subsistence fisheries on the Kenai and Kasilof rivers, 2007.**

Gear	Kenai River				Kasilof River	Federal Subsistence Total
	Russian River	Upper Kenai River	Moose Range Meadows	Total		
Dip Net	450	0	12	462	25	487
Rod-and-Reel	160	66	4	230	5	235
Total	610	66	16	692	30	722

Source: USFWS 2008a.

**Table 5.17. Number of Subsistence Halibut Registration Certificates (SHARCs) fished, and harvest of halibut, lingcod, and rockfish, in federal subsistence fisheries in Cook Inlet, 2003-2006.**

Year	Number of SHARCs Fished	Harvest		
		Halibut	Lingcod	Rockfish
2003	360 <sup>a</sup>	2,955	117	815
2004	251	4,368	266	934
2005	210	4,646	103	679
2006	317	3,194	228	330

Sources: Fall et al. 2004a, 2005-2007.

<sup>a</sup> SHARCs issued.

Several species of marine mammals are harvested in federal subsistence hunts in Alaska. From 2000-2004, from 688-857 harbor seals were taken by subsistence hunts in the Gulf of Alaska (Angliss and Outlaw 2008). In the Cook Inlet area, Alaska Natives have hunted beluga whales prior to and subsequent to the Marine Mammal Protection Act in 1972 (Hobbs et al. 2006). Subsistence hunting probably removed up to 20 percent of the Cook Inlet population in 1996, and is thought to account for annual population declines of 14 percent annually from 1994-1988 (Hobbs et al. 2006). NMFS implemented regulations on subsistence hunting of belugas in Cook Inlet beginning in 2001. In 2001 and 2002, subsistence harvest was 1 beluga each year, no belugas were harvested in 2003 and 2004, 2 were harvested in 2005, and none were harvested in 2006 and 2007 (Angliss and Outlaw 2008; Hobbs et al. 2006; Hobbs et al. 2008). Belugas were listed as endangered under the Endangered Species Act in October 2008 (73 FR 205, 62919).



Cook Inlet beluga hunt, 1995.

From Mahoney and Sheldon 2000.

## C. Public Water Supplies

The Cook Inlet aquifer system, and the numerous rivers, lakes, and streams of the area provide important sources of public water supplies throughout the area. These freshwaters provide drinking water for public water systems, private wells, and surface springs.

The Matanuska-Susitna Borough operates and maintains public water systems for the community of Talkeetna and the Palmer Garden Terrace Subdivision (DCCED 2008e). Public water for the City of Palmer comes from three deep wells. Although most of Palmer's residents are on the public water system, over 60 percent of Wasilla households and nearly all households in other Mat-Su communities have individual water wells (DCCED 2008e).

Eklutna Lake and Ship Creek provide about two-thirds of the public water supply in the Anchorage area (Glass 1999), with the remainder coming from underground aquifers. The Anchorage Water and Wastewater Utility, owned and operated by the Municipality of Anchorage, serves 80 percent of the municipality's residents (DCCED 2008b). Residential, commercial, and business demand is about 25 million gallons per day.

The Ninilchik and Anchor rivers, Deep Creek, and Bridge Creek, a tributary of the Anchor River, are important water supplies for residents of the Kenai Peninsula (KPB 2007). The communities of Homer, Kenai, Nanwalek, Port Graham, Seldovia, Soldotna, and Tyonek have a high portion of households on public water systems (DCCED 2008d). Residents in other communities and locations have a high dependence on private water systems and individual wells.

## D. Forestry

There are no designated state forests in the Cook Inlet area, although much of the state's public domain land is available for forestry activities (DOF 2006). Historically, the Cook Inlet area has had relatively low economic value for forestry products, but in the Matanuska-Susitna area and the Kenai Peninsula, interest is growing in pellet mills, ethanol plants and co-generation plants that could provide alternative energy sources. The Municipality of Anchorage has no forestland of commercial value although it is an important market for forest products from other areas such as the Matanuska-Susitna Borough and Kenai Peninsula (DCCED 2003a). From 1998-2006, the Division of Forestry offered up to 37,929 mbf (thousand board feet) and sold a high of 17,754 mbf (Table 5.18; DOF 2006).

**Table 5.18. Commercial timber sales, in mbf (thousand board feet), offered and sold by the Division of Forestry in the Coastal Region-Southcentral, by fiscal year 1998-2006.**

Fiscal Year	Timber Volume Offered for Sale	Timber Volume Sold
1998	18,412	17,754
1999	7,777	2,803
2000	9,361	5,774
2001	8,568	1,857
2002	3,749	1,333
2003	12,470	9,779
2004	21,133	957
2005	37,929	4,564
2006	37,346	1,703

Source: DOF 2006.

In the Mat-Su Borough, about 300,000 acres of land are under state ownership, the Mat-Su Borough owns and manages about 114,000 acres of forestland, and other landowners include the Alaska Mental Health Trust, Tyonek Native Corp., Eklutna Inc., and Cook Inlet Region Inc. However, not all of this land is considered commercial timberland. The Mat-Su Borough established 14 forest management units in 1990, totaling about 111,000 acres of which about 73,000 (66 percent) are considered commercial forestland capable of producing at least 20 cu. ft./acre per year under management (DCCED 2003c). Forests in the area are composed primarily of three species of hardwoods, Alaska birch, balsam poplar, black cottonwood; and one species of softwood, white spruce.

Although there have been numerous attempts to develop a commercial market for wood products in the Matanuska-Susitna area, success has been limited because forest density and quality are relatively low, and residential and recreational activities have increasingly competed against logging. However, there are a few commercial operations in the area including about 10 sawmills, most of which sell roughcut lumber or house logs. One supplies kiln-dried birch products in Alaska, and one is a large chip mill that uses spruce and birch and exports its products through Point MacKenzie (DOF 2006). In 2006, the state offered or readied to offer 2,883 acres of timber in the Houston, Willow, and Petersburg areas (DOF 2006). A total of 11,465 acres is scheduled to be offered from 2007-2011 (Table 5.19; DOF 2007).

Kenai Peninsula forests are composed predominantly of old growth Sitka spruce, western hemlock, white spruce, paper birch, and Lutz spruce (a white spruce – Sitka spruce hybrid) (DOF 2006). Most commercial timber activity on the Kenai Peninsula takes place on state and Native corporation lands (DCCED 2003b). The Kenai Peninsula includes an estimated 481,700 acres of commercial timberland (DCCED 2003b). At 5.3 million acres, the Chugach National Forest is the second largest national forest in the country. But although portions of it is located on the Kenai Peninsula, none is within the Cook Inlet lease sale area. The westside of Cook Inlet includes an additional 163,000 acres of commercial timberland (DCCED 2003b). The Kenai Peninsula has a longer and more significant history of commercial timber operations than the Matanuska-Susitna area, primarily

small-scale production that is used locally. However, a major and continuing infestation of spruce bark beetle since the 1990s has significantly affected the industry. Although salvage and fire prevention measures have provided some economic benefit, most beetle-killed timber is only suitable for chipping. In 2006, a wood pellet mill was being planned for the area (DOF 2006). DOF offered three competitive timber sales in 2006, totaling 2,976 mbf, and sold an additional 33,257 mbf in over-the-counter timber sales (DOF 2007). A total of 20,544 acres is scheduled to be offered from 2007-2011 (Table 5.20; DOF 2007).

**Table 5.19. Timber sales planned for the Mat-Su District, calendar years 2007-2011.**

Calendar Year	Houston Small Sales	Willer-Kash (Copper)	Moose Range	Rabideux Sale Area	West Petersville	Fish Creek 1/ Fish Creek 2	Total <sup>a</sup>
2007	250	1,174	90				1,514
2008	130	1,100		70		2,500	1,300
2009	245	1,200				2,200	1,445
2010	50			80	1,286		1,416
2011	250	840					1,090
2007-2011							11,465

Source: DOF 2007.

<sup>a</sup> Totals for individual calendar years do not include Fish Creek because the Fish Creek Management Area is classified for agriculture, not forestry. Total for 2007-2011 includes both Fish Creek sales.

**Table 5.20. Timber sales planned for the Kenai-Kodiak area, calendar years 2007-2011.**

Timber Sale Name	Estimated Acreage	Timber Sale Name	Estimated Acreage	Timber Sale Name	Estimated Acreage
<b><u>2007</u></b>		<b><u>2009</u></b>		<b><u>2011</u></b>	
Pothole #7	33	North Ranch	160	Fox	1,310
Pothole #8	37	Kasilof	22	Ohlson	342
Pothole #9	72	Chakok	133	Ohlson West	144
Pothole Block	<u>238</u>	Chakok Hills	<u>99</u>	Chin	114
Subtotal	380	Subtotal	414	Sunshine	<u>87</u>
				Subtotal	1,997
<b><u>2008</u></b>		<b><u>2010</u></b>			
Corners	149	East Ninilchik	270		
Reflection	96	Slikok	157		
Bluff	142	Pioneer	46		
Whiskey	40	American	133		
Fork	35	Garden	97		
Three Rs	41	Wolverine	104		
Pothole #10	85	English	64		
Pothole #11	103	Center Plateau	<u>7,310</u>		
Pothole #12	116	Subtotal	8,181		
Circle	245				
Caribou Hills II	<u>8,520</u>				
Subtotal	9,572			<b>2007-2011 Total</b>	<b>20,544</b>

Source: DOF 2007.

## E. Agriculture

Since the 1930s, crops and cattle have been raised in the Matanuska Valley and Kenai Peninsula but agriculture is of relatively minor importance to the economy of the Cook Inlet area because of the far north latitude and poor climate for agriculture (DCCED 2002). In 2005, farm production values were \$820,000 for crops and \$235,000 for livestock and poultry on the Kenai Peninsula (KPB 2008). In 2006, earnings from crop production totaled about \$660,000 for the Mat-Su Borough (ADLWD 2006).



Matanuska Valley farm.

Alaska Div. of Tourism

Important crops of the Matanuska Valley include vegetables, beef, potatoes, oats, hay, and greenhouse plants and vegetables (DCCED 2002).

A few value-added products are produced in the Mat-Su area, including birch syrup and candies that are marketed to the tourist industry, and the greenhouse industry that provides landscaping products throughout Southcentral Alaska (Wells and Hanson 2006). Dairy and livestock operators face serious obstacles such as increasing costs for fuel and fertilizer, and housing development that competes for agricultural lands (Wells and Hanson 2006). Five dairies operate in the Mat-Su area (Wells and Hanson 2006), but the only dairy processor, Matanuska Maid, closed in 2007 because of increasing costs for supply, energy, and security (Matanuska Maid 2007) leaving dairy operators with few options for selling their product. Another facility that processes livestock, Mt. McKinley Meat and Sausage, is operated at a loss by the state and is an additional serious infrastructure concern for the agricultural industry of the Mat-Su area (Wells and Hanson 2006).

## F. Mining

Mineral resources in the Cook Inlet area include coal, sand and gravel, peat, zeolites, gypsum, limestone, gold, copper, silver, zinc, molybdenum, tin, tungsten, lead, arsenic, mercury, chromium, iron, titanium, and tellurium (DCCED 2008f). Although there were large operations for gold and coal in the past, mining in the Mat-Su area is now limited to a few small operations; gravel extraction has increased, however, with most of the product destined for the Anchorage construction market (Wells and Hanson 2006). There are only a few mineral resources in the Anchorage area, including sand and gravel, gold, and small amounts of silver, copper, lead, zinc, molybdenum, and arsenic. Actual commercial activities are limited to several small sand and gravel operations, and limited placer gold has been produced from the Crow Creek and Girdwood areas (DCCED 2008a). Growth potential is severely limited because the Anchorage area is densely populated (DCCED 2008a). Several seasonal sand and gravel operations constitute the primary mining activity on the Kenai Peninsula (DCCED 2008c).

Expenditures for exploration in Southcentral Alaska totaled \$9.7 million in 2006 (Szumigala and Hughes 2006). Note that this includes operations outside the Cook Inlet lease sale area because statistics are not available for smaller geographic areas. Major projects include exploration for copper and gold on the Whistler property near Rainy Pass, and for gold on the Lucky Shot property in the Willow Creek mining district. Exploration for diamonds was conducted at Shulin Lake and near Yenlo Hills. In May 2007, the permitting process was begun for a drilling program in the Chickaloon portion of the Matanuska Coal Field (Szumigala and Hughes 2006). Exploration activities resulted in over 10,000 work days of employment, as reported by 23 companies (Table 5.21).

Expenditures for mining development in Southcentral Alaska totaled almost \$9 million in 2006 (Szumigala and Hughes 2006), which also includes operations outside the Cook Inlet lease sale area. Development activities resulted in almost 11,000 work days of employment, as reported by 7 companies (Table 5.21). The Chuitna coal project, a particularly large and important project, is located on the west side of Cook Inlet, about 45 miles west of Anchorage, and lies within the lease sale area. This project is being developed by PacRim Coal on land owned by a combination of public and private entities, including the State of Alaska, Mental Health Trust, Kenai Peninsula Borough, Tyonek Native Corporation, Cook Inlet Region, Inc., and individuals (Chuitna Coal Project 2008). The project is anticipated to include a surface coal mine, access road, coal transport conveyor, air strip, personnel housing, logistic center, and an export terminal that includes a 10,000 foot trestle from shore to load coal transport ships (Chuitna Coal Project 2008). Agencies involved in permitting and consulting for the project include EPA, Army Corps of Engineers, ADNR, and USFWS. In March 2008, Agrium Corp. canceled plans for a coal gasification project at its Kenai plant that would have utilized coal from Usibelli Mines located in Healy (Bradner 2008).

**Table 5.21. Expenditures and employment resulting from mining exploration and development activities, 2006.**

	Exploration	Development
<b>Expenditures</b>		
Placer	\$109,000	\$145,250
Lode	\$9,684,317	\$320,000
Coal and Peat		\$8,000,000
Industrial Minerals		\$516,000
<b>Total</b>	<b>\$9,793,317</b>	<b>\$8,981,250</b>
<b>Employment</b>		
Work Days	10,435	10,820
Work Years	40	42
Companies Reporting	23	7

Source: Szumigala and Hughes 2006.

Notes: Includes activities for all of Southcentral Alaska, including activities occurring outside the Cook Inlet areawide lease sale area.

The primary mining production in Southcentral was for rock, sand, gravel, and peat (topsoil) in 2006 with 71 operators in the area (Szumigala and Hughes 2006). A total of 6.42 million tons of sand and gravel was produced with a value of \$27 million and 386,567 tons of rock valued at almost \$5.0 million. Sand and gravel operations provided 105 full-time equivalent jobs, rock provided 11 jobs. A total of 41,500 cubic yards of peat were produced resulting in 7 full-time equivalent jobs. Additionally in 2006, placer gold production was 5,837 ounces by 25 operators (10 of which were recreational) with full-time equivalent employment of 36 (Szumigala and Hughes 2006).

## G. Oil and Gas

Oil and gas exploration, development, and production has been ongoing in the Cook Inlet area since the early 1960s. The oil and gas industry is an important employer in the area, and is critical to the area’s economy. Chapter 6 provides a detailed description of the oil and gas industry in the Cook Inlet area.

## H. Recreation and Tourism

The Cook Inlet area is well known for its recreational opportunities, and tourism is a vital component of most local economies. During summer 2006, visitors totaled 139,000 to the Palmer/Wasilla area, 814,000 in Anchorage, and 439,00 on the Kenai Peninsula (McDowell Group 2007). Compared to other parts of the state, visitors to Southcentral Alaska tend to be more likely to enter and exit the state by air, as opposed to cruise ship; they tend to stay slightly longer, averaging 10.9 nights; and they are more likely to participate in tours and activities



E. Schneider, Alaska Div. of Tourism

RV at pullout along Turnagain Arm.

(McDowell Group 2007). The communities of Palmer/Wasilla, Homer, and Kenai/Soldotna had a high percentage of highway and ferry travelers, and had the longest length of stay in Alaska, ranging from 14.6-18.8 nights (McDowell Group 2007). Average expenditure was \$1,290 in Palmer/Wasilla, \$1,181 in Anchorage, and \$1,407 in Kenai/Soldotna. Total out-of-pocket expenditures for visitors statewide was \$1.5 billion, excluding transportation costs to and from Alaska (McDowell Group 2007).

The top activities visitors participated in were shopping, wildlife viewing, sightseeing tours, day cruises, train excursions, hiking and nature walks, museums, Native cultural tours and activities, fishing, and historical and cultural attractions (McDowell Group 2007). “Soft-adventure” recreation and tourist activities, ranging from helicopters to whitewater rafting to dog mushing, are growing rapidly in the area (Colt et al. 2002) and are expected to continue to grow (Brooks and Haynes 2001). Rates and intensity of participation in outdoor recreation are higher in Alaska than in the lower 48 states, and rates are expected to remain high (Brooks and Haynes 2001). The five activities with the greatest growth are scenic driving, biking, bird and wildlife viewing, recreational vehicle camping, and fishing, indicating that roads and waterways are heavily relied on for outdoor recreation (Brooks and Haynes 2001).

## **I. Renewable Energy**

Renewable energy resources that hold the most potential in the Cook Inlet area include geothermal, wind, and hydropower (Papp et al. 2008).

### **1. Geothermal**

Geothermal energy is heat from the earth that is accessed from water or steam wells (EERE 2008). Geothermal resources are found in the Cook Inlet area associated with the Ring of Fire volcanoes (AEA 2007). Geothermal resources occur in shallow ground, as well as several miles below earth’s surface in the form of hot water and rock, and even deeper as hot molten rock (magma). Wells can be drilled to a mile or more, tapping into steam and very hot water that is brought to the surface to drive turbines to generate electricity and heat buildings (EERE 2008). Other potential uses in Alaska include district heating, greenhouses, absorption chilling, mariculture, process heating in the seafood industry, swimming pool heating, and hydrogen production (AEA 2007). Geothermal energy results in little or no greenhouse gases, is reliable, and is a domestic energy supply (EERE 2008). Geothermal plants are relatively expensive to develop. They may produce some byproduct sludges that require disposal at approved sites and other waste materials and excess water may be reinjected (EERE 2008).

### **2. Wind**

Wind energy is used to generate mechanical power, which can be used to pump water, or a generator can convert the mechanical power into electricity (EERE 2008). Western and coastal areas of Alaska hold the most promise for wind energy where there are strong high and low pressure systems and associated storm tracks (AEA 2007). Possible locations for harnessing wind energy in the Cook Inlet area include Fire Island and the upper Matanuska Valley (AEA 2007). To harness wind energy, wind turns the blades of a wind turbine, which spin a shaft, which is connected to a generator that makes electricity (EERE 2008). Wind turbines can range from small, for use in homes, to large enough to provide electricity on a utility scale. Wind energy is considered a clean fuel source because it does not result in emissions, and is also a domestic energy source (EERE 2008). However, some wind farms may not be cost competitive with conventional energy sources because a higher investment is required than for fossil-fueled generators. In addition, the wind source may be intermittent so that it does not provide a reliable energy source; wind sources are often found in remote areas far from

where they are needed; they may compete with other land uses, produce unacceptable noise levels, and have aesthetic impacts; and birds can be killed by the rotors (EERE 2008).

### 3. Hydropower

Hydropower is the use of water to power machinery or make electricity (EERE 2008). The Cook Inlet area has abundant potential for hydropower because of its location in a mountainous region with moderate to high precipitation and its location on the coast with access to marine waters (AEA 2007). The Bradley Lake project near Homer is an important source of power for the area, providing about 8 percent of the electrical energy for the Railbelt (AEA 2007). Power is captured from the kinetic energy of water flowing downstream. Energy is converted into electricity by turbines and generators, which is then transferred into electrical grids for use in homes, businesses, and industry (EERE 2008). Hydropower can be captured by impounding water behind a dam in a reservoir or without a dam (AEA 2007). Ocean energy includes thermal energy, tidal energy, and wave energy. Hydropower is considered a clean fuel because it does not produce emissions, and it is a domestic energy source. Hydropower is generally reliable, as flow through turbines can be controlled based on power needs. Tidal energy is reliable as well because of the predictability of tides. However, during drought, water may not be available for systems dependant on freshwater sources. In addition, hydropower associated with dams can have serious environmental issues, including impeding fish passage, fish mortality from turbines, impacts on water quality and flow, and impacts on habitat (EERE 2008).

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