

**Fishery Management Report No. 16-26**

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**Area Management Report for the Sport Fisheries of  
the North Gulf Coast, 2009**

by

**Charles E. Brazil**

and

**Dan Bosch**

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September 2016

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



## Symbols and Abbreviations

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

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

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**AREA MANAGEMENT REPORT FOR THE SPORT FISHERIES OF THE  
NORTH GULF COAST, 2009**

by  
Charles E. Brazil  
and  
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Division of Sport Fish, Research and Technical Services  
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## ABSTRACT

This report provides a detailed summary of the sport fisheries in the North Gulf Coast Management Area. Included are a description and overview of each fishery, how the fisheries are managed, and fishery performance and escapement for 2008 and a discussion of 2009. The sport fisheries include Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), sockeye salmon (*O. nerka*), pink salmon (*O. gorbuscha*), chum salmon (*O. keta*), Pacific halibut (*Hippoglossus stenolepis*), rockfish (*Sebastes* spp. and *Sebastolobus* spp.), lingcod (*Ophiodon elongates*), shellfish, sharks, rainbow trout (*O. mykiss*), and Dolly Varden (*Salvelinus malma*).

Key words: North Gulf Coast Management Area, Alaska Board of Fisheries, Seward, Chinook salmon, coho salmon, sockeye salmon, pink salmon, chum salmon, halibut, rockfish, lingcod, shellfish, sharks, rainbow trout, Dolly Varden, sport fisheries overview

## INTRODUCTION

The North Gulf Coast Management Area (NGCMA) consists of all waters between Gore Point (156°96'25"W longitude) and Cape Fairfield (148°50'25"W longitude) (Figure 1). The eastern boundary of NGCMA used to be located 15 miles further east at Cape Puget. At the 2008 Alaska Board of Fisheries (BOF) meeting, the eastern boundary was moved to Cape Fairfield to align the commercial, subsistence, and sport fish regulatory boundaries to one location. The City of Seward is the only community in the management area.

The Port of Seward, at the head of Resurrection Bay, is the gateway to sport fishing in the NGCMA. Tourism, including a growing sport fish charter industry, is vital to the economy of Seward. Access to area sport fisheries is by road, rail, air, and boat. Most sport fisheries in the NGCMA require a boat or plane for access, so effort from boat anglers, both private and charter, dominate these fisheries (Tables 1 and 2). Local Seward beaches, which are adjacent to stocking sites, are the only easily accessible shore fishery for salmon in the NGCMA. In contrast to boat accessible fisheries, road accessible streams and lakes provide only minor sport fisheries. Principal land managers include private individuals, the City of Seward, U.S. National Park Service, U.S. Forest Service, Native corporations, and the State of Alaska.

Most area sport fisheries occur in salt water and target 5 species of Pacific salmon (coho or silver salmon [*Oncorhynchus kisutch*], Chinook or king salmon [*O. tshawytscha*], pink or humpy salmon [*O. gorbuscha*], chum or dog salmon [*O. keta*], sockeye or red salmon [*O. nerka*]), and Dolly Varden (*Salvelinus malma*). NGCMA has one of the largest marine coho salmon fisheries in the Pacific Northwest (Table 3). The Seward Silver Salmon Derby, sponsored by the Seward Chamber of Commerce, highlights this popular fishery each year in August. Coho salmon are a mix of hatchery and wild fish; Chinook and sockeye salmon are a result of hatchery production; pink and chum salmon and Dolly Varden are all wild fish. The management and allocation of these fisheries is guided by the *Trail Lakes Hatchery Sockeye Management Plan* (Alaska Administrative Code 5 AAC 21.373), the *Bear Lake Management Plan* (5 AAC 21.375), and the *Resurrection Bay Management Plan* (5 AAC 21.376) (Appendix A1). These plans were recently changed at statewide BOF meetings and portions of the Trail Lakes Hatchery Sockeye Management Plan are scheduled to sunset in May 2011. The original descriptions of these plans will be described later in the fishery sections.

Groundfish species are also targeted by sport anglers and include Pacific halibut (*Hippoglossus stenolepis*), rockfish (*Sebastes* spp. and *Sebastolobus* spp.), and lingcod (*Ophiodon elongates*) (Table 3). When weather permits, charter boats travel daily to the marine waters of Prince

William Sound to target the abundant groundfish resources. There is also a relatively small salmon shark (*Lamna ditropis*) fishery.

With the exception of the Resurrection River drainage downstream of the Seward Highway and Nash Road in Seward, all freshwater drainages in Resurrection Bay are closed to salmon fishing but are open to Dolly Varden, rainbow trout (*O. mykiss*), and Arctic grayling (*Thymallus arcticus*) sport fishing.

Starting in 2006, all charter boat operators are required to record all fish caught and harvested for each angler, including the captain and crew, in saltwater logbooks issued by the Alaska Department of Fish and Game (ADF&G). Logbooks must be filled in before anglers or fish leave the boat and must be mailed or delivered to the ADF&G office no later than 1 week after the fishing trip. Logbook data are compiled in an ADF&G database and a data summary is published annually. Each fishery will be discussed in greater detail in individual chapters.

## **AREAWIDE OVERVIEW**

### **AREAWIDE CATCH, HARVEST, AND EFFORT**

The most recent 5-year (2004–2008) estimate of angler effort in the NGCMA was 111,595 angler-days, or about 4% of the total statewide sport fishing effort and 6% of the total Southcentral Alaska effort (Table 1, Figure 2).

In the NGCMA, most sport fisheries occur in salt water and account for almost all angling effort. Since 2004, anglers fishing from boats have composed the largest part of the angler effort (87%). Fishing effort in the NGCMA has continued to grow since 2000, increasing annually by about 3,200 angler-days (Table 2, Figure 3).

Anadromous salmon harvest in NGCMA has varied since 1990 with a peak harvest of 152,600 salmon occurring in 2005 (Table 3). Coho salmon annually composed the largest anadromous catch by area anglers, followed by pink salmon, sockeye salmon, Chinook salmon, and chum salmon (Table 3). The linear trend since 1990 suggests that salmon harvest in NGCMA is increasing by approximately 4,835 fish annually.

Groundfish catch and harvest in the NGCMA varies, but has generally increased since 1990 (Table 3). Pacific halibut composed the largest proportion of the groundfish catch, followed by rockfish and lingcod. Current linear trends in groundfish catch and harvest rates are increasing annually by about 4,450 fish.

### **GUIDE LOGBOOK OVERVIEW**

The guided sport fishing industry in Alaska has increased significantly in recent years with implications to fish allocation and management decisions. Resolution of related issues was hampered by a lack of information regarding the industry and its effect on fishery resources in many parts of Alaska. The sport fishing guide and business registration and licensing programs were designed to provide a comprehensive system to better define this diverse industry throughout Alaska. Guide logbooks collect data on individual guided anglers and include only the guided portion of the total fishing effort, catch, and harvest. The Alaska Statewide Harvest Survey (SWHS) collects data based on a household mail-out survey, including both guided and unguided fishing effort, to estimate total catch, harvest, and fishing effort.

In 1998, BOF adopted new statewide sport fishing guide registrations and definitions during their February Statewide Finfish meeting in Girdwood, Alaska (5 AAC 75.075: Sport Fishing Service and Sport Fishing Guide Services; License Requirements; Regulations of Activity). This was a registration process and not a licensing process. On May 11, 2004, the Alaska Legislature adopted House Bill 452 (HB 452), which established statewide licensing requirements for sport fishing guide business owners and sport fishing guides. This bill was created to establish minimum professional standards for fishing guides before they could obtain a license. This was established to protect consumers and promote professionalism in the Sport Fishing Guide business. In February 1998, BOF adopted regulations (5 AAC 75.076) requiring logbooks for saltwater charter vessels statewide. A complete history of this and detailed charter logbook information from 2006 through 2008 can be found in Sigurdsson and Powers (2009).

Annually, the Port of Seward has more than 100 registered charter businesses and more than 140 registered charter vessels (Sigurdsson and Powers 2009). This makes Seward the third largest charter fleet in Alaska behind Sitka and Homer. Most of these charter vessels participate in both groundfish and salmon fisheries.

## **STOCKED FISHERIES**

### **ARCTIC GRAYLING AND RAINBOW TROUT**

#### **Fishery Description**

In the late 1990s, ADF&G began a stocking program to increase sport fishing opportunities within the NGCMA. There are only a few systems that support natural rainbow trout fisheries and none for Arctic grayling in the NGCMA. These fish have been stocked in lakes near Seward to diversify opportunities for sport anglers (Table 4). Lost Lake was stocked in 1999 and 2001 with a total of approximately 67,800 diploid fingerling rainbow trout. First Lake, located in Seward's Two Lakes Park, is stocked annually with either catchable-sized rainbow trout or Arctic grayling. Stocking provides opportunities for local youth and supports the Youth-Only Fishery sponsored by the Seward Advisory Committee and local businesses.

#### **Fishery Management and Objectives**

The management goal for the NGCMA stocking program is to provide sport fishing opportunity through annual or alternate-year stocking of lakes with catchable-sized rainbow trout or Arctic grayling. The ADF&G Statewide Stocking Plan for Recreational Fisheries is updated annually and available for public comment. The stocking plan can be found online at <http://www.adfg.alaska.gov/index.cfm?adfg=fishingSportStockingHatcheries.stockingPlan>.

## **SALMON**

#### **Fishery Description**

The stocking of systems with hatchery fish has increased and diversified the opportunities available to sport anglers in the NGCMA, especially for Resurrection Bay saltwater anglers. Total hatchery releases in the NGCMA annually average over 3 million salmon (Table 4 and Appendices B1–B3). These stocking activities consist of 2 types of programs: large private nonprofit hatchery releases to enhance both fish abundance for commercial fisheries and sport fisheries, and smaller ADF&G hatchery releases targeted at enhancing sport fisheries. All hatchery salmon releases contribute to the common property of all fisheries. Terminal Harvest

Areas (THAs) were created around release sites to allow increased sport fish bag limits on hatchery fish.

Programs directed toward enhancing sport fisheries include the stocking of coho and Chinook salmon smolt by state-operated hatcheries, and the release of coho salmon raised by Cook Inlet Aquaculture Association (CIAA) (Table 4). CIAA also releases sockeye salmon into Resurrection Bay fresh and salt waters primarily intended for commercial harvest. In 2009, approximately 2.5 million sockeye salmon fry were released at Bear Lake and approximately 1.6 million sockeye salmon smolt were released into salt water. To benefit sport anglers, 270,000 coho salmon fry were released into Bear Lake and 68,000 coho salmon smolt were released into Bear Creek. In addition, ADF&G stocked a total of approximately 184,000 coho salmon smolt into Seward Lagoon and Lowell Creek.

### **Fishery Management and Objectives**

The coho and Chinook salmon stocking programs in Seward are designed to create additional saltwater and shoreline fishing opportunities.

The Alaska Board of Fisheries has established 3 salmon management plans for the North Gulf Coast and Resurrection Bay. These plans provide for the sustained yield of area fisheries, as well as establishing allocation and management guidelines for ADF&G managers and can be found in Appendix A1. Management plans and policies established for Resurrection Bay include the following:

- 1) Bear Lake Management Plan 5 AAC 21.375. This management plan establishes guidelines for the enhancement of coho and sockeye salmon in Bear Lake near Seward. In essence, the plan provides for the enhancement of sockeye salmon in Bear Lake intended for commercial use in Resurrection Bay, provided the enhancement does not negatively impact coho salmon smolt production from Bear Lake. Surplus sockeye salmon are split 50:50—50% to CIAA cost recovery and 50% to the commercial fishing fleet. This management plan was put aside by BOF at their statewide meeting in March 2009 to allow CIAA to harvest 100% of sockeye salmon for cost recovery. BOF further stipulated this would sunset after 2 years.
- 2) Resurrection Bay Salmon Management Plan 5 AAC 21.376. This management plan provides allocation and management guidelines for Resurrection Bay salmon fisheries. The plan stipulates that coho and Chinook salmon fisheries of Resurrection Bay be managed exclusively for sport fisheries and provides for a commercial fishery for other salmon species only if the prosecution of these fisheries does not interfere with the sport fishery in Resurrection Bay.
- 3) North Gulf Coast King Salmon Sport Fishery Management Plan 5 AAC 58.065. This management plan directs Chinook salmon fishery effort to hatchery stocks and stabilizes the sport harvest of Chinook salmon in the North Gulf Coast.

# **CHINOOK SALMON FISHERIES**

## **AREAWIDE OVERVIEW**

There is little wild production of Chinook salmon in NGCMA waters. The Chinook salmon sport fishery in the NGCMA is supported almost entirely by hatchery-produced fish. Hatchery Chinook salmon return to release sites as mature adults from late May through mid-July. Anglers harvest feeder Chinook salmon throughout the year, with winter months being the most productive.

## **STOCKING PROGRAM**

Chinook salmon were originally stocked at Box Canyon Creek, a tributary of Resurrection River, from 1976 to 1979 and 1983 as mitigation for highway construction and to create a new sport fishery (Appendix B1). Stocking at Box Canyon Creek was discontinued because it failed to produce any significant returns. Beginning in 1984, Chinook salmon smolt were released in marine waters adjacent to Lowell Creek. In 1985, Seward Lagoon was also stocked with early-run Chinook salmon smolt. Since 1988, early-run releases have averaged approximately 240,000 fish annually (Table 4). Starting in 1991, Chinook salmon smolt with a late run timing (August) were stocked in Seward Lagoon. This program was intended to diversify and increase Chinook salmon fishing opportunities in Resurrection Bay but was cut in 1998 because brood stock were unavailable.

The current Chinook salmon enhancement plan authorizes ADF&G to stock 210,000 fish into Resurrection Bay: 105,000 fish in Seward Lagoon, and 105,000 fish at Lowell Creek. In 2005, both ADF&G hatcheries (Fort Richardson and Elmendorf Air Force Base) lost their hot water source used to rear fish due to the decommissioning of power plants on both bases. The loss of heated water forced the hatchery programs to move from a 1-year fish rearing cycle to a 2-year rearing cycle. This decreased hatchery capacity, and even after 2 years in the hatchery, fish in catchable-sized programs and smolt programs do not meet release size standards. These constraints at the hatcheries forced changes in stocking programs and some programs had to be put on hiatus. Due to these constraints, the Seward Chinook salmon release was put on hold. In 2006, the Alaska SeaLife Center reared smolt for release at Lowell Creek. These smolt were part of a “smoltification” study conducted in conjunction with MariCal, who developed a process to increase initial marine survival. In 2008, the Alaska SeaLife Center released approximately 142,000 of these fish at Lowell Creek (Table 4). In 2010, ADF&G will be able to resume Chinook salmon stocking into Seward Lagoon and Lowell Creek. A new ADF&G hatchery is under construction and will begin releasing Chinook salmon in 2012.

## **CATCH, HARVEST, AND EFFORT**

The average annual catch of Chinook salmon in the NGCMA for 2004-2008 was approximately 5,509 (Table 5, Figure 4) and the high during that time was 6,490 in 2005. The catch and harvest of Chinook salmon since 2006 has decreased annually. The average harvest from 2004 to 2008 was approximately 2,900 fish. Chinook salmon anglers harvested 54% of their catch on average during this period.

From 1990 through 1999, 57% of the Chinook salmon harvested were caught by shorebased anglers. Since 2000, boat anglers have harvested approximately 75% of all Chinook salmon caught in the NGCMA. This trend could be the result of an increase in charter and private boat

angler effort, a decrease in shorebased angler effort, and the release of smaller, less fit smolt. In addition, stocking of waters with Chinook salmon in the 1990s averaged approximately 100,000 more fish annually when both early-run and late-run fish fueled an excellent shore fishery. Many Chinook salmon are also caught and harvested incidentally to the coho salmon fishery.

The total catch of Chinook salmon in 2009 was approximately 3,729 fish with a harvest of about 2,000 (Table 5). This is the third lowest catch on record since 1990 and is probably due to several factors. Chinook salmon runs throughout Southcentral Alaska have been depressed in recent years, and Chinook salmon smolt stocked into local waters are undersized and probably suffer even greater mortality. The shorebased fishery continues to decline, probably due to small smolt size, and from boat anglers harvesting Chinook salmon stocked in adjacent waters.

## **FISHERY MANAGEMENT AND OBJECTIVES**

The Alaska Board of Fisheries has established management plans for North Gulf Coast and Resurrection Bay salmon (Appendix A1). These plans provide for the sustained yield of area fisheries, as well as establishing allocation and management guidelines for ADF&G managers. Management plans and policies established for Resurrection Bay for Chinook salmon include the following:

Resurrection Bay Salmon Management Plan 5 AAC 21.376. This management plan provides allocation and management guidelines for Resurrection Bay salmon fisheries. The plan stipulates that coho and Chinook salmon fisheries of Resurrection Bay be managed exclusively for sport fisheries and provides for a commercial fishery for other salmon species only if the prosecution of these fisheries does not interfere with the sport fishery in Resurrection Bay.

North Gulf Coast King Salmon Sport Fishery Management Plan 5 AAC 58.065. This management plan directs king (Chinook) salmon fishery effort to hatchery stocks and stabilizes the sport harvest of Chinook salmon in the North Gulf Coast.

The purpose of the Chinook salmon enhancement program is to provide early-run sport fishing opportunities in Resurrection Bay. The management objectives are as follows: 1) produce a return of 4,000-6,000 early-run adult Chinook salmon to Resurrection Bay, and 2) generate 10,000 angler-days of annual sport fishing effort directed at stocked early-run Chinook salmon in Resurrection Bay.

No formal escapement goals have been established for Chinook salmon runs in the North Gulf Coast.

## **COHO SALMON FISHERIES**

### **AREAWIDE OVERVIEW**

The North Gulf Coast and Resurrection Bay annually support one of the largest marine coho salmon sport fisheries in Alaska. The sport coho salmon fishery has grown substantially since the 1990s and is one of the most popular sport fisheries in NGCMA. Natural bathymetric features, Aialik Peninsula and the Chiswell Ridge, combined with coastal ocean currents and upwellings result in an area rich in primary production that attract great numbers of feeding salmon. This fishery starts in late June to early July as anglers target wild and hatchery coho salmon feeding

just outside of Resurrection Bay. This fishery culminates with the Seward Silver Salmon Derby, held each August since 1956, and a shoreline fishery over Labor Day weekend.

## **STOCKING PROGRAM**

ADF&G's current stocking goal is 240,000 coho salmon smolt at 2 Resurrection Bay locations: Lowell Creek (120,000 fish) and Seward Lagoon (120,000 fish). CIAA also has a permit to release another 250,000 coho salmon smolt into Bear Creek. From 2006 through 2008, these hatcheries combined stocked on average about 413,000 coho salmon smolt and 400,000 fry annually (Table 4, Appendix B2).

The Resurrection Bay coho salmon enhancement program was initiated in 1964 at Bear Lake to supplement the production of wild stocks. The enhancement program included stocking Bear Lake with hatchery-reared coho salmon fingerlings and eradicating major competitors such as threespine stickleback (*Gasterosteus aculeatus*). The program initially resulted in increased coho salmon smolt production (Vincent-Lang 1987). However, Bear Lake gradually became repopulated with threespine stickleback, and the lake was rehabilitated again in 1971. Subsequent survival of stocked hatchery-reared fingerling and smolt in some years has exceeded 50%. Coupled with a corresponding high survival to adults, this has increased the catch and harvest in the sport fishery.

ADF&G began to enhance coho salmon annually in Resurrection Bay in 1969 with hatchery-reared smolt at several local release sites (Table 4, Appendix B2). Although survival rates have varied between sites and years, smolt-to-adult survival has been as high as 15%. The contribution of these fish to the sport fishery (up to 51%) has also been significant (Vincent-Lang 1987; Vincent-Lang et al. 1988; Carlon and Vincent-Lang 1989, 1990). A recent study (Bosch 2011) showed that ADF&G stocking at Seward Lagoon and Lowell Creek sites provide as much as 80% of the coho salmon harvested from the Seward beach fishery during late August and September. Coho salmon released from hatcheries in Cook Inlet, Resurrection Bay, and Prince William Sound are all harvested by sport anglers fishing out of Seward (Bosch 2011). The hatchery contribution of coho salmon to this harvest was 33% in 2003, 24% in 2004, and 33% in 2005. Coho salmon released from hatcheries in Prince William Sound, Resurrection Bay, and Cook Inlet all contributed to this harvest.

## **AREAWIDE CATCH, HARVEST, AND EFFORT**

The average annual catch of coho salmon in NGCMA for 2004-2008 was approximately 126,800 fish (Table 6, Figure 5) and the high was 170,000 fish in 2005. The average harvest during this time was 102,498 coho salmon and anglers on average harvested 83% of the catch.

In 2005, excellent survival of coho salmon led to the highest catch (about 170,000 fish) and harvest (about 136,000 fish) in the history of the fishery. Shore anglers also benefitted from excellent returns in 2005, with the second highest catch of coho salmon (13,399 fish) from the beach since 2001 when almost 16,000 fish were caught. The 2006 season was hampered by poor weather conditions and was reflected in the catch rates of all user groups. The fishery rebounded in 2007 when the total catch exceeded 127,000 coho salmon; however, most of the catch (97.7%) was by charter and private boat anglers.

The total catch of coho salmon in 2009 again exceeded 100,000 fish with an estimated harvest of just over 91,000 (Table 6). Anglers fishing from boats reported good catches of fish in the North

Gulf Coast from the 1st week of July through early August, slowing through the end of August and into September. The estimated catch of 2,210 coho salmon and harvest of 1,700 from the beach fishery were the lowest on record since 1990, and well below the historical average. This reflects both poor survival of stocked small smolt and an increase in harvest by boat anglers. The overall catch and harvest from boat anglers, both charter and private, has continued to increase, while catch and harvest rates from shorebased anglers has declined. Once the new ADF&G hatchery starts releasing coho salmon in 2013, angling at beach sites should improve regardless of the increased interception by boat anglers.

## **AREAWIDE MANAGEMENT**

The Alaska Board of Fisheries has established management plans for North Gulf Coast and Resurrection Bay salmon (Appendix A1). These plans provide for the sustained yield of area fisheries, as well as establishing allocation and management guidelines for ADF&G managers. Management plans and policies established for Resurrection Bay for coho salmon include the following:

Bear Lake Management Plan 5 AAC 21.375. This management plan establishes guidelines for the enhancement of coho and sockeye salmon in Bear Lake near Seward. In essence, the plan provides for the enhancement of sockeye salmon in Bear Lake intended for commercial use in Resurrection Bay, provided the enhancement does not negatively impact coho salmon smolt production from Bear Lake. Surplus sockeye salmon are split 50:50—50% to CIAA cost recovery, 50% to the commercial fishing fleet. This management plan was put aside by BOF at their statewide meeting in March 2009 to allow CIAA to harvest 100% of sockeye salmon for cost recovery. BOF further stipulated this would sunset after 2 years.

Resurrection Bay Salmon Management Plan 5 AAC 21.376. This management plan provides allocation and management guidelines for Resurrection Bay salmon fisheries. The plan stipulates that coho and Chinook salmon fisheries of Resurrection Bay be managed exclusively for sport fisheries, and provides for a commercial fishery for other salmon species only if the prosecution of these fisheries does not interfere with the sport fishery in Resurrection Bay.

The purpose of the coho salmon enhancement program is to increase coho salmon sport fishing opportunities in Resurrection Bay while maintaining the natural production of Resurrection Bay drainages. The management objectives are as follows: 1) produce a return of 20,000 adult coho salmon to Resurrection Bay, and 2) generate 25,000 angler-days of annual sport fishing effort directed at stocked coho salmon in Resurrection Bay.

Although no formal escapement goals have been established for coho salmon returns in Resurrection Bay, CIAA allows a minimum of 300 coho salmon into Bear Lake. A weir on Bear Creek is used to collect coho salmon eggs for ADF&G and CIAA stocking activities.

## **SOCKEYE SALMON FISHERY**

### **AREAWIDE OVERVIEW**

Sockeye salmon return to NGCMA streams from late May through July and spawn from mid-July through September. The major sockeye salmon fishery in NGCMA takes place at the mouth of Resurrection River and targets hatchery stocks returning to Bear Lake. Smaller sockeye salmon fisheries occur on wild stocks throughout the management area and are accessible only

by boat or air. A popular fishery occurs at Little Johnstone Bay because charter operators fly clients in from as far away as Anchorage and Soldotna. These small fisheries generally do not receive enough responses in the SWHS to accurately estimate effort or harvest.

## **STOCKING PROGRAM**

ADF&G does not have a sockeye salmon stocking program in North Gulf Coast waters. Cook Inlet Aquaculture Association operates the Trail Lake hatchery and Bear Lake weir under a cooperative agreement with ADF&G. From 2007 through 2009, CIAA stocked on average approximately 2.4 million fry into Bear Lake and 1.3 million smolt into Bear Creek (Table 4, Appendix B3). The CIAA egg-take goal for Bear Lake sockeye salmon is 6 million eggs. Brood stock is allowed to enter the lake, mature under natural conditions, and is then collected at spawning areas in the lake. This method of collection was found to minimize broodstock mortality. Bear Lake has a desired escapement range of 5,600 to 13,200 sockeye salmon for broodstock and natural spawning requirements (Hammarstrom and Ford 2009). This goal has been achieved every year since 1994 (Hammarstrom and Ford 2009).

## **AREAWIDE CATCH, HARVEST, AND EFFORT**

The average annual catch of sockeye salmon in NGCMA for 2004–2008 was approximately 6,347 fish with an estimated harvest of 4,983 fish (Table 7, Figure 6). Sockeye salmon anglers harvested 79% of their catch on average during the same period. In 2009, anglers caught a record 11,959 sockeye salmon while harvesting 10,619 fish, or 89% of their catch. The popularity of the North Gulf Coast sockeye salmon sport fishery is increasing and the catch of sockeye salmon is increasing annually by approximately 760 fish and is driven by Resurrection River catches from hatchery releases.

## **AREAWIDE MANAGEMENT**

The Alaska Board of Fisheries has established management plans for North Gulf Coast and Resurrection Bay salmon (Appendix A1). These plans provide for the sustained yield of area fisheries, as well as establishing allocation and management guidelines for ADF&G managers. Management plans and policies established for Resurrection Bay for sockeye salmon include the following:

Bear Lake Management Plan 5 AAC 21.375. This management plan establishes guidelines for the enhancement of coho and sockeye salmon in Bear Lake near Seward. In essence, the plan provides for the enhancement of sockeye salmon in Bear Lake intended for commercial use in Resurrection Bay, provided the enhancement does not negatively impact coho salmon smolt production from Bear Lake. Surplus sockeye salmon are split 50:50—50% to CIAA cost recovery, 50% to the commercial fishing fleet. This management plan was put aside by BOF at their statewide meeting in March 2009 to allow CIAA to harvest 100% of sockeye salmon for cost recovery. BOF further stipulated this would sunset after 2 years.

CIAA broodstock requirements are approximately 2,460 female and male sockeye salmon.

## **PINK SALMON FISHERIES**

### **AREAWIDE OVERVIEW**

Pink salmon are the most common wild stock returning to Resurrection Bay and North Gulf Coast streams. Pink salmon begin their annual migration in late July through mid-September with peak run timing occurring in mid to late August. Pink salmon returns are typically largest on even years. Boat operators typically do not target pink salmon.

### **STOCKING PROGRAM**

There currently is no pink salmon stocking program in NGCMA.

### **AREAWIDE CATCH, HARVEST, AND EFFORT**

The 2004–2008 average annual catch of pink salmon was 22,550 with a harvest of 5,644 fish (Table 8, Figure 7). During this time, anglers have harvested an average of 25% of their pink salmon catch. Both charter and private boat catch and harvest rates have continued to increase since 2000. The recent increase in private boat effort is most likely the major contributing factor in the increased catch of pink salmon. Shore angler catch and harvest of pink salmon have been relatively stable since 2000. The pink salmon fishery peaked in 2005 when anglers caught about 30,000 pink salmon and harvested just over 7,000, which were the highest in the last 20 years. Poor weather conditions in 2006 were a factor in the reduction of catch and harvest that season. Pink salmon catch numbers were again high in 2007 when anglers landed over 28,000 pink salmon and retained over 5,900 fish. Anglers fishing from boats, charter and private combined, had the most success catching pink salmon during the 2006-2008 seasons. Shore-based anglers had a banner year in 2007, catching over 7,400 pink salmon while releasing almost 70% of the catch. The 2008 season was another excellent year for anglers because both catch and harvest were above the 5-year average. The 2009 season was a good pink salmon year with a catch of about 16,757 fish and a harvest of 4,399, both higher than 2004 and 2006. Bright ocean-caught pink salmon are often misidentified as coho salmon until anglers start to clean these fish dockside. Without taking into account the 2009 season, the current trend shows an annual increase in catch of about 1,370 pink salmon since 2000.

### **AREAWIDE MANAGEMENT**

There are no formal management objectives for pink salmon in the NGCMA. ADF&G has a constitutional mandate to manage on the principle of sustained yield. Within the sustained yield principle, Division of Sport Fish goals seek to optimize social and economic benefits and, where possible, expand opportunity to participate in diverse fisheries on these stocks.

## **CHUM SALMON FISHERIES**

### **AREAWIDE OVERVIEW**

The chum salmon fishery in the NGCMA is a relatively small fishery. Wild stocks of chum salmon spawn in most NGCMA streams from mid-July through late August with the peak of the return in late June through early August. Most boat catches and harvest are incidental to anglers targeting other species such as Chinook or coho salmon. Shore anglers targeting chum salmon frequent Spring Creek, Fourth of July Creek, the mouth of the Resurrection River, and Tonsina Creek in Resurrection Bay.

## **STOCKING PROGRAM**

There currently is no chum salmon stocking program in NGCMA.

## **AREAWIDE CATCH, HARVEST, AND EFFORT**

Catches of chum salmon vary annually in this small fishery. From 2004 through 2008 the average annual catch of chum salmon was approximately 2,975 with a harvest of about 898 fish (Table 9, Figure 8). During this period, anglers have harvested an average of 30% of the chum salmon catch, which has averaged about 2,975 fish. From 2006 through 2008, the shore fishery has averaged almost 61% of the catch and 71% of the harvest. During this same period, harvest was much lower by boat anglers, both charter (18%) and private (10%). The chum salmon catch of approximately 4,695 in 2008 was the highest in the last 20 years. The 2009 catch of 1,426 and harvest of 580 chum salmon were below the 2004-2008 averages; 2009 had the lowest catch since 1998. Since 1999, the current trend for this fishery indicates an overall annual decline in catch.

## **AREAWIDE MANAGEMENT**

There are no formal management objectives for chum salmon in the NGCMA. ADF&G has a constitutional mandate to manage on the principle of sustained yield. Within the sustained yield principle, Division of Sport Fish goals seek to optimize social and economic benefits, and where possible, expand opportunity to participate in diverse fisheries on these stocks.

## **DOLLY VARDEN FISHERIES**

### **AREAWIDE OVERVIEW**

Dolly Varden are available to anglers throughout the year in the NGCMA; however, peak fishing opportunities generally occur as they migrate to and from wintering and spawning areas. Peak harvest occurs in May and from mid-July through September, but much of the catch is incidental to fishing for other species. Spawning begins as early as September and may continue into November.

This fishery starts each spring as the ice melts from freshwater wintering ponds and lakes in NGCMA drainages. Anglers fish these ponds and lakes each spring before these anadromous fish emigrate to nearshore marine environments. Saltwater anglers target Dolly Varden throughout the summer until fish begin returning to overwintering areas in the fall.

## **STOCKING PROGRAM**

There is currently no Dolly Varden stocking program in NGCMA.

## **AREAWIDE CATCH, HARVEST, AND EFFORT**

The 2004-2008 average annual catch of Dolly Varden is 927 fish with a harvest of 279 fish (Table 10, Figure 9). Although overall catches of Dolly Varden are predominately by boat anglers, the percent harvested is higher for shore anglers. The shore fishery harvest is 50% of the catch on average (2004-2008). Anglers fishing from boats, charter and private, catch these fish incidentally while targeting other species. The catch from boats averaged 630 fish from 2004 through 2008 with a harvest rate of 21%. The 2006 shore fishery catch (102 fish) and harvest (102 fish) was the second lowest in the past 20 years when 55 fish were caught from the beach in

1999 and 33 of them were harvested. The shore fishery rebounded in 2007 when 275 fish were caught and 148 were harvested, but this was still well below the average catch of 403 and harvest of 215 fish during 2000–2008. The 2008 shore fishery was again below average and no Dolly Varden were harvested. The total catch (303 fish) and harvest (165 fish) of Dolly Varden for 2009 was the lowest on record (Table 10).

## **AREAWIDE MANAGEMENT**

There are no formal management objectives for Dolly Varden in the NGCMA. ADF&G has a constitutional mandate to manage on the principle of sustained yield principle. Within the sustained yield principle, Division of Sport Fish goals seek to optimize social and economic benefits and, where possible, expand opportunity to participate in diverse fisheries on these stocks.

## **HALIBUT FISHERIES**

### **AREAWIDE OVERVIEW**

Halibut are one of the most sought after fish species by anglers in the marine waters of the NGCMA. They are a highly prized big game fish known for their fighting ability, ease of preparation, and gourmet taste. Most halibut are harvested from May through early September with the average fish weighing between 20 and 40 pounds but often exceeding 100 pounds. Most halibut are caught by anglers fishing from private boats and by the large charter fleet that operates out of the Port of Seward. Halibut fishing out of Seward is highly dependent upon weather. Charter vessels are typically larger than most of the private fleet, which allows them to venture farther into North Gulf Coast waters and well into Prince William Sound to fish productive waters in the Gulf of Alaska. Halibut catch rates begin to increase in May as fish migrate from deeper wintering and spawning areas into shallower areas and catch rates begin to decrease through September when they return to deeper waters.

Halibut have been managed under a treaty between the U.S. and Canada since 1923. This treaty resulted in the formation of the International Pacific Halibut Commission (IPHC). IPHC sets harvest goals for halibut for each of 10 regulatory areas from Oregon to Alaska. The Port of Seward and the entire North Gulf Coast fall into Area 3A. Once harvest goals have been set, it is the responsibility of the North Pacific Fishery Management Council (NPFMC) to allocate the harvest between commercial, sport, and subsistence users. The council (NPFMC) can also set bag limits. A more detailed history of the North Gulf Coast halibut fishery can be found in Meyer and Stock (2002).

The Division of Sport Fish annually collects fishery-related age structure, sex, and length data, and estimates harvest and catch to help IPHC and NPFMC make informed management and allocation decisions. Each guide or charter boat operator is required to fill out daily logbooks that record the catch and harvest of all species of fish by individual anglers. ADF&G will continue to collect, confirm, and compile information from the charter and guide logbooks.

### **AREAWIDE CATCH, HARVEST, AND EFFORT**

The estimated average annual sport catch of halibut from the NGCMA in 2004-2008 was 93,063 fish (Table 11, Figure 10). The 2006 halibut catch was approximately 91,040 fish with a harvest of 57,915, even though the season was often hampered by poor weather conditions. The 2007

halibut catch of 96,449 fish is the third largest on record and produced a record harvest of 62,579 fish. In 2008, weather conditions were good for anglers venturing out of the Port of Seward, producing a record catch of almost 98,700 halibut with a total harvest of almost 60,900 fish. The 2009 fishery performance was well below the 2004–2008 average. In 2009, 76,761 halibut were caught, but only 50,604 were harvested.

Halibut catches from NGCMA increased dramatically from 1990 (16,527 fish) through 2008 (98,691 fish). Since 2000, the estimated increase is almost 8,000 fish annually. The halibut charter industry has had record catches on an annual basis over the last 20 years in the NGCMA. Catches from the charter industry have increased 8-fold from 1990 (7,625 fish) to 2008 (61,320 fish). Private boat angler catch rates increased 4-fold during the same period.

## **AREAWIDE MANAGEMENT**

State management limits are the same as federal regulations for halibut: 2 fish per day, 4 fish in possession. The fishery is open year-round except in January, when the fishery is closed to protect spawning adults.

The State of Alaska does not have direct management authority of halibut fisheries in Alaska. Halibut fisheries are managed under an international treaty—the 1953 Halibut Convention as amended by the 1979 Protocol (McCaughran and Hoag 1992). The International Pacific Halibut Commission (IPHC) was formed to ensure an optimal sustained yield of the North Pacific halibut resource. However, the IPHC does not have authority to allocate the catch quota among the various halibut fisheries in U.S. waters. In U.S. waters, the responsibility for allocation of the catch quota among fisheries falls to the North Pacific Fishery Management Council (NPFMC) via the Magnuson-Stevens Fishery Conservation and Management Act of 1996. ADF&G, Division of Sport Fish, provides harvest data and other information to both IPHC and NPFMC to aid in making management and allocation decisions.

Under treaty, North Pacific halibut stocks are managed for optimum sustained yield. Currently, the North Pacific halibut stock is fully utilized. A constant exploitation rate strategy is used to manage North Pacific halibut stocks. IPHC annually calculates the exploitable biomass available for harvest in each of 10 regulatory areas. Constant exploitation yield (CEY) is calculated for each regulatory area as the estimated exploitable biomass available times a 20% exploitation rate. Thus, each CEY represents the total allowable removals (i.e., harvest, waste, and legal-size bycatch) for each regulatory area. IPHC then estimates the sport and subsistence harvests for each regulatory area, as well as mortality from waste and legal-size bycatch, and these are subtracted from the CEY. The remainder is then “allocated” to the directed commercial halibut fishery. This factoring of the catch has, to the present, been done by IPHC and the final numbers “approved” by NPFMC on an annual basis. Under this management approach, CEY changes annually, reflecting the estimated biomass of exploitable halibut.

The charter fleet has operated under a guideline harvest level (GHL) since September 2003. The GHL was created by NPFMC as a target harvest level for each IPHC area that should not be exceeded but was not a hard limit on harvest. NPFMC is currently exploring options to limit charter halibut harvest, which may include a lower daily bag limit or a charter halibut boat limit or both. Additionally, the state has used its emergency order (EO) authority to limit harvest from charter guides. EOs have been issued 2 of the last 3 years to restrict charter boat skippers and crew from retaining fish while clients are on board in an attempt to keep the harvest of halibut under the federal GHL. A solution is currently under consideration by NPFMC, and the state has

added halibut to its groundfish monitoring program to improve tracking of halibut harvests by charter boat anglers.

## **ROCKFISH FISHERIES**

### **AREAWIDE OVERVIEW**

Rockfish are a popular target of sport anglers fishing NGCMA marine waters. A variety of rockfishes, species of the genera *Sebastes* and *Sebastolobus*, inhabit the marine waters of the NGCMA. These rockfishes are categorized into the following groups based on habitat preferences: slope, demersal shelf, and pelagic shelf. The sport fishery primarily targets demersal and pelagic shelf rockfish, with slope rockfish only occasionally harvested. Although many species of rockfish have been identified in the NGCMA, the most commonly harvested *Sebastes* species are the demersal yelloweye rockfish (*S. ruberrimus*), pelagic black rockfish (*S. melanops*), demersal quillback rockfish (*S. maliger*), and demersal copper rockfish (*S. caurinus*). Although available year-round, most rockfish are harvested in the sport fishery from May through early September. Management issues and stock status are discussed in Meyer and Stock (2002).

### **AREAWIDE CATCH, HARVEST, AND EFFORT**

The estimated average annual sport catch of rockfish from the NGCMA for 2004-2008 was 70,159 fish (Table 12, Figure 11) and harvest averaged 43,566 fish. The overall average harvest rate was 62% for rockfish in the NGCMA.

The summer of 2004 was a particularly hot season and a record-breaking forest fire year in Interior Alaska. The dramatic increase in effort and catch in 2004 (Table 12, Figure 11) was attributed to anglers heading to the coast to escape smoke from the record number of forest fires in the interior of Alaska. The 2006 catch of rockfish from NGCMA waters was about 64,000 fish, which was below the 2004-2008 average. In 2007, rockfish catch (66,803 fish) was below average but harvest (44,384 fish) was not. The 2008 season produced the second highest catch (74,391 fish) and largest harvest (48,917 fish) in the history of this fishery. The 2009 fishery was above average with a catch of 76,663 fish and a harvest of 46,047 fish.

Since the 1990s, catch and harvest in numbers of fish has increased for rockfish in the NGCMA. Catches from the charter industry have averaged about 40% of the total annual catch since 2000, with private boat anglers accounting for about 60% of the total annual catch. The current linear trend in this fishery shows that catch rates are increasing by approximately 2,100 fish annually with harvest increasing by about 1,900 fish.

### **AREAWIDE MANAGEMENT**

Limits for rockfish in the NGCMA are 4 fish per day, 8 in possession (only 1 per day and 2 in possession may be nonpelagic), with no size restrictions. This limit was put into effect during the 2007–2008 BOF meeting for the NGCMA.

Due to a lack of stock assessment data, no formal fishery objectives have been established for rockfish sport fisheries in the NGCMA. ADF&G has a constitutional mandate to manage on the principle of sustained yield. Within the sustained yield principle, Division of Sport Fish goals seek to optimize social and economic benefits and, where possible, expand opportunity to

participate in diverse fisheries on these stocks. However, the following management approach is followed:

- 1) a conservative daily limit of 1 fish per day for nonpelagic species and a total daily limit of 4 rockfish
- 2) public education regarding rockfish life history and how to avoid catching these fish unintentionally

Rockfish management can be challenging and many rockfish stocks in California, Oregon, Washington, and British Columbia are depleted. The Division of Sport Fish groundfish harvest monitoring program provides estimates of species, age, length, and sex composition, as well as the spatial distribution of the rockfish sport harvest. This program is effective at describing harvest, but these data alone cannot be used to evaluate stock status or develop management objectives because pelagic and nonpelagic species are not accounted for in the Statewide Harvest Survey. The Division of Commercial Fisheries also collects fishing-independent data. A meaningful time series would have to be developed before a program could be developed that estimates stock status independent of the rockfish fisheries.

Since 2000, more than 24,000 rockfish are released annually on average by NGCMA sport anglers. Rockfish captured at depths greater than 60 ft often suffer physical damage associated with rapid decompression (called barotrauma). Fish suffering barotrauma are believed to have a poor probability of surviving if released. ADF&G is completing a 3-year project to assess rockfish release mortality in Prince William Sound. This project will estimate discard (i.e., catch and release) survival of 2 groups of yelloweye rockfish: one group released at the water surface and a second group released at depth with a deepwater release mechanism. Preliminary estimates of yelloweye rockfish survival when released at depth with a deepwater release device are encouraging (98%) and suggest that the survival of discarded yelloweye rockfish (about 24%) can be significantly increased if fish are released at depth rather than at the surface.

## **LINGCOD FISHERIES**

### **AREAWIDE OVERVIEW**

Lingcod are targeted by anglers in the NGCMA and are commonly found along the outer North Gulf Coast. They are voracious and feed on many types of fish, crustaceans, and octopuses, and are often cannibalistic. Lingcod prefer rocky reef habitats and typically do not stray far from their home reef (Barss and Demory 1989; Jagielo 1990). However, some fish move great distances and tagged lingcod have been caught 50 kilometers from their release site (Mathews and LaRiviere 1987; Jagielo 1990). Lingcod caught in the North Gulf typically range in age from 7 to 16 years old (Vincent-Lang 1991; Meyer 1992, 1993b). They commonly exceed 1 meter in length and weigh more than 50 pounds. Growth is relatively rapid, with both sexes reaching 50-60 cm by age 4 (Meyer 1992). Unlike rockfish, lingcod have no swim bladder and can be released with a high expectation of survival.

### **AREAWIDE CATCH, HARVEST, AND EFFORT**

The estimated average annual sport catch of lingcod from the NGCMA for 2004-2008 was 16,861 fish (Table 13, Figure 12) and harvest averaged 7,002. The overall average harvest rate was 42% for lingcod in the NGCMA.

The 2006 catch of lingcod from the NGCMA was 14,785 fish, which was below the 2004-2008 (5-year) average. In 2007, lingcod catch (20,729 fish), and harvest (9,047 fish) were the second highest on record and were second only to 2008, with a catch of 23,940 fish and a harvest of 9,163 fish. The 2009 fishery was another above-average year with a catch of 18,497 and a harvest of 7,002 lingcod.

Since the 1990s, catch and harvest in numbers of fish has increased for lingcod in the NGCMA. Catches from the charter industry have averaged about 57% of the total annual catch for 2004–2008, with private boats accounting for about 43%. From 2006 through 2008, the charter industry catch averaged almost 12,000 fish annually, which is almost 4 times greater than the 1990s average catch of 3,300 fish. Harvest during this same period has also increased 3-fold. The private boat angler catch has increased by about 50% from 2006 through 2008 compared to the 1990s, whereas harvest has increased by about 30%. The current linear trend in this fishery shows that catch rates are increasing by approximately 1,600 fish annually with harvest increasing by about 600 fish.

## **AREAWIDE MANAGEMENT**

Due to a lack of stock assessment data, no formal fishery objectives have been established for lingcod sport fisheries in the NGCMA. The Alaska Department of Fish and Game has a constitutional mandate to manage on the principle of sustained yield. Within the sustained yield principle, Division of Sport Fish goals seek to optimize social and economic benefits and, where possible, expand opportunity to participate in diverse fisheries on these stocks. However, the following management approach for the sport fishery is followed:

- 1) a conservative daily bag limit of 1 per day, 1 in possession
- 2) seasonal closure to protect spawning fish from January 1 to June 30
- 3) a 35-inch minimum size limit for both sport and commercial fisheries to allow fish the opportunity to spawn at least once before reaching a harvestable size
- 4) sport caught lingcod may only be landed by hand or net if they are to be released
- 5) all waters north of a line between Aialik Cape and Cape Resurrection are closed to lingcod fishing

The Division of Sport Fish groundfish harvest monitoring program provides baseline biological data for the recreational lingcod fisheries throughout Southcentral Alaska. The current port sampling and creel survey provide the only available information and are integral to the management of these fish. Other management activities consist of attending public meetings and working with the local Fish and Game Advisory Committee.

The current stock status of lingcod in North Gulf coast waters is unknown and ADF&G has no fishery independent assessment tool. A line-transect study to estimate the abundance of lingcod in the North Gulf Coast and in Resurrection Bay was conducted in 2009. The data for this study are still being analyzed, and preliminary results should be available soon. A baseline data survey was conducted in 1998 (in the Chiswell Islands and in Resurrection Bay) and a comparison with the new data may help to determine if management tools (i.e., closed areas, minimum size restrictions, lower bag limits) that were put in place in 1993 have been effective in maintaining a sustainable harvest of lingcod. Given these aggressive fish are easy to find and easy to catch, overfishing for lingcod in Resurrection Bay is likely. Lingcod populations in Washington,

Oregon, and California are considered overfished, and these fisheries are currently in a 10-year rebuilding program (NMFS 2001).

## SHARKS

### AREAWIDE OVERVIEW

The shark fisheries in the NGCMA are relatively new. The 3 most commonly caught sharks in the NGCMA are the salmon shark (*Lamna ditropis*), spiny dogfish (*Squalis acanthias*), and the Pacific sleeper shark (*Somniosus pacificus*). Although all 3 species are caught incidentally in other fisheries, there is a growing interest in targeting salmon shark as a sport fish by charter operators out of the Port of Seward and by a small number of unguided anglers.

The spiny dogfish makes up about 95% of the shark catch in the NGCMA (Meyer and Stock 2002). Anglers fishing for halibut and other groundfish generally catch these sharks incidentally. From 1998 through 2000, only 1.6% of spiny dogfish caught by anglers were retained (Meyer and Stock 2002). Salmon sharks make up a much smaller portion of the annual shark catch, but they are a targeted species and make good table fare. At least 1 charter operator in Seward specialized in salmon shark fishing trips. Salmon sharks are a fairly large fish; in the Gulf of Alaska the average length of 72 fish measured since 1987 was 7.3 ft (223 cm). These fish require special knowledge to successfully catch and land. Salmon sharks have an abrasive skin and tend to roll when caught, wrapping themselves tightly in fishing line and breaking off. Pacific sleeper sharks have an inedible flesh that may be poisonous, and these fish are rarely kept.

Salmon sharks and spiny dogfish are both slow-growing, late-to-mature species. Both are ovoviviparous, giving birth to live young called pups. The average litter size for salmon sharks is 5 pups, whereas spiny dogfish give birth to an average 7 pups. The maximum reported age for salmon sharks is about 25 years (Tanaka 1980), whereas dogfish may live to more than 80 years old (Meyer and Stock 2002). Both species are pelagic and are known to move great distances.

During 2005 and 2006, the shark catch by anglers based out of the Port of Seward increased considerably from a transient school of spiny dogfish that moved into the North Gulf Coast. However, based on the low percentage of spiny dogfish harvested (2% of the catch) by sport anglers, these fish are not desirable and the potential for excessive waste exists if current regulations are liberalized. Spiny dogfish in particular have become a nuisance, at least for charter boat operators fishing for groundfish in western Prince William Sound and near Montague Island in the Gulf of Alaska. There is the potential to harvest more of these fish. In 2004–2005, BOF adopted regulations (5AAC 28.379) that allow a commissioner's permit to be issued to commercially harvest spiny dogfish. Since then, only 1 permit has been issued to harvest spiny dogfish, and only 1 trip has been conducted.

The proportion of salmon shark in the total catch and harvest (which includes all shark species) is unknown, but the harvest of salmon shark is recorded by samplers in major NGCMA ports. There are currently no reliable estimates of stock status for any shark species in the NGCMA. The tendency for sharks to congregate in nearshore waters during the summer makes them particularly vulnerable to sport anglers. This, combined with more media coverage of shark fishing, has increased the popularity of this big game fish. It has also been speculated that an Individual Fishing Quota implemented on halibut charter boats may direct more effort toward sharks. The vulnerability of sharks to overexploitation is well documented (Walker 1998).

## **AREAWIDE CATCH, HARVEST, AND EFFORT**

Most sharks caught in the sport fishery in 2004-2008 were released, with an average harvest rate of only 1.6% (Table 14, Figure 13). Although the SWHS does not separate sharks by species, most harvested sharks are probably salmon sharks. Fluctuations in shark catch and harvest statistics have been large in the past because of the short time series of data and the changing nature of the fishery. Since 2000, charter boat anglers have caught and harvested most of the sharks landed at the Port of Seward.

The catch and harvest of sharks has increased markedly since 1996, when the first yearly catch (29 fish) and harvest (22 fish) data were collected. Catches of sharks increased dramatically from 2004 to 2005 when the largest shark catch (21,041 fish) and harvest (358 fish) were recorded. The average annual catch from 2004 to 2008 was about 11,699 fish. During 2006, a total of 12,526 sharks were caught with a harvest of 116 sharks. The 2007 catch of 13,706 sharks was the second largest on record; 136 were harvested. Shark catches in 2008 had a dramatic decline to about 5,871 sharks; however, harvest was comparable to 2007. The catch of sharks in 2009 fell to 4,587 and only 25 of these fish harvested. This was the lowest catch since 2002 and the second lowest harvest overall.

## **AREAWIDE MANAGEMENT**

Due to a lack of stock assessment data, no formal fishery objectives have been established for shark sport fisheries in the NGCMA. The statewide Sport Shark Fishery Management Plan (5AAC 75.012) states that ADF&G shall manage shark sport fisheries for sustained yield. Within the sustained yield principle, Division of Sport Fish goals seek to optimize social and economic benefits and, where possible, expand opportunity to participate in diverse fisheries on these stocks. However, the following management approach is followed:

- 1) a conservative daily bag limit of 1 fish per day, 1 in possession and an annual limit of 2 sharks
- 2) sport harvest of all sharks must be recorded on a fishing license or harvest record card

The Division of Commercial Fisheries groundfish harvest monitoring program collects information on age, length, sex, and location of harvested salmon sharks, Pacific sleeper sharks, and spiny dogfish in order to develop a time series of data on these fish. To help manage these species, ADF&G is cooperating with other shark researchers to gain more information about age, growth, diet, migration, and the thermal biology of sharks. Although there are no formal objectives with respect to the shark fishery, it is hoped that the harvest of these species can be characterized using several years of data.

## **SHRIMP**

### **AREAWIDE OVERVIEW**

During the statewide shellfish meeting in March 2006, the BOF opened a personal use shrimp pot fishery in the North Gulf Coast from Aialik Cape to Gore Point. The open season is April 15 through September 15. Residents of Alaska with a sport fishing license, a Permanent Identification Card (PID), or an ADF&G Disabled Veterans license can obtain a permit to set up to 5 shrimp pots in this area. This permit must be in possession while participating in the fishery. The limit is 5 pots per person, with a maximum of 5 pots per vessel. There is no limit on the

amount of shrimp that can be harvested. Anglers are required to record the dates fished, location fished, number of pots fished, length of time fished, and the total harvest of shrimp. The permit must be mailed to ADF&G by September 30 whether or not the permit was used.

### **AREAWIDE CATCH, HARVEST, AND EFFORT**

This fishery is remote and 2006 was the first year the shrimp fishery took place in the NGCMA. There were 65 permits issued in 2006 and only 27 permits were returned to ADF&G. Total harvest in 2006 was low and estimated at approximately 4.7 gallons or 11.3 pounds of shrimp. In 2007, 139 permits were issued and 93 permits were returned, resulting in an estimated total harvest of 117.3 gallons or 281.5 pounds of shrimp. This fishery declined slightly in 2008 with 122 permits issued (all returned) and a harvest of only 31.4 gallons or approximately 75.4 pounds of shrimp (only 44 permits reported fishing activity). Interest in this fishery is expected to increase in the future; however, the economics of high fuel costs may inhibit this fishery.

### **AREAWIDE MANAGEMENT**

There are no formal fishery objectives established for the personal use shrimp fishery in the NGCMA. ADF&G has a constitutional mandate to manage on the principle of sustained yield. Within the sustained yield principle, Division of Sport Fish goals seek to optimize social and economic benefits and, where possible, expand opportunity to participate in diverse fisheries on these stocks.

The Division of Commercial Fisheries monitors the status of shrimp stocks by conducting pot surveys. ADF&G will continue to monitor effort and harvest from this personal use fishery by issuing permits. Because permit return rates were so low the first 2 years of this fishery, reminder letters are now sent to permit holders who do not return permits as required.

## REFERENCES CITED

- Barss, W. H., and R. L. Demory. 1989. Movement of lingcod tagged off the central Oregon coast. Oregon Department of Fish and Wildlife, Fish Division, Information Report No. 89-8, Anchorage.
- Bosch, D. 2011. Coho salmon thermal-marked otolith recovery, Resurrection Bay, Alaska, 2003–2005. Alaska Department of Fish and Game, Fishery Data Series No. 11-06, Anchorage. <http://www.adfg.alaska.gov/FedAidpdfs/FDS11-06.pdf>
- Carlson, J. A., and D. Vincent-Lang. 1989. Sport efforts for and harvests of coho and Chinook salmon, halibut, and lingcod in Resurrection Bay sport fisheries, Alaska, during 1988. Alaska Department of Fish and Game, Fishery Data Series No. 83, Juneau. <http://www.adfg.alaska.gov/FedAidPDFs/fds-083.pdf>
- Carlson, J. A., and D. Vincent-Lang. 1990. Sport effort for and harvest of coho salmon, halibut, rockfish, and lingcod in Resurrection Bay sport fisheries, Alaska, during 1989. Alaska Department of Fish and Game, Fishery Data Series No. 90-6, Anchorage. <http://www.adfg.alaska.gov/FedAidPDFs/fds90-06.pdf>
- Hammarstrom, L. F., and E. G. Ford. 2009. Lower Cook Inlet annual finfish management report. Alaska Department of Fish and Game, Fishery Management Report No. 9-28, Anchorage. <http://www.adfg.alaska.gov/FedAidpdfs/fmr09-28.pdf>
- Howe, A. L., G. Fidler, A. E. Bingham, and M. J. Mills. 1996. Harvest, catch, and participation in Alaska sport fisheries during 1995. Alaska Department of Fish and Game, Fishery Data Series No. 96-32, Anchorage. <http://www.adfg.alaska.gov/FedAidPDFs/fds96-32.pdf>
- Howe, A. L., G. Fidler, and M. J. Mills. 1995. Harvest, catch, and participation in Alaska sport fisheries during 1994. Alaska Department of Fish and Game, Fishery Data Series No. 95-24, Anchorage. <http://www.adfg.alaska.gov/FedAidPDFs/fds95-24.pdf>
- Howe, A. L., R. J. Walker, C. Olnes, K. Sundet, and A. E. Bingham. 2001a. Revised Edition. Harvest, catch, and participation in Alaska sport fisheries during 1996. Alaska Department of Fish and Game, Fishery Data Series No. 97-29 (revised), Anchorage. [http://www.adfg.alaska.gov/FedAidPDFs/fds97-29\(revised\).pdf](http://www.adfg.alaska.gov/FedAidPDFs/fds97-29(revised).pdf)
- Howe, A. L., R. J. Walker, C. Olnes, K. Sundet, and A. E. Bingham. 2001b. Revised Edition. Harvest, catch, and participation in Alaska sport fisheries during 1997. Alaska Department of Fish and Game, Fishery Data Series No. 98-25 (revised), Anchorage. [http://www.adfg.alaska.gov/FedAidPDFs/fds98-25\(revised\).pdf](http://www.adfg.alaska.gov/FedAidPDFs/fds98-25(revised).pdf)
- Howe, A. L., R. J. Walker, C. Olnes, K. Sundet, and A. E. Bingham. 2001c. Revised Edition. Participation, catch, and harvest in Alaska sport fisheries during 1998. Alaska Department of Fish and Game, Fishery Data Series No. 99-41 (revised), Anchorage. [http://www.adfg.alaska.gov/FedAidPDFs/fds99-41\(revised\).pdf](http://www.adfg.alaska.gov/FedAidPDFs/fds99-41(revised).pdf)
- Howe, A. L., R. J. Walker, C. Olnes, K. Sundet, and A. E. Bingham. 2001d. Participation, catch, and harvest in Alaska sport fisheries during 1999. Alaska Department of Fish and Game, Fishery Data Series No. 01-08, Anchorage. <http://www.adfg.alaska.gov/FedAidPDFs/fds01-08.pdf>
- Jagiello, T. H. 1990. Movement of tagged lingcod *Ophiodon elongatus* at Neah Bay, Washington. Fishery Bulletin 88:815-820.
- Jennings, G. B., K. Sundet, and A. E. Bingham. 2007. Participation, catch, and harvest in Alaska sport fisheries during 2004. Alaska Department of Fish and Game, Fishery Data Series No. 07-40, Anchorage. <http://www.adfg.alaska.gov/FedAidPDFs/fds07-40.pdf>
- Jennings, G. B., K. Sundet, and A. E. Bingham. 2009a. Estimates of participation, catch, and harvest in Alaska sport fisheries during 2005. Alaska Department of Fish and Game, Fishery Data Series No. 09-47, Anchorage. <http://www.adfg.alaska.gov/FedAidPDFs/FDS09-47.pdf>
- Jennings, G. B., K. Sundet, and A. E. Bingham. 2009b. Estimates of participation, catch, and harvest in Alaska sport fisheries during 2006. Alaska Department of Fish and Game, Fishery Data Series No. 09-54, Anchorage. <http://www.adfg.alaska.gov/FedAidPDFs/FDS09-54.pdf>
- Jennings, G. B., K. Sundet, and A. E. Bingham. 2010a. Estimates of participation, catch, and harvest in Alaska sport fisheries during 2007. Alaska Department of Fish and Game, Fishery Data Series No. 10-02, Anchorage. <http://www.adfg.alaska.gov/FedAidpdfs/Fds10-02.pdf>
- Jennings, G. B., K. Sundet, and A. E. Bingham. 2010b. Estimates of participation, catch, and harvest in Alaska sport fisheries during 2008. Alaska Department of Fish and Game, Fishery Data Series No. 10-22, Anchorage. <http://www.adfg.alaska.gov/FedAidpdfs/FDS10-22.pdf>
- Jennings, G. B., K. Sundet, and A. E. Bingham. 2011. Estimates of participation, catch, and harvest in Alaska sport fisheries during 2009. Alaska Department of Fish and Game, Fishery Data Series No. 11-45, Anchorage. <http://www.adfg.alaska.gov/FedAidpdfs/FDS11-45>
- Jennings, G. B., K. Sundet, A. E. Bingham, and D. Sigurdsson. 2004. Participation, catch, and harvest in Alaska sport fisheries during 2001. Alaska Department of Fish and Game, Fishery Data Series No. 04-11, Anchorage. <http://www.adfg.alaska.gov/FedAidPDFs/fds04-11.pdf>

## REFERENCES CITED (Continued)

- Jennings, G. B., K. Sundet, A. E. Bingham, and D. Sigurdsson. 2006a. Participation, catch, and harvest in Alaska sport fisheries during 2002. Alaska Department of Fish and Game, Fishery Data Series No. 06-34, Anchorage. <http://www.adfg.alaska.gov/FedAidpdfs/fds06-34.pdf>
- Jennings, G. B., K. Sundet, A. E. Bingham, and D. Sigurdsson. 2006b. Participation, catch, and harvest in Alaska sport fisheries during 2003. Alaska Department of Fish and Game, Fishery Data Series No. 06-44, Anchorage. <http://www.adfg.alaska.gov/FedAidpdfs/fds06-44.pdf>
- Mathews, S. B., and M. LaRiviere. 1987. Movement of tagged lingcod, *Ophiodon elongatus*, in the Pacific northwest. Fishery Bulletin 85:153-159.
- McCaughran, D. A., and S. H. Hoag. 1992. The 1979 Protocol to the convention and related legislation. International Pacific Halibut Commission, Technical Report No. 26, Seattle.
- Meyer, S. C. 1992. Biological characteristics of the sport harvest of marine groundfishes in Southcentral Alaska, 1991. Alaska Department of Fish and Game, Fishery Data Series No. 92-41, Anchorage. <http://www.adfg.alaska.gov/FedAidPDFs/fds92-41.pdf>
- Meyer, S. C., and C. E. Stock. 2002. Management report for Southcentral Alaska recreational halibut and groundfish fisheries, 2001. Alaska Department of Fish and Game, Fishery Management Report No. 02-05, Anchorage. <http://www.adfg.alaska.gov/FedAidPDFs/fmr02-05.pdf>
- Mills, M. J. 1991. Harvest, catch, and participation in Alaska sport fisheries during 1990. Alaska Department of Fish and Game, Fishery Data Series No. 91-58, Anchorage. <http://www.adfg.alaska.gov/FedAidPDFs/fds91-58.pdf>
- Mills, M. J. 1992. Harvest, catch, and participation in Alaska sport fisheries during 1991. Alaska Department of Fish and Game, Fishery Data Series No. 92-40, Anchorage. <http://www.adfg.alaska.gov/FedAidPDFs/fds92-40.pdf>
- Mills, M. J. 1993. Harvest, catch, and participation in Alaska sport fisheries during 1992. Alaska Department of Fish and Game, Fishery Data Series No. 93-42, Anchorage. <http://www.adfg.alaska.gov/FedAidPDFs/fds93-42.pdf>
- Mills, M. J. 1994. Harvest, catch, and participation in Alaska sport fisheries during 1993. Alaska Department of Fish and Game, Fishery Data Series No. 94-28, Anchorage. <http://www.adfg.alaska.gov/FedAidPDFs/fds94-28.pdf>
- NMFS (National Marine Fisheries Service). 2001. Endangered and threatened species: Puget Sound populations of copper rockfish, quillback rockfish, brown rockfish, and Pacific herring: Notice of determination of status review. Federal Register 66(64):17659-17668. National Archives and Records Administration, Washington, DC.
- Sigurdsson, D., and B. Powers. 2009. Participation, effort, and harvest in the sport fish business/guide licensing and logbook reporting programs, 2006-2008. Alaska Department of Fish and Game, Special Publication No. 09-11, Anchorage. <http://www.adfg.alaska.gov/FedAidPDFs/SP09-11.pdf>
- Tanaka, S. 1980. Biological investigation of *Lamna ditropis* in the north-western waters of the North Pacific [*In*] Report of investigation on sharks as a new marine resource (1979). Japan Fishery Resource Research Center, Tokyo (English abstract, translation by Nakaya).
- Vincent-Lang, D. 1987. Biological statistics for coho (*Oncorhynchus kisutch*) and sockeye (*O. nerka*) salmon in Resurrection Bay, Alaska, 1962-86. Alaska Department of Fish and Game, Fishery Manuscript No. 1, Juneau. <http://www.adfg.alaska.gov/FedAidPDFs/fms-001.pdf>
- Vincent-Lang, D. 1991. Age, length, and species compositions of groundfish harvested in the marine sport fisheries of Resurrection Bay, Alaska, 1988-1990. Alaska Department of Fish and Game, Fishery Data Series No. 91-28, Anchorage. <http://www.adfg.alaska.gov/FedAidPDFs/fds91-28.pdf>
- Vincent-Lang, D., S. Conrad, R. H. McHenry, and T. Edward. 1988. Migrations and age, sex, and length compositions of coho *Oncorhynchus kisutch* and sockeye *O. nerka* salmon in Resurrection Bay, Alaska during 1987. Alaska Department of Fish and Game, Fishery Data Series No. 40, Juneau. <http://www.adfg.alaska.gov/FedAidPDFs/fds-040.pdf>
- Walker, R. J., C. Olnes, K. Sundet, A. L. Howe, and A. E. Bingham. 2003. Participation, catch, and harvest in Alaska sport fisheries during 2000. Alaska Department of Fish and Game, Fishery Data Series No. 03-05, Anchorage. <http://www.adfg.alaska.gov/FedAidPDFs/fds03-05.pdf>
- Walker, T. I. 1998. Can shark resources be harvested sustainably? A question revisited with a review of shark fisheries. Marine and Freshwater Research 49: 553-572.



## **TABLES**

Table 1.—Number of angler-days expended in the North Gulf Coast Management Area compared to Southcentral and statewide, 1990–2008 and 2009.

| Year      | Effort (angler-days) |              |                  | Percent of statewide | Percent of Southcentral |
|-----------|----------------------|--------------|------------------|----------------------|-------------------------|
|           | Statewide            | Southcentral | North Gulf Coast |                      |                         |
| 1990      | 2,453,284            | 1,745,110    | 72,181           | 3                    | 4                       |
| 1991      | 2,456,328            | 1,782,055    | 73,683           | 3                    | 4                       |
| 1992      | 2,540,374            | 1,889,730    | 83,568           | 3                    | 4                       |
| 1993      | 2,559,408            | 1,867,233    | 90,274           | 4                    | 5                       |
| 1994      | 2,719,911            | 1,966,985    | 86,861           | 3                    | 4                       |
| 1995      | 2,787,670            | 1,985,539    | 100,194          | 4                    | 5                       |
| 1996      | 2,006,528            | 1,434,943    | 81,699           | 4                    | 6                       |
| 1997      | 2,079,514            | 1,400,983    | 90,031           | 4                    | 6                       |
| 1998      | 1,856,976            | 1,258,482    | 71,564           | 4                    | 6                       |
| 1999      | 2,499,152            | 1,659,966    | 84,742           | 3                    | 5                       |
| 2000      | 2,627,805            | 1,844,824    | 83,830           | 3                    | 5                       |
| 2001      | 2,621,941            | 1,560,562    | 91,477           | 3                    | 6                       |
| 2002      | 2,259,091            | 1,569,513    | 97,351           | 4                    | 6                       |
| 2003      | 2,219,398            | 1,535,501    | 95,579           | 4                    | 6                       |
| 2004      | 2,473,961            | 1,709,671    | 117,941          | 5                    | 7                       |
| 2005      | 2,461,933            | 1,712,610    | 115,605          | 5                    | 7                       |
| 2006      | 2,294,548            | 1,605,983    | 102,239          | 4                    | 6                       |
| 2007      | 2,543,674            | 1,799,352    | 119,553          | 5                    | 7                       |
| 2008      | 2,315,601            | 1,622,920    | 102,635          | 4                    | 6                       |
| Average   |                      |              |                  |                      |                         |
| 2004–2008 | 2,417,943            | 1,690,107    | 111,595          | 4                    | 6                       |
| 2009      | 2,216,445            | 1,522,345    | 99,195           | 4                    | 7                       |

Source: Mills (1991-1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011).

Note: Starting in 2001, location codes for Resurrection Bay are based on destination rather than location, so harvest, catch, and effort is estimated by “port of return” and a small portion of these estimates may have come from outside the North Gulf Coast Area.

Table 2.—Saltwater sport fishing effort by user group, North Gulf Coast Management Area, 1990–2008 and 2009.

| Year      | Saltwater effort | Charter boat |         | Private boat |         | Shore  |         |
|-----------|------------------|--------------|---------|--------------|---------|--------|---------|
|           |                  | Effort       | Percent | Effort       | Percent | Effort | Percent |
| 1990      | 69,485           | 17,810       | 25.6    | 36,556       | 52.6    | 15,119 | 21.8    |
| 1991      | 71,332           | 20,872       | 29.3    | 32,291       | 45.3    | 18,169 | 25.5    |
| 1992      | 80,814           | 21,342       | 26.4    | 41,206       | 51.0    | 18,266 | 22.6    |
| 1993      | 85,559           | 22,251       | 26.0    | 41,442       | 48.4    | 21,866 | 25.6    |
| 1994      | 85,742           | 26,664       | 31.1    | 38,807       | 45.3    | 20,271 | 23.6    |
| 1995      | 99,689           | 32,057       | 32.2    | 42,132       | 42.3    | 25,500 | 25.6    |
| 1996      | 81,499           | 23,214       | 28.5    | 36,156       | 44.4    | 22,129 | 27.2    |
| 1997      | 89,686           | 24,052       | 26.8    | 41,446       | 46.2    | 24,188 | 27.0    |
| 1998      | 71,034           | 22,409       | 31.5    | 32,129       | 45.2    | 16,496 | 23.2    |
| 1999      | 84,637           | 22,962       | 27.1    | 45,143       | 53.3    | 16,532 | 19.5    |
| 2000      | 83,551           | 27,184       | 32.5    | 41,560       | 49.7    | 14,807 | 17.7    |
| 2001      | 91,477           | 29,573       | 32.3    | 44,195       | 48.3    | 17,709 | 19.4    |
| 2002      | 97,351           | 33,138       | 34.0    | 47,074       | 48.4    | 17,139 | 17.6    |
| 2003      | 95,579           | 37,762       | 39.5    | 43,303       | 45.3    | 14,514 | 15.2    |
| 2004      | 117,941          | 29,943       | 25.4    | 71,681       | 60.8    | 16,317 | 13.8    |
| 2005      | 115,605          | 33,248       | 28.8    | 64,007       | 55.4    | 18,350 | 15.9    |
| 2006      | 102,239          | 30,201       | 29.5    | 59,815       | 58.5    | 12,223 | 12.0    |
| 2007      | 119,553          | 45,913       | 38.4    | 59,591       | 49.8    | 14,049 | 11.8    |
| 2008      | 102,635          | 37,050       | 36.1    | 55,834       | 54.4    | 9,751  | 9.5     |
| Average   |                  |              |         |              |         |        |         |
| 2004–2008 | 111,595          | 35,271       | 31.6    | 62,186       | 55.8    | 14,138 | 12.6    |
| 2009      | 99,195           | 36,993       | 37.3    | 50,515       | 50.9    | 11,687 | 11.8    |

Source: Mills (1991-1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011).

Note: Starting in 2001, location codes for Resurrection Bay are based on destination rather than location, so harvest, catch, and effort is estimated by “port of return” and a small portion of these estimates may have come from outside the North Gulf Coast Area.

Table 3.—Sport fishing effort and harvest by species, North Gulf Coast Management Area, 1990–2008 and 2009.

| Year      | Saltwater effort | All effort | Salmon  |         |       |         |       |         | Total | Dolly Varden | Groundfish <sup>a</sup> | Other <sup>b</sup> |
|-----------|------------------|------------|---------|---------|-------|---------|-------|---------|-------|--------------|-------------------------|--------------------|
|           |                  |            | Chinook | Coho    | Pink  | Sockeye | Chum  |         |       |              |                         |                    |
| 1990      | 69,485           | 72,181     | 1,004   | 29,761  | 6,193 | 418     | 427   | 37,803  | 228   | 27,910       | 9,480                   |                    |
| 1991      | 71,332           | 73,683     | 1,547   | 30,964  | 4,714 | 983     | 757   | 38,965  | 524   | 38,352       | 2,299                   |                    |
| 1992      | 80,814           | 83,568     | 2,925   | 27,904  | 4,277 | 1,135   | 1,321 | 37,562  | 376   | 53,453       | 6,728                   |                    |
| 1993      | 85,559           | 90,274     | 5,121   | 47,572  | 4,172 | 1,865   | 680   | 59,410  | 774   | 50,537       | 1,644                   |                    |
| 1994      | 85,742           | 86,861     | 2,078   | 38,465  | 5,573 | 1,415   | 688   | 48,219  | 283   | 56,910       | 1,744                   |                    |
| 1995      | 99,689           | 100,194    | 3,886   | 40,098  | 4,799 | 1,294   | 396   | 50,473  | 675   | 43,743       | 2,356                   |                    |
| 1996      | 78,262           | 81,699     | 6,247   | 75,808  | 4,910 | 767     | 1,676 | 89,408  | 705   | 48,303       | 1,646                   |                    |
| 1997      | 89,686           | 90,031     | 6,436   | 87,213  | 1,571 | 1,786   | 745   | 97,751  | 494   | 50,967       | 4,042                   |                    |
| 1998      | 71,034           | 71,564     | 3,267   | 69,146  | 2,837 | 1,269   | 209   | 76,728  | 861   | 47,803       | 9,975                   |                    |
| 1999      | 84,637           | 84,742     | 2,640   | 75,620  | 4,560 | 1,064   | 663   | 84,547  | 221   | 53,122       | 2,060                   |                    |
| 2000      | 83,551           | 83,830     | 2,655   | 70,771  | 3,883 | 1,485   | 1,179 | 79,973  | 514   | 64,829       | 3,269                   |                    |
| 2001      | 91,477           | 91,934     | 2,281   | 96,470  | 3,840 | 1,263   | 650   | 104,504 | 388   | 64,393       | 1,330                   |                    |
| 2002      | 97,351           | 98,464     | 3,380   | 98,559  | 4,280 | 3,112   | 430   | 109,761 | 915   | 78,049       | 2,816                   |                    |
| 2003      | 95,579           | 95,579     | 2,730   | 84,714  | 4,188 | 2,077   | 259   | 93,968  | 392   | 77,971       | 1,859                   |                    |
| 2004      | 114,338          | 117,941    | 3,302   | 107,917 | 5,604 | 2,984   | 1,063 | 120,870 | 679   | 109,056      | 3,214                   |                    |
| 2005      | 102,274          | 115,605    | 2,768   | 136,143 | 7,051 | 5,460   | 1,178 | 152,600 | 181   | 97,847       | 3,471                   |                    |
| 2006      | 102,239          | 102,565    | 3,388   | 82,836  | 3,514 | 4,977   | 715   | 95,430  | 375   | 94,018       | 1,247                   |                    |
| 2007      | 119,553          | 119,656    | 3,522   | 106,213 | 5,941 | 5,761   | 318   | 121,755 | 381   | 116,010      | 2,908                   |                    |
| 2008      | 102,635          | 103,096    | 1,834   | 80,035  | 6,217 | 5,844   | 1,218 | 95,148  | 202   | 118,317      | 657                     |                    |
| Average   |                  |            |         |         |       |         |       |         |       |              |                         |                    |
| 2004–2008 | 108,208          | 111,773    | 2,963   | 102,629 | 5,665 | 5,005   | 898   | 117,161 | 364   | 107,050      | 2,299                   |                    |
| 2009      | 99,195           | 99,921     | 1,981   | 91,910  | 4,399 | 10,619  | 580   | 109,489 | 165   | 102,946      | 1,000                   |                    |

Source: Mills (1991-1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011).

Note: Estimates for 1996–1999 were recalculated due to an error in the original published data analysis. Estimates for 1995 are biased but could not be recalculated.

<sup>a</sup> Includes halibut, rockfish, and lingcod (1991–2007).

<sup>b</sup> Other may include smelt, herring, sablefish, cod, greenling, sculpin, shark, and lingcod (1987–2007).

Table 4.—Hatchery releases by species, location, and year, North Gulf Coast Management Area, 1998–2009.

| Species                 | Location          | 1998      | 1999      | 2000      | 2001    | 2002      | 2003      | 2004      | 2005      | 2006      | 2007      | 2008      | 2009      |
|-------------------------|-------------------|-----------|-----------|-----------|---------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Coho fry                | Bear Lake         | 409,000   | 306,000   | 316,000   | 310,000 | 404,700   | 404,800   | 406,000   | 400,500   | 447,300   | 521,000   | 360,000   | 270,000   |
|                         | Bear Creek        |           |           |           |         |           |           |           |           |           |           |           |           |
| Coho smolt              | Bear Creek        | 177,000   | 51,000    | 102,000   | 120,500 | 123,800   | 253,400   | 285,000   | 488,200   | 115,300   | 237,000   | 142,000   | 68,000    |
|                         | Bear Lake         |           |           |           |         |           |           |           |           |           |           |           |           |
|                         | Box Canyon Creek  |           |           |           |         |           |           |           |           |           |           |           |           |
|                         | Grouse Lake       |           |           |           |         |           |           |           |           |           |           |           |           |
|                         | Lowell Creek      | 65,687    | 62,580    | 54,184    | 125,618 | 119,512   | 124,225   | 131,989   | 132,276   | 131,261   | 130,862   |           | 91,833    |
|                         | Seward Lagoon     | 74,365    | 109,142   | 145,693   | 124,703 | 121,743   | 123,718   | 131,798   | 132,229   | 131,326   | 132,811   | 233,365   | 91,979    |
|                         | Seward SeaLife    |           |           |           |         |           |           | 192,000   |           | 146,100   |           |           |           |
| Chinook smolt           | Box Canyon Creek  |           |           |           |         |           |           |           |           |           |           |           |           |
|                         | Lowell Creek      | 101,992   | 85,502    | 109,461   | 114,748 | 93,296    | 110,331   | 89,388    | 100,088   |           |           |           |           |
|                         | Seward Lagoon     | 205,133   | 88,066    | 212,873   | 113,147 | 100,314   | 109,976   | 109,600   | 114,847   | 226,621   |           |           |           |
|                         | Spring Creek      |           |           |           |         |           |           |           |           |           |           |           |           |
|                         | Thumb Cove        |           |           |           |         |           |           |           |           |           |           |           |           |
|                         | Seward SeaLife    |           |           |           |         |           |           | 30,066    | 96,702    | 76,596    | 117,842   | 142,469   |           |
| Chum fingerling         | Jap Creek         |           |           |           |         |           |           |           |           |           |           |           |           |
|                         | Spring Creek      |           |           |           |         |           |           |           |           |           |           |           |           |
| Sockeye fry             | Bear Lake         | 265,000   | 1,380,000 | 1,796,000 | 145,000 | 2,407,700 | 1,467,000 | 2,406,000 | 2,416,000 | 2,413,900 | 2,437,000 | 2,400,000 | 2,543,000 |
| Sockeye fingerling      | Bear Lake         |           |           |           |         |           |           |           |           |           |           |           |           |
| Sockeye smolt, presmolt | Bear Lake         | 506,703   |           |           |         | 802,600   | 334,000   | 603,000   | 1,005,700 |           | 619,000   |           |           |
|                         | Bear Creek        |           |           |           |         |           |           |           |           | 979,200   |           | 1,600,000 |           |
|                         | Grouse Lake       | 1,514,000 |           |           |         |           |           |           |           |           |           |           |           |
|                         | Saltwater release |           |           |           |         |           |           |           |           |           |           |           | 1,675,000 |

-continued-

Table 4.–Page 2 of 2.

| Species                    | Location   | 1998      | 1999      | 2000      | 2001      | 2002      | 2003      | 2004      | 2005      | 2006      | 2007      | 2008      | 2009      |
|----------------------------|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Rainbow trout catchables   |            |           |           |           |           |           |           |           |           |           |           |           |           |
|                            | First Lake |           |           | 1,000     | 1,000     | 1,007     | 1,427     | 955       | 760       | 405       |           |           |           |
| Rainbow trout fingerling   |            |           |           |           |           |           |           |           |           |           |           |           |           |
|                            | Lost Lake  |           | 42,802    |           | 25,000    |           |           |           |           |           |           |           |           |
| Arctic grayling catchables |            |           |           |           |           |           |           |           |           |           |           |           |           |
|                            | First Lake |           |           |           |           |           |           |           |           |           | 478       | 981       |           |
| Total                      |            | 3,318,880 | 2,125,092 | 2,737,211 | 1,079,716 | 4,174,672 | 2,928,877 | 4,385,796 | 4,887,302 | 4,668,009 | 4,195,993 | 4,878,815 | 4,739,812 |

Source: Marianne McNair, ADF&G, CFMD, Juneau; Tom Prochazka and Mark Thomas, CIAA, Trail Lakes Hatchery; ADF&G, Division of Sport Fish stocking records.

Table 5.–Chinook salmon catch and harvest, North Gulf Coast Management Area, 1990-2008 and 2009.

| Year      | Boat    |         |         |         |       |         | Shore |         | Total |         |
|-----------|---------|---------|---------|---------|-------|---------|-------|---------|-------|---------|
|           | Charter |         | Private |         | Total |         | Catch | Harvest | Catch | Harvest |
|           | Catch   | Harvest | Catch   | Harvest | Catch | Harvest |       |         |       |         |
| 1990      | 84      | 62      | 890     | 532     | 974   | 594     | 1,290 | 410     | 2,264 | 1,004   |
| 1991      | 437     | 358     | 452     | 420     | 889   | 778     | 888   | 769     | 1,777 | 1,547   |
| 1992      | 388     | 329     | 1,584   | 1,219   | 1,972 | 1,548   | 1,669 | 1,377   | 3,641 | 2,925   |
| 1993      | 976     | 674     | 1,655   | 1,292   | 2,631 | 1,966   | 3,834 | 3,155   | 6,465 | 5,121   |
| 1994      | 632     | 348     | 691     | 434     | 1,323 | 782     | 2,092 | 1,296   | 3,415 | 2,078   |
| 1995      | 913     | 608     | 1,225   | 899     | 2,138 | 1,507   | 3,139 | 2,379   | 5,277 | 3,886   |
| 1996      | 1,330   | 807     | 1,354   | 1,172   | 2,684 | 1,979   | 4,972 | 4,268   | 7,656 | 6,247   |
| 1997      | 1,175   | 573     | 3,220   | 2,156   | 4,395 | 2,729   | 4,924 | 3,740   | 9,319 | 6,469   |
| 1998      | 729     | 263     | 1,421   | 880     | 2,150 | 1,143   | 2,447 | 2,124   | 4,597 | 3,267   |
| 1999      | 594     | 303     | 1,185   | 779     | 1,779 | 1,082   | 2,432 | 1,558   | 4,211 | 2,640   |
| 2000      | 854     | 717     | 1,478   | 717     | 2,332 | 1,434   | 1,565 | 1,221   | 3,897 | 2,655   |
| 2001      | 907     | 572     | 1,278   | 870     | 2,185 | 1,442   | 1,093 | 839     | 3,278 | 2,281   |
| 2002      | 1,509   | 982     | 1,853   | 1,247   | 3,362 | 2,229   | 1,503 | 1,151   | 4,865 | 3,380   |
| 2003      | 1,581   | 862     | 2,025   | 1,186   | 3,606 | 2,048   | 854   | 744     | 4,460 | 2,792   |
| 2004      | 1,402   | 865     | 3,611   | 1,744   | 5,013 | 2,609   | 841   | 693     | 5,854 | 3,302   |
| 2005      | 3,142   | 1,179   | 2,864   | 1,151   | 6,006 | 2,330   | 484   | 438     | 6,490 | 2,768   |
| 2006      | 1,924   | 1,064   | 3,866   | 1,999   | 5,790 | 3,063   | 370   | 325     | 6,160 | 3,388   |
| 2007      | 2,703   | 1,366   | 2,191   | 1,576   | 4,894 | 2,942   | 645   | 580     | 5,539 | 3,522   |
| 2008      | 1,667   | 793     | 1,473   | 731     | 3,140 | 1,524   | 362   | 310     | 3,502 | 1,834   |
| Average   |         |         |         |         |       |         |       |         |       |         |
| 2004–2008 | 2,168   | 1,053   | 2,801   | 1,440   | 4,969 | 2,494   | 540   | 469     | 5,509 | 2,963   |
| 2009      | 1,597   | 910     | 2,106   | 1,045   | 3,703 | 1,955   | 26    | 26      | 3,729 | 1,981   |

Source: Mills (1991-1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011).

Table 6.–Coho salmon catch and harvest, North Gulf Coast Management Area, 1990-2008 and 2009.

| Year      | Boat    |         |         |         |         |         | Shore  |         | Total   |         |
|-----------|---------|---------|---------|---------|---------|---------|--------|---------|---------|---------|
|           | Charter |         | Private |         | Total   |         | Catch  | Harvest | Catch   | Harvest |
|           | Catch   | Harvest | Catch   | Harvest | Catch   | Harvest |        |         |         |         |
| 1990      | 10,039  | 7,487   | 21,392  | 16,631  | 31,431  | 24,118  | 8,403  | 5,643   | 39,834  | 29,761  |
| 1991      | 8,265   | 7,335   | 20,484  | 18,452  | 28,749  | 25,787  | 5,827  | 5,177   | 34,576  | 30,964  |
| 1992      | 5,830   | 5,263   | 19,199  | 15,976  | 25,029  | 21,239  | 7,823  | 6,665   | 32,852  | 27,904  |
| 1993      | 13,957  | 12,907  | 31,728  | 27,018  | 45,685  | 39,925  | 8,512  | 7,647   | 54,197  | 47,572  |
| 1994      | 6,872   | 6,377   | 23,510  | 21,248  | 30,382  | 27,625  | 11,337 | 10,840  | 41,719  | 38,465  |
| 1995      | 9,150   | 8,172   | 25,737  | 21,713  | 34,887  | 29,885  | 12,717 | 10,213  | 47,604  | 40,098  |
| 1996      | 24,093  | 18,696  | 51,346  | 41,898  | 75,439  | 60,594  | 19,217 | 15,214  | 94,656  | 75,808  |
| 1997      | 30,300  | 24,010  | 75,463  | 50,188  | 105,763 | 74,198  | 16,771 | 13,015  | 122,534 | 87,213  |
| 1998      | 19,501  | 16,288  | 63,145  | 42,552  | 82,646  | 58,840  | 11,537 | 10,306  | 94,183  | 69,146  |
| 1999      | 29,891  | 24,053  | 54,169  | 44,500  | 84,060  | 68,553  | 8,628  | 7,067   | 92,688  | 75,620  |
| 2000      | 25,706  | 22,708  | 47,222  | 42,079  | 72,928  | 64,787  | 7,186  | 5,984   | 80,114  | 70,771  |
| 2001      | 41,739  | 36,873  | 53,011  | 45,990  | 94,750  | 82,863  | 15,969 | 13,607  | 110,719 | 96,470  |
| 2002      | 38,944  | 34,018  | 62,642  | 54,811  | 101,586 | 88,829  | 10,486 | 9,730   | 112,072 | 98,559  |
| 2003      | 26,697  | 22,834  | 69,385  | 54,401  | 96,082  | 77,235  | 11,275 | 8,776   | 107,357 | 86,011  |
| 2004      | 40,552  | 32,599  | 88,060  | 69,087  | 128,611 | 101,687 | 8,318  | 6,230   | 136,929 | 107,917 |
| 2005      | 50,211  | 43,371  | 107,126 | 81,440  | 157,337 | 124,811 | 13,399 | 11,135  | 170,736 | 135,946 |
| 2006      | 27,541  | 24,700  | 66,789  | 53,291  | 94,330  | 77,991  | 5,063  | 4,708   | 99,393  | 82,699  |
| 2007      | 50,314  | 43,547  | 74,566  | 60,177  | 124,880 | 103,724 | 2,971  | 2,246   | 127,851 | 105,970 |
| 2008      | 33,525  | 32,032  | 63,455  | 46,190  | 96,980  | 78,222  | 2,130  | 1,734   | 99,110  | 79,956  |
| Average   |         |         |         |         |         |         |        |         |         |         |
| 2004–2008 | 40,429  | 35,250  | 79,999  | 62,037  | 120,428 | 97,287  | 6,376  | 5,211   | 126,804 | 102,498 |
| 2009      | 44,718  | 39,814  | 57,065  | 49,722  | 101,783 | 89,536  | 2,210  | 1,699   | 103,993 | 91,235  |

Source: Mills (1991-1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011).

Table 7.—Sockeye salmon catch and harvest, North Gulf Coast Management Area, 1990–2008 and 2009.

| Year      | Boat    |         |         |         |       |         | Shore |         | Total  |         |
|-----------|---------|---------|---------|---------|-------|---------|-------|---------|--------|---------|
|           | Charter |         | Private |         | Total |         | Catch | Harvest | Catch  | Harvest |
|           | Catch   | Harvest | Catch   | Harvest | Catch | Harvest |       |         |        |         |
| 1990      | 273     | 68      | 408     | 272     | 681   | 340     | 185   | 78      | 866    | 418     |
| 1991      | 320     | 256     | 216     | 208     | 536   | 464     | 692   | 519     | 1,228  | 983     |
| 1992      | 99      | 58      | 666     | 551     | 765   | 609     | 699   | 526     | 1,464  | 1,135   |
| 1993      | 318     | 206     | 1,375   | 1,147   | 1,693 | 1,353   | 666   | 512     | 2,359  | 1,865   |
| 1994      | 408     | 408     | 574     | 306     | 982   | 714     | 748   | 701     | 1,730  | 1,415   |
| 1995      | 209     | 198     | 407     | 284     | 616   | 482     | 833   | 812     | 1,449  | 1,294   |
| 1996      | 409     | 161     | 507     | 325     | 916   | 486     | 491   | 281     | 1,407  | 767     |
| 1997      | 458     | 76      | 636     | 493     | 1,094 | 569     | 1,447 | 1,217   | 2,541  | 1,786   |
| 1998      | 516     | 431     | 591     | 439     | 1,107 | 870     | 716   | 399     | 1,823  | 1,269   |
| 1999      | 151     | 108     | 719     | 697     | 870   | 805     | 280   | 259     | 1,150  | 1,064   |
| 2000      | 460     | 331     | 1,609   | 477     | 2,069 | 808     | 712   | 677     | 2,781  | 1,485   |
| 2001      | 1,046   | 705     | 534     | 293     | 1,580 | 998     | 374   | 265     | 1,954  | 1,263   |
| 2002      | 317     | 252     | 2,629   | 2,087   | 2,946 | 2,339   | 900   | 773     | 3,846  | 3,112   |
| 2003      | 460     | 215     | 1,405   | 1,222   | 1,865 | 1,437   | 938   | 640     | 2,803  | 2,077   |
| 2004      | 227     | 154     | 2,571   | 2,051   | 2,798 | 2,205   | 888   | 779     | 3,686  | 2,984   |
| 2005      | 716     | 634     | 2,604   | 2,134   | 3,320 | 2,768   | 2,960 | 2,692   | 6,280  | 5,460   |
| 2006      | 1,409   | 1,248   | 2,664   | 1,705   | 4,073 | 2,953   | 2,292 | 2,024   | 6,365  | 4,977   |
| 2007      | 2,156   | 1,621   | 2,610   | 2,159   | 4,766 | 3,780   | 2,765 | 1,981   | 7,531  | 5,761   |
| 2008      | 1,836   | 974     | 1,799   | 1,579   | 3,635 | 2,553   | 4,240 | 3,179   | 7,875  | 5,732   |
| Average   |         |         |         |         |       |         |       |         |        |         |
| 2004–2008 | 1,269   | 926     | 2,450   | 1,926   | 3,718 | 2,852   | 2,629 | 2,131   | 6,347  | 4,983   |
| 2009      | 965     | 784     | 2,462   | 1,909   | 3,427 | 2,693   | 8,532 | 7,926   | 11,959 | 10,619  |

Source: Mills (1991-1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011).

Table 8.—Pink salmon catch and harvest, North Gulf Coast Management Area, 1990–2008 and 2009.

| Year      | Boat    |         |         |         |        |         | Shore |         | Total  |         |
|-----------|---------|---------|---------|---------|--------|---------|-------|---------|--------|---------|
|           | Charter |         | Private |         | Total  |         | Catch | Harvest | Catch  | Harvest |
|           | Catch   | Harvest | Catch   | Harvest | Catch  | Harvest |       |         |        |         |
| 1990      | 2,346   | 1,027   | 7,224   | 3,086   | 9,570  | 4,113   | 5,326 | 2,080   | 14,896 | 6,193   |
| 1991      | 1,873   | 1,157   | 3,833   | 1,569   | 5,706  | 2,726   | 2,996 | 1,988   | 8,702  | 4,714   |
| 1992      | 1,328   | 897     | 4,067   | 1,548   | 5,395  | 2,445   | 4,616 | 1,832   | 10,011 | 4,277   |
| 1993      | 1,284   | 866     | 5,946   | 1,822   | 7,230  | 2,688   | 3,978 | 1,484   | 11,208 | 4,172   |
| 1994      | 1,435   | 657     | 4,320   | 1,500   | 5,755  | 2,157   | 5,782 | 3,416   | 11,537 | 5,573   |
| 1995      | 1,549   | 883     | 6,119   | 2,186   | 7,668  | 3,069   | 5,081 | 1,730   | 12,749 | 4,799   |
| 1996      | 1,798   | 645     | 4,152   | 1,351   | 5,950  | 1,996   | 6,572 | 2,914   | 12,522 | 4,910   |
| 1997      | 911     | 298     | 3,376   | 676     | 4,287  | 974     | 2,647 | 597     | 6,934  | 1,571   |
| 1998      | 1,131   | 406     | 5,928   | 1,409   | 7,059  | 1,815   | 2,575 | 1,022   | 9,634  | 2,837   |
| 1999      | 3,961   | 1,285   | 9,471   | 2,386   | 13,432 | 3,671   | 2,314 | 889     | 15,746 | 4,560   |
| 2000      | 2,355   | 791     | 8,189   | 1,681   | 10,544 | 2,472   | 6,848 | 1,411   | 17,392 | 3,883   |
| 2001      | 1,412   | 865     | 6,692   | 1,564   | 8,104  | 2,429   | 3,937 | 1,411   | 12,041 | 3,840   |
| 2002      | 2,736   | 650     | 8,186   | 2,098   | 10,922 | 2,748   | 5,630 | 1,532   | 16,552 | 4,280   |
| 2003      | 2,978   | 723     | 12,291  | 2,366   | 15,269 | 3,089   | 3,262 | 1,381   | 18,531 | 4,470   |
| 2004      | 1,724   | 426     | 8,140   | 2,920   | 9,864  | 3,347   | 5,665 | 2,257   | 15,529 | 5,604   |
| 2005      | 5,950   | 1,359   | 18,196  | 3,764   | 24,146 | 5,123   | 6,327 | 1,928   | 30,473 | 7,051   |
| 2006      | 1,489   | 402     | 9,428   | 1,941   | 10,917 | 2,343   | 3,727 | 1,109   | 14,644 | 3,452   |
| 2007      | 5,977   | 2,234   | 15,014  | 1,856   | 20,991 | 4,090   | 7,426 | 1,851   | 28,417 | 5,941   |
| 2008      | 3,602   | 1,567   | 13,811  | 3,157   | 17,413 | 4,724   | 6,274 | 1,448   | 23,687 | 6,172   |
| Average   |         |         |         |         |        |         |       |         |        |         |
| 2004–2008 | 3,748   | 1,198   | 12,918  | 2,728   | 16,666 | 3,925   | 5,884 | 1,719   | 22,550 | 5,644   |
| 2009      | 4,210   | 1,625   | 8,114   | 1,612   | 12,324 | 3,237   | 4,433 | 1,162   | 16,757 | 4,399   |

Source: Mills (1991-1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011).

Table 9.—Chum salmon catch and harvest, North Gulf Coast Management Area, 1990–2008 and 2009.

| Year      | Boat    |         |         |         |       |         | Shore |         | Total |         |
|-----------|---------|---------|---------|---------|-------|---------|-------|---------|-------|---------|
|           | Charter |         | Private |         | Total |         | Catch | Harvest | Catch | Harvest |
|           | Catch   | Harvest | Catch   | Harvest | Catch | Harvest |       |         |       |         |
| 1990      | 296     | 148     | 268     | 56      | 564   | 204     | 480   | 223     | 1,044 | 427     |
| 1991      | 415     | 294     | 106     | 106     | 521   | 400     | 471   | 357     | 992   | 757     |
| 1992      | 501     | 243     | 2,338   | 463     | 2,839 | 706     | 1,374 | 615     | 4,213 | 1,321   |
| 1993      | 267     | 79      | 294     | 117     | 561   | 196     | 1,913 | 484     | 2,474 | 680     |
| 1994      | 87      | 58      | 251     | 131     | 338   | 189     | 926   | 499     | 1,264 | 688     |
| 1995      | 287     | 92      | 257     | 120     | 544   | 212     | 1,294 | 184     | 1,838 | 396     |
| 1996      | 517     | 363     | 961     | 176     | 1,478 | 539     | 3,123 | 1,137   | 4,601 | 1,676   |
| 1997      | 263     | 248     | 866     | 241     | 1,129 | 489     | 1,886 | 256     | 3,015 | 745     |
| 1998      | 128     | 49      | 99      | 8       | 227   | 57      | 575   | 152     | 802   | 209     |
| 1999      | 242     | 79      | 430     | 61      | 672   | 140     | 2,621 | 523     | 3,293 | 663     |
| 2000      | 844     | 179     | 1,103   | 541     | 1,947 | 720     | 2,488 | 459     | 4,435 | 1,179   |
| 2001      | 159     | 29      | 2,144   | 360     | 2,303 | 389     | 1,014 | 261     | 3,317 | 650     |
| 2002      | 560     | 71      | 638     | 181     | 1,198 | 252     | 868   | 178     | 2,066 | 430     |
| 2003      | 288     | 7       | 1,880   | 138     | 2,168 | 145     | 1,158 | 118     | 3,326 | 263     |
| 2004      | 178     | 74      | 903     | 300     | 1,081 | 374     | 1,629 | 689     | 2,710 | 1,063   |
| 2005      | 339     | 153     | 1,177   | 215     | 1,516 | 368     | 1,743 | 810     | 3,259 | 1,178   |
| 2006      | 394     | 152     | 732     | 144     | 1,126 | 296     | 1,468 | 419     | 2,594 | 715     |
| 2007      | 405     | 109     | 339     | 0       | 744   | 109     | 873   | 209     | 1,617 | 318     |
| 2008      | 384     | 0       | 966     | 128     | 1,350 | 128     | 3,344 | 1,090   | 4,694 | 1,218   |
| Average   |         |         |         |         |       |         |       |         |       |         |
| 2004–2008 | 340     | 98      | 823     | 157     | 1,163 | 255     | 1,811 | 643     | 2,975 | 898     |
| 2009      | 236     | 168     | 313     | 175     | 549   | 343     | 877   | 237     | 1,426 | 580     |

Source: Mills (1991-1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011).

Table 10.–Dolly Varden catch and harvest, North Gulf Coast Management Area, 1990–2008 and 2009.

| Year      | Boat    |         |         |         |       |         | Shore |         | Total |         |
|-----------|---------|---------|---------|---------|-------|---------|-------|---------|-------|---------|
|           | Charter |         | Private |         | Total |         | Catch | Harvest | Catch | Harvest |
|           | Catch   | Harvest | Catch   | Harvest | Catch | Harvest |       |         |       |         |
| 1990      | 115     | 94      | 246     | 21      | 361   | 115     | 226   | 113     | 587   | 228     |
| 1991      | 97      | 97      | 311     | 220     | 408   | 317     | 336   | 207     | 744   | 524     |
| 1992      | 24      | 24      | 262     | 164     | 286   | 188     | 344   | 188     | 630   | 376     |
| 1993      | 370     | 321     | 770     | 328     | 1,140 | 649     | 238   | 125     | 1,378 | 774     |
| 1994      | 66      | 47      | 271     | 27      | 337   | 74      | 718   | 209     | 1,055 | 283     |
| 1995      | 43      | 33      | 237     | 204     | 280   | 237     | 699   | 438     | 979   | 675     |
| 1996      | 752     | 254     | 182     | 146     | 934   | 400     | 744   | 305     | 1,678 | 705     |
| 1997      | 396     | 141     | 645     | 170     | 1,041 | 311     | 337   | 183     | 1,378 | 494     |
| 1998      | 149     | 72      | 1,931   | 670     | 2,080 | 742     | 296   | 119     | 2,376 | 861     |
| 1999      | 125     | 34      | 242     | 154     | 367   | 188     | 55    | 33      | 422   | 221     |
| 2000      | 138     | 34      | 105     | 34      | 243   | 68      | 498   | 174     | 741   | 242     |
| 2001      | 0       | 0       | 452     | 108     | 452   | 108     | 410   | 108     | 862   | 216     |
| 2002      | 69      | 0       | 531     | 391     | 600   | 391     | 783   | 524     | 1,383 | 915     |
| 2003      | 456     | 72      | 512     | 189     | 968   | 261     | 452   | 392     | 1,420 | 653     |
| 2004      | 163     | 201     | 552     | 92      | 715   | 293     | 676   | 386     | 1,391 | 679     |
| 2005      | 11      | 0       | 184     | 47      | 195   | 47      | 185   | 99      | 380   | 146     |
| 2006      | 144     | 28      | 337     | 64      | 481   | 92      | 102   | 102     | 583   | 194     |
| 2007      | 300     | 0       | 429     | 72      | 729   | 72      | 275   | 148     | 1,004 | 220     |
| 2008      | 104     | 0       | 926     | 157     | 1,030 | 157     | 245   | 0       | 1,275 | 157     |
| Average   |         |         |         |         |       |         |       |         |       |         |
| 2004–2008 | 144     | 46      | 486     | 86      | 630   | 132     | 297   | 147     | 927   | 279     |
| 2009      | 147     | 0       | 84      | 136     | 231   | 136     | 72    | 29      | 303   | 165     |

Source: Mills (1991-1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011).

Table 11.—Halibut catch and harvest, North Gulf Coast Management Area, 1990-2008 and 2009.

| Year      | Charter |         | Private |         | Total  |         |
|-----------|---------|---------|---------|---------|--------|---------|
|           | Catch   | Harvest | Catch   | harvest | Catch  | Harvest |
| 1990      | 7,625   | 4,180   | 8,902   | 5,396   | 16,527 | 9,576   |
| 1991      | 10,530  | 7,794   | 7,048   | 6,266   | 17,578 | 14,060  |
| 1992      | 14,664  | 9,544   | 13,891  | 9,061   | 28,555 | 18,605  |
| 1993      | 18,359  | 11,722  | 24,809  | 13,826  | 43,168 | 25,548  |
| 1994      | 24,308  | 15,501  | 14,013  | 9,549   | 38,321 | 25,050  |
| 1995      | 27,985  | 16,331  | 12,843  | 7,348   | 40,828 | 23,679  |
| 1996      | 26,075  | 15,421  | 13,960  | 8,802   | 40,035 | 24,223  |
| 1997      | 31,572  | 17,633  | 17,129  | 10,205  | 48,701 | 27,838  |
| 1998      | 26,573  | 16,486  | 13,403  | 8,261   | 39,976 | 24,747  |
| 1999      | 20,670  | 15,092  | 18,381  | 10,789  | 39,051 | 25,881  |
| 2000      | 26,768  | 18,655  | 14,418  | 10,463  | 41,186 | 29,118  |
| 2001      | 32,775  | 20,795  | 14,303  | 9,716   | 47,078 | 30,511  |
| 2002      | 33,773  | 22,267  | 18,356  | 13,814  | 52,129 | 36,081  |
| 2003      | 39,007  | 27,032  | 22,446  | 16,281  | 61,453 | 43,313  |
| 2004      | 59,657  | 34,484  | 37,125  | 22,156  | 96,782 | 56,640  |
| 2005      | 54,619  | 35,605  | 27,733  | 18,280  | 82,352 | 53,885  |
| 2006      | 55,220  | 32,387  | 35,820  | 25,528  | 91,040 | 57,915  |
| 2007      | 60,629  | 37,051  | 35,820  | 25,528  | 96,449 | 62,579  |
| 2008      | 61,320  | 35,352  | 37,371  | 25,542  | 98,691 | 60,894  |
| Average   |         |         |         |         |        |         |
| 2004–2008 | 58,289  | 34,976  | 34,774  | 23,407  | 93,063 | 58,383  |
| 2009      | 45,636  | 30,491  | 31,125  | 20,113  | 76,761 | 50,604  |

Source: Mills (1991-1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011).

Table 12.—Rockfish catch and harvest, North Gulf Coast Management Area, 1990–2008 and 2009.

| Year      | Charter |         | Private |         | Total  |         |          |
|-----------|---------|---------|---------|---------|--------|---------|----------|
|           | Catch   | Harvest | Catch   | Harvest | Catch  | Harvest | Released |
| 1990      | 14,675  | 9,349   | 18,095  | 9,894   | 32,770 | 19,243  | 13,527   |
| 1991      | 13,892  | 10,615  | 13,892  | 9,253   | 27,784 | 19,868  | 7,916    |
| 1992      | 17,690  | 14,131  | 22,429  | 14,598  | 40,119 | 28,729  | 11,390   |
| 1993      | 14,025  | 10,860  | 27,420  | 14,143  | 41,445 | 25,003  | 16,442   |
| 1994      | 21,176  | 14,577  | 21,904  | 13,679  | 43,080 | 28,256  | 14,824   |
| 1995      | 13,929  | 10,357  | 11,639  | 7,003   | 25,568 | 17,360  | 8,208    |
| 1996      | 14,051  | 9,643   | 18,967  | 11,818  | 33,018 | 21,461  | 11,557   |
| 1997      | 12,771  | 9,033   | 22,865  | 11,352  | 35,636 | 20,385  | 15,251   |
| 1998      | 16,121  | 9,423   | 24,459  | 11,452  | 40,580 | 20,875  | 19,705   |
| 1999      | 15,885  | 9,498   | 25,449  | 14,510  | 41,334 | 24,008  | 17,326   |
| 2000      | 23,911  | 14,494  | 30,689  | 15,860  | 54,600 | 30,354  | 24,246   |
| 2001      | 23,401  | 15,967  | 33,103  | 16,494  | 56,504 | 32,461  | 24,043   |
| 2002      | 26,342  | 19,206  | 35,215  | 20,753  | 61,557 | 39,959  | 21,598   |
| 2003      | 21,599  | 14,024  | 28,420  | 16,427  | 50,019 | 30,450  | 19,569   |
| 2004      | 33,063  | 20,915  | 48,148  | 26,427  | 81,211 | 47,342  | 33,869   |
| 2005      | 22,787  | 16,921  | 41,574  | 21,591  | 64,361 | 38,512  | 25,849   |
| 2006      | 24,245  | 16,665  | 39,782  | 22,008  | 64,027 | 38,673  | 25,354   |
| 2007      | 28,542  | 20,322  | 38,261  | 24,062  | 66,803 | 44,384  | 22,419   |
| 2008      | 32,619  | 23,499  | 41,772  | 25,418  | 74,391 | 48,917  | 25,474   |
| Average   |         |         |         |         |        |         |          |
| 2004–2008 | 28,251  | 19,664  | 41,907  | 23,901  | 70,159 | 43,566  | 26,593   |
| 2009      | 25,538  | 18,708  | 51,125  | 27,339  | 76,663 | 46,047  | 24,416   |

Source: Mills (1991-1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011).

Table 13.—Lingcod catch and harvest, North Gulf Coast Management Area, 1991-2008 and 2009.

| Year      | Charter |         | Private |         | Total  |         | Percent harvest |
|-----------|---------|---------|---------|---------|--------|---------|-----------------|
|           | Catch   | Harvest | Catch   | Harvest | Catch  | Harvest |                 |
| 1991      | 3,780   | 3,088   | 3,595   | 3,104   | 7,375  | 6,192   | 84.0            |
| 1992      | 5,124   | 3,621   | 6,298   | 4,460   | 11,422 | 8,081   | 70.7            |
| 1993      | 2,078   | 875     | 5,083   | 2,204   | 7,161  | 3,079   | 43.0            |
| 1994      | 4,928   | 1,891   | 4,943   | 1,821   | 9,871  | 3,712   | 37.6            |
| 1995      | 3,314   | 1,643   | 2,139   | 976     | 5,453  | 2,619   | 48.0            |
| 1996      | 2,292   | 1,296   | 3,395   | 1,334   | 5,687  | 2,630   | 46.2            |
| 1997      | 2,716   | 1,631   | 4,261   | 1,115   | 6,977  | 2,746   | 39.4            |
| 1998      | 2,517   | 1,179   | 3,599   | 1,009   | 6,116  | 2,188   | 35.8            |
| 1999      | 3,280   | 1,597   | 4,802   | 1,752   | 8,082  | 3,349   | 41.4            |
| 2000      | 5,445   | 2,559   | 7,017   | 2,711   | 12,462 | 5,270   | 42.3            |
| 2001      | 4,428   | 2,339   | 4,263   | 1,354   | 8,691  | 3,693   | 42.5            |
| 2002      | 4,238   | 2,248   | 5,480   | 1,915   | 9,718  | 4,163   | 42.8            |
| 2003      | 5,359   | 2,581   | 4,160   | 1,627   | 9,519  | 4,208   | 44.2            |
| 2004      | 5,732   | 2,985   | 6,223   | 2,089   | 11,955 | 5,074   | 42.4            |
| 2005      | 6,995   | 3,391   | 5,900   | 2,060   | 12,895 | 5,451   | 42.3            |
| 2006      | 8,979   | 4,385   | 5,806   | 1,892   | 14,785 | 6,277   | 42.5            |
| 2007      | 12,358  | 6,093   | 8,371   | 2,954   | 20,729 | 9,047   | 43.6            |
| 2008      | 14,215  | 5,688   | 9,725   | 3,475   | 23,940 | 9,163   | 38.3            |
| Average   |         |         |         |         |        |         |                 |
| 2004–2008 | 9,656   | 4,508   | 7,205   | 2,494   | 16,861 | 7,002   | 41.8            |
| 2009      | 8,740   | 4,113   | 9,757   | 2,684   | 18,497 | 6,797   | 41.5            |

Source: Mills (1991-1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011).

Table 14.—Shark catch and harvest, North Gulf Coast Management Area, 1996-2008 and 2009.

| Year      | Charter |         | Private |         | Total  |         | Percent harvest |
|-----------|---------|---------|---------|---------|--------|---------|-----------------|
|           | Catch   | Harvest | Catch   | Harvest | Catch  | Harvest |                 |
| 1996      | 13      | 6       | 16      | 16      | 29     | 22      | 75.9            |
| 1997      | 1,821   | 104     | 592     | 77      | 2,413  | 181     | 7.5             |
| 1998      | 1,091   | 89      | 1,748   | 107     | 2,839  | 196     | 6.9             |
| 1999      | 336     | 37      | 1,217   | 197     | 1,553  | 234     | 15.1            |
| 2000      | 1,715   | 101     | 2,112   | 98      | 3,827  | 199     | 5.2             |
| 2001      | 4,787   | 52      | 1,791   | 15      | 6,578  | 67      | 1.0             |
| 2002      | 1,166   | 133     | 1,004   | 44      | 2,170  | 177     | 8.2             |
| 2003      | 4,412   | 148     | 3,337   | 35      | 7,749  | 182     | 2.3             |
| 2004      | 3,803   | 23      | 1,548   | 87      | 5,351  | 110     | 2.1             |
| 2005      | 13,385  | 260     | 7,656   | 98      | 21,041 | 358     | 1.7             |
| 2006      | 9,124   | 47      | 3,402   | 69      | 12,526 | 116     | 0.9             |
| 2007      | 8,238   | 95      | 5,468   | 37      | 13,706 | 132     | 1.0             |
| 2008      | 2,704   | 43      | 3,167   | 92      | 5,871  | 135     | 2.3             |
| Average   |         |         |         |         |        |         |                 |
| 2004–2008 | 7,451   | 94      | 4,248   | 77      | 11,699 | 170     | 1.6             |
| 2009      | 2,764   | 25      | 1,823   | 0       | 4,587  | 25      | 1.4             |

Source: Howe et al. (2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011).

## **FIGURES**

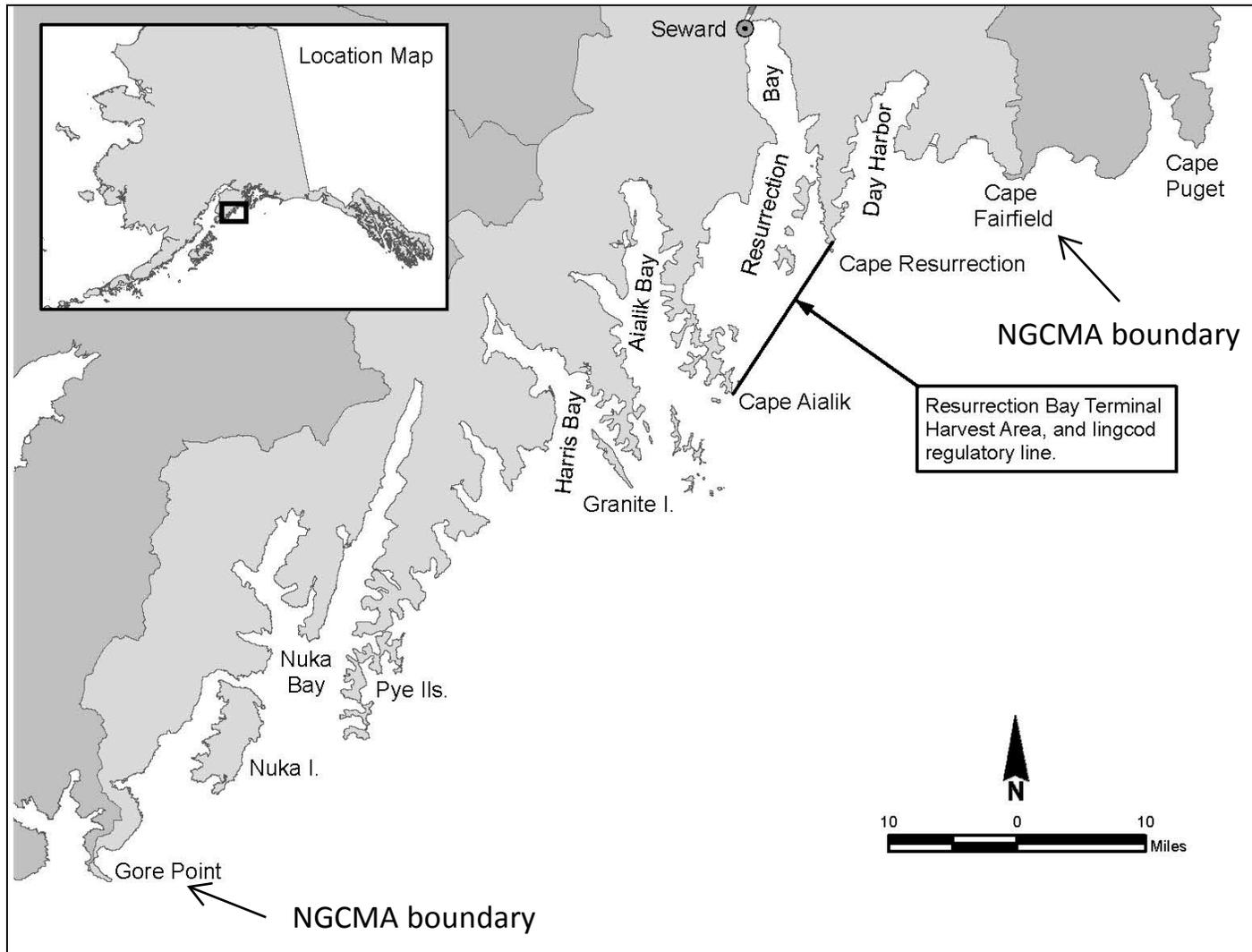


Figure 1.—North Gulf Coast Management Area.

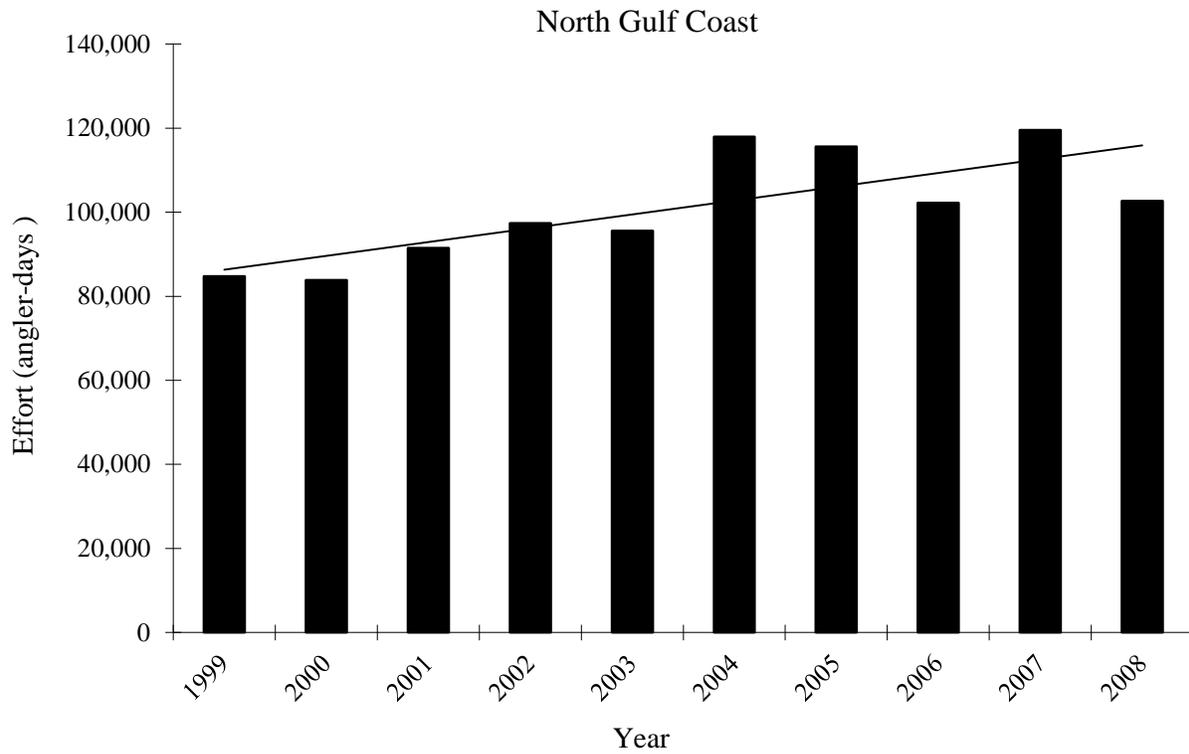


Figure 2.—Sport fishing angler effort and linear trend expended in the North Gulf Coast Management Area, 1999–2008.

Source: Howe et al. (2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011).

### North Gulf Coast

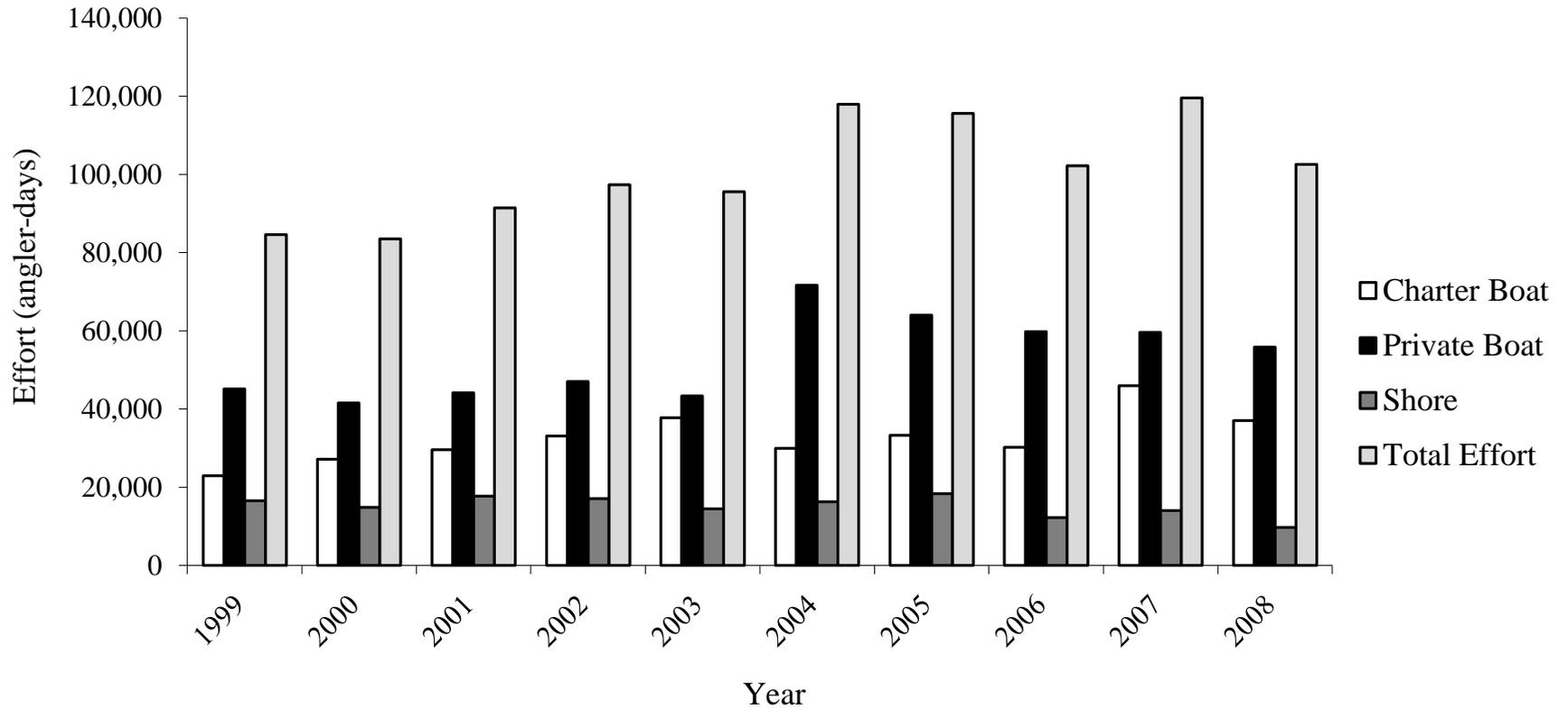


Figure 3.—Saltwater sport fishing effort, North Gulf Coast Management Area, 1999–2008.

Source: Howe et al. (2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011).

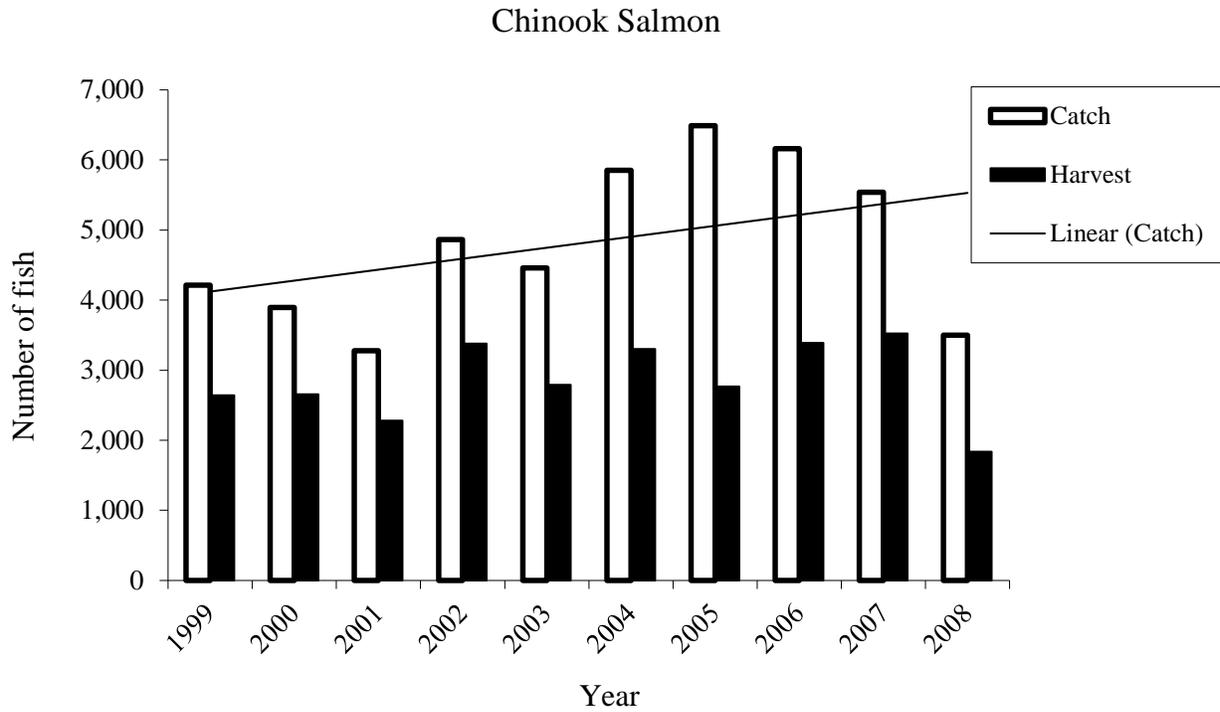


Figure 4.—Chinook salmon catch, harvest, and linear trend in catch, North Gulf Coast Management Area, 1999–2008.

*Source:* Howe et al. (2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011).

### Coho Salmon

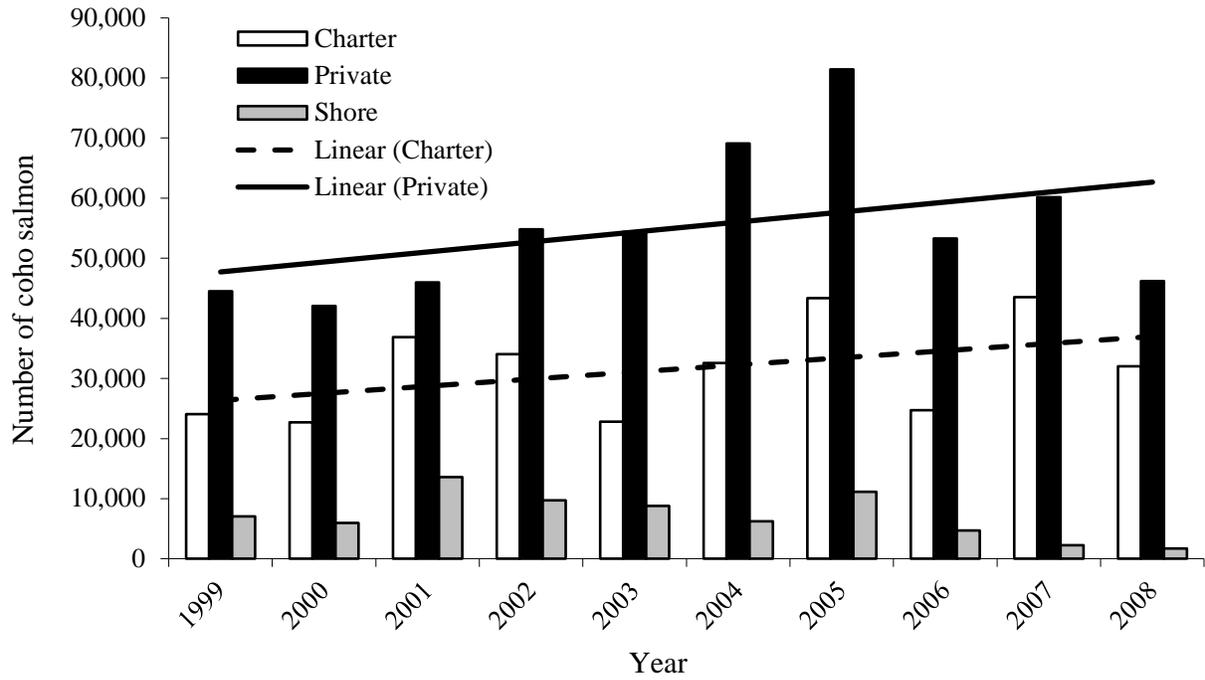


Figure 5.—Coho salmon harvest for charter and private boat anglers and shore anglers, and linear trends in charter and private boat angler harvest, North Gulf Coast Management Area, 1999–2008.

Source: Howe et al. (2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011).

## Sockeye Salmon

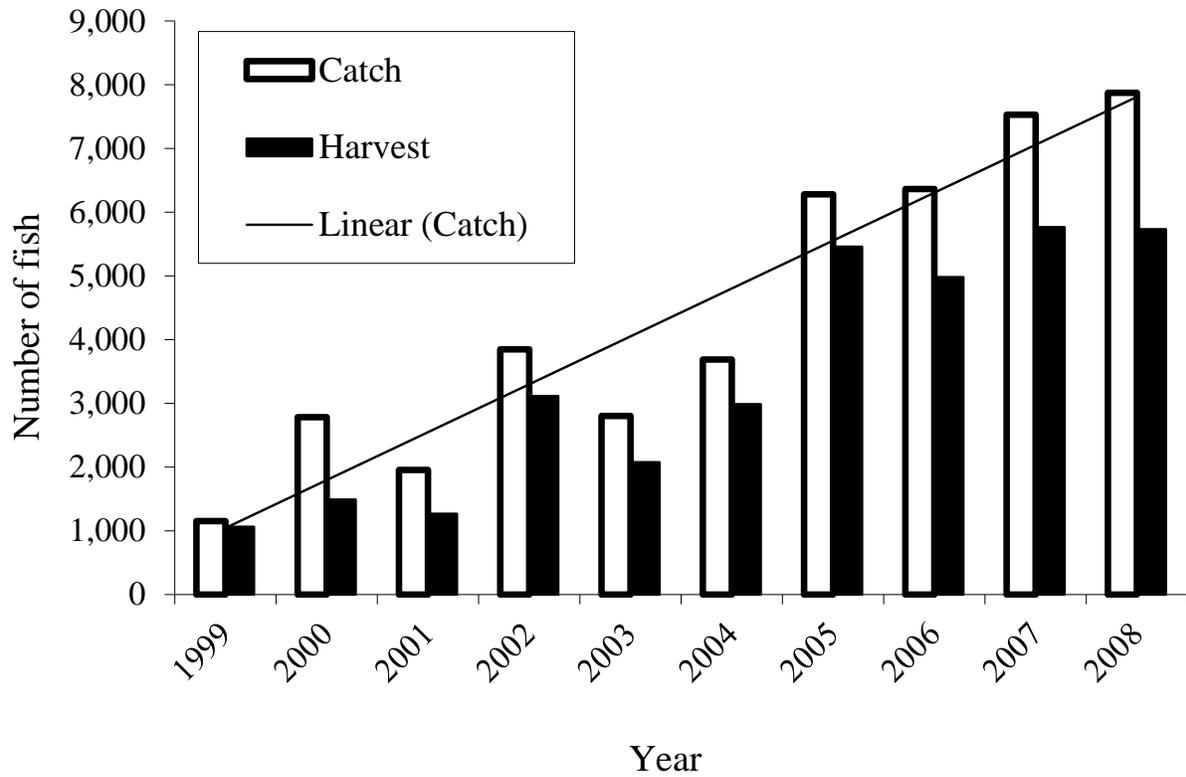


Figure 6.—Sockeye salmon catch, harvest, and linear trend in catch, North Gulf Coast Management Area, 1999–2008.

*Source:* Howe et al. (2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011).

### Pink Salmon

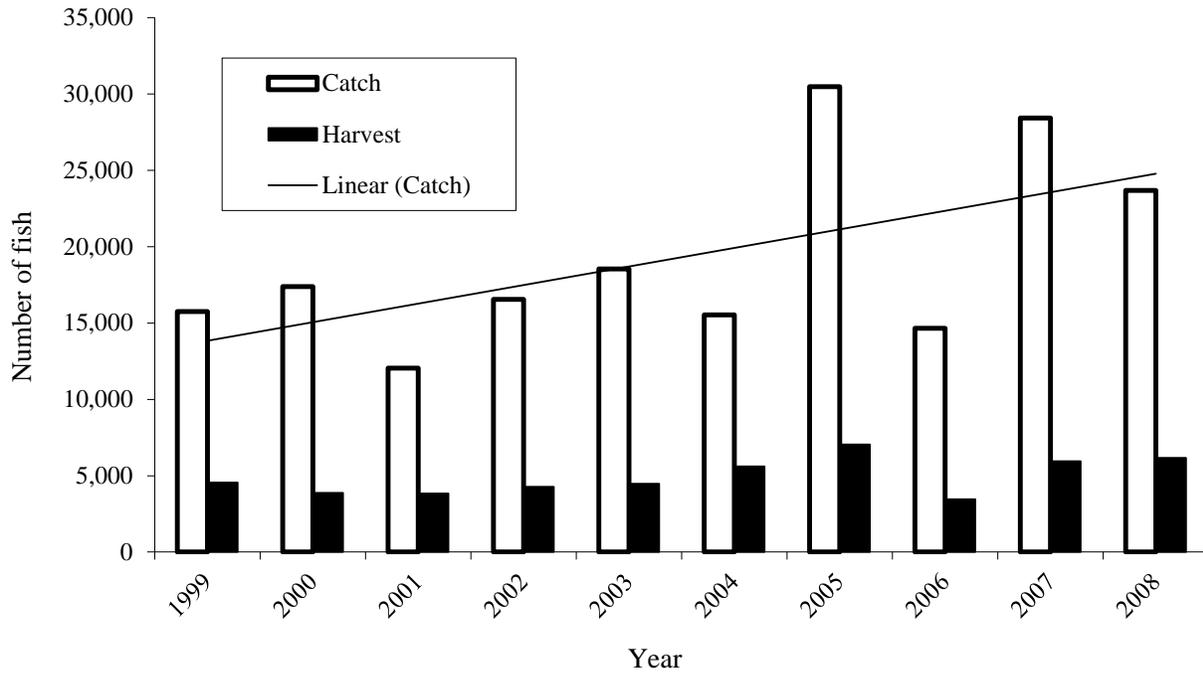


Figure 7.—Pink salmon catch, harvest, and linear trend in catch, North Gulf Coast Management Area, 1999–2008.

Source: Howe et al. (2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011).

### Chum Salmon

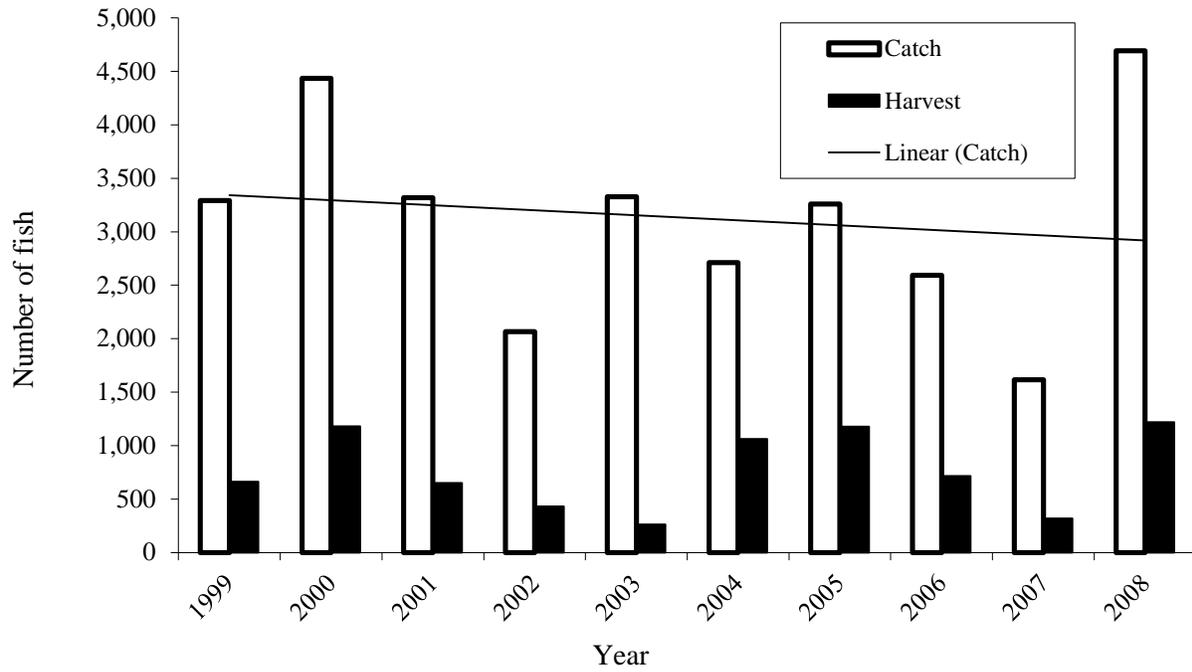


Figure 8.—Chum salmon catch, harvest, and linear trend in catch, North Gulf Coast Management Area, 1999–2008.

Source: Howe et al. (2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011).

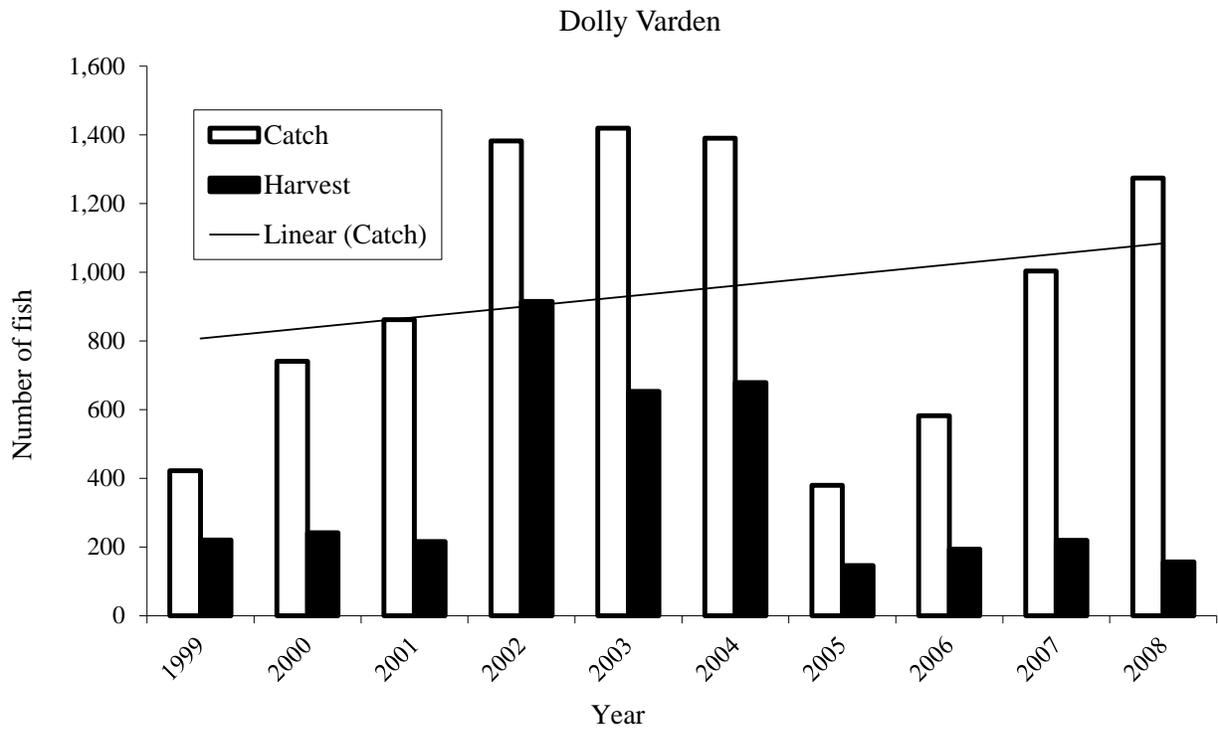


Figure 9.—Dolly Varden catch, harvest, and linear trend in catch, North Gulf Coast Management Area, 1999–2008.

*Source:* Howe et al. (2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011).

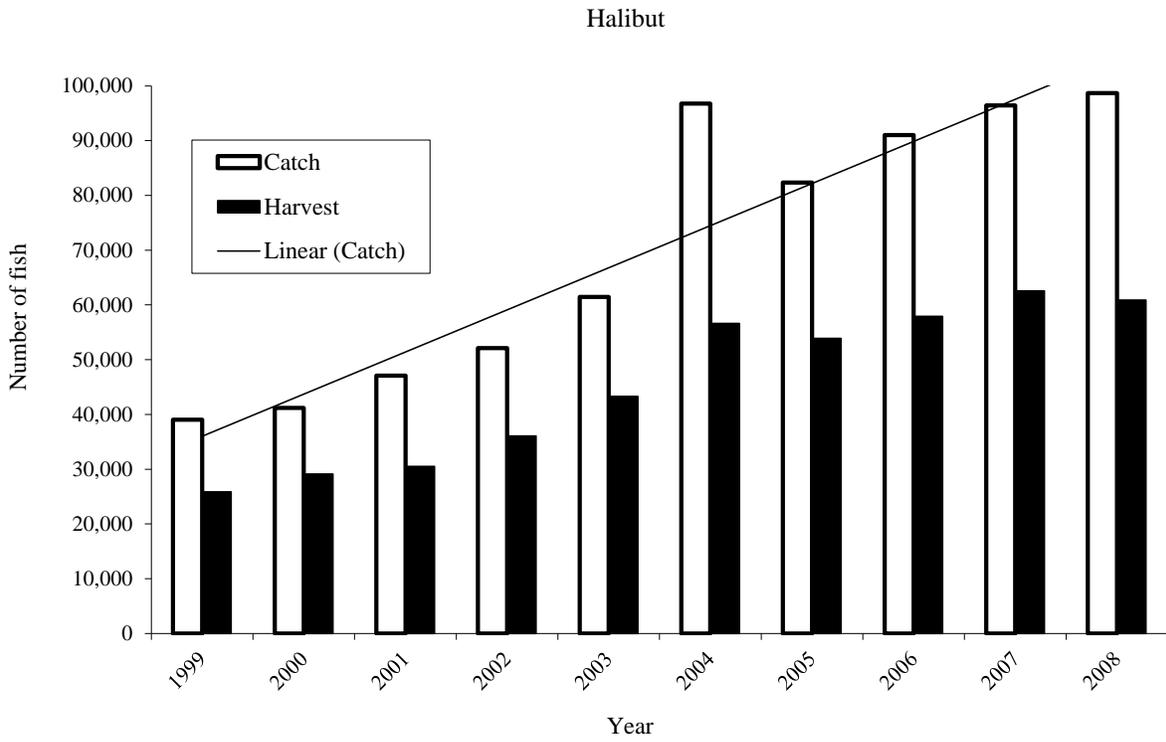


Figure 10.—Halibut catch, harvest, and linear trend in catch, North Gulf Coast Management Area, 1999–2008.

Source: Howe et al. (2001a-d); Walker et al. (2003); Jennings et al. (2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011).

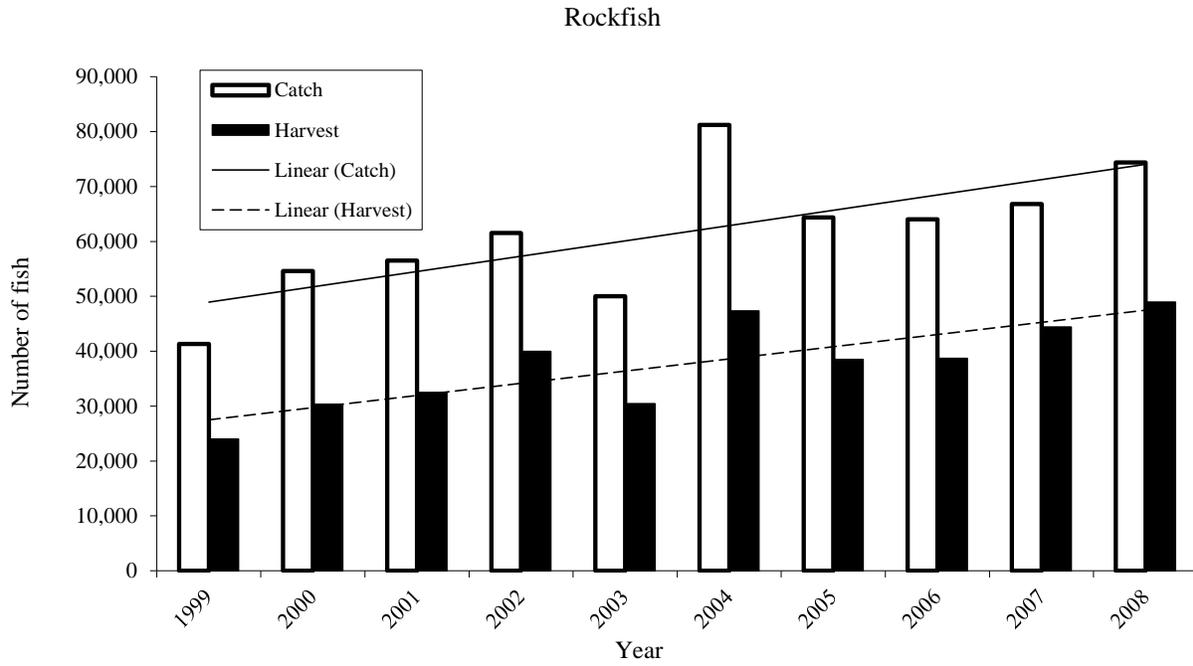


Figure 11.—Rockfish catch, harvest, and linear trends in catch and harvest, North Gulf Coast Management Area, 1999–2008.

# Lingcod

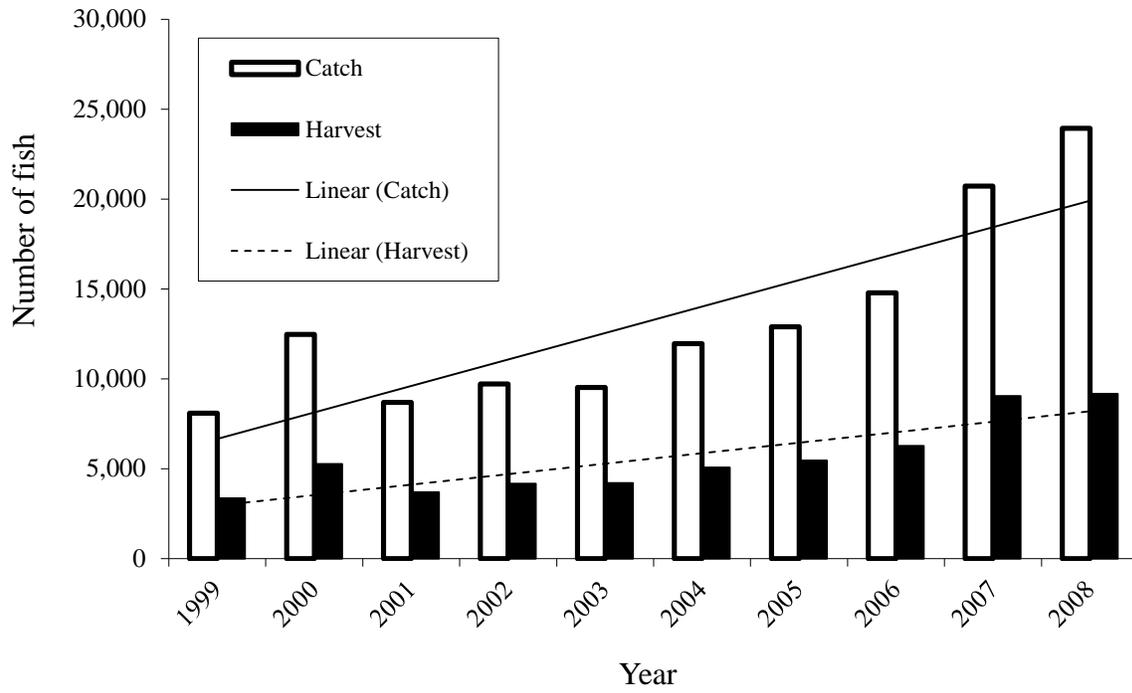


Figure 12.—Lingcod catch, harvest, and linear trends in catch and harvest, North Gulf Coast Management Area, 1999–2008.

### Sharks

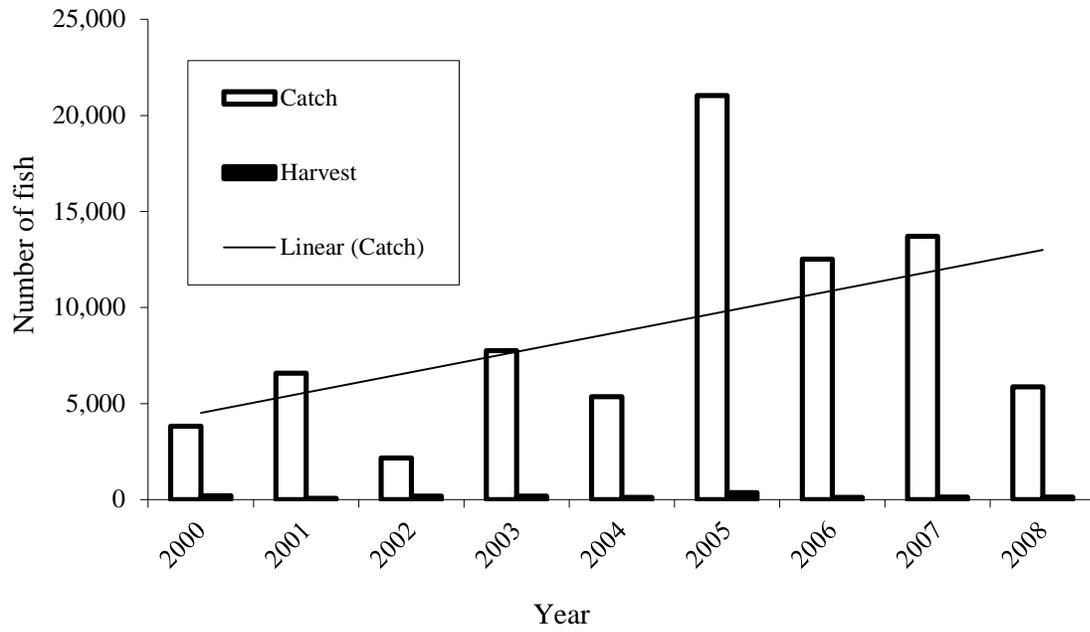


Figure 13.—Shark catch, harvest, and linear trend in catch, North Gulf Coast Management Area, 2000–2008.

**APPENDIX A: NORTH GULF COAST MANAGEMENT  
PLANS**

### **5 AAC 21.373 Trail Lakes Hatchery Sockeye Salmon Management Plan**

(a) The purpose of the management plan in this section is to provide an equitable distribution of the harvest of hatchery-produced salmon among seine and set gillnet commercial fisheries and the cost recovery fishery conducted by the Trail Lakes Hatchery operator. The department, in consultation with the hatchery operator, shall primarily manage the Lower Cook Inlet Special Harvest Areas salmon fisheries in the Southern District to achieve the Cook Inlet Aquaculture Association cost recovery harvest goal and the broodstock escapement goals for the Trail Lake Hatchery.

(b) The Cook Inlet Aquaculture Association, or the association's agent or contractor, may harvest salmon within the China Poot and Hazel Lake Special Harvest Area, Tutka Bay Special Harvest Area, Kirschner Lake Special Harvest Area, and Bear Lake Special Harvest Area during periods established by emergency order on or after the third Monday in May, using purse seines, hand purse seines, beach seines, and weirs. The China Poot and Hazel Lake Special Harvest Area, Tutka Bay Special Harvest Area, Kirschner Lake Special Harvest Area, and Bear Lake Special Harvest Area will remain closed to commercial fishing until the cost recovery goal and broodstock goal for the Trail Lake Hatchery is achieved or the department projects that the goals will be achieved.

(c) It is the intent of the Board of Fisheries that

- 1) any enhancement of sockeye salmon will not cause a net loss of coho salmon smolt production from Bear Lake;
- 2) any enhancement of sockeye salmon in Bear Lake will maintain the early run timing of the indigenous stocks;
- 3) the prime objective of any Bear Lake sockeye salmon enhancement is to provide the opportunity for a commercial sockeye salmon fishery conducted with minimal conflict with the noncommercial fisheries.

(d) No management restrictions will be imposed on the noncommercial fisheries in order to achieve the Trail Lakes Hatchery objectives for sockeye salmon.

(e) For the purposes of this section, the Lower Cook Inlet Special Harvest Areas are described as follows:

- 1) China Poot and Hazel Lake Special Harvest Area consists of the marine waters of the China Poot Bay Subdistrict in the Southern District shoreward of and enclosed by a line from 59° 34.66' N lat, 151° 19.27' W long, to 59° 35.08' N lat, 151° 19.77' W long, to 59° 33.09' N lat, 151° 25.22' W long, to 59° 32.84' N lat, 151° 24.90' W long;
- 2) Tutka Bay Special Harvest Area consists of the marine waters of the Tutka Bay Subdistrict in the Southern District southeast and shoreward of a line from 59° 30.23' N lat, 151° 28.23' W long to 59° 28.63' N lat, 151° 30.37' W long, including Tutka Bay Lagoon;

- 3) Kirschner Lake Special Harvest Area consists of the marine waters of the Bruin Bay Subdistrict in the Kamishak Bay District northwest and shoreward of a line from 59° 25.17' N lat, 153° 50.50' W long to 59° 23.17' N lat, 153° 56.90' W long;
- 4) Bear Lake Special Harvest Area consists of the marine waters of Resurrection Bay in the Eastern District north of the latitude of Caines Head at approximately 59° 58.93' N lat, and the fresh waters of Bear Creek, Salmon Creek, and Resurrection River downstream from and including the Bear Creek weir.

(f) The provisions of this section do not apply after May 1, 2011.

History: Eff. 8/23/2009, Register 191

#### **5 AAC 21.375. BEAR LAKE MANAGEMENT PLAN.**

Repealed. (Eff. 6/10/89, Register 110; am 2/13/2005, Register 173; repealed 8/23/2009, Register 191)

#### **5 AAC 21.376. RESURRECTION BAY SALMON MANAGEMENT PLAN.**

(a) Since the beginning of significant commercial harvests of pink and chum salmon in Resurrection Bay, there have been some conflicts between sport and commercial fishermen. The issues are the protection of coho and king salmon for the sport fishery, and the management of surplus pink and chum salmon stocks in a manner that provides for a commercial fishery while minimizing the incidental catch of coho and king salmon.

(b) The commissioner shall, by emergency order,

- 1) manage Resurrection Bay coho and king salmon stocks primarily for recreational use;
- 2) manage the indigenous pink and chum salmon stocks primarily for commercial use, insofar as that harvest does not interfere in time or area with the recreational fishery;
- 3) manage the commercial fishery in Resurrection Bay in a manner that does not interfere with the recreational fishery.

History: Eff. 6/10/89, Register 110; 6/11/2005, Register 126



**APPENDIX B: STOCKED FISHERIES IN THE NORTH  
GULF COAST MANAGEMENT AREA**

Appendix B1.—Chinook salmon stocking by year and release site, North Gulf Coast Management Area, 1966–1997.

| Year | Chinook salmon smolt |                 |                                      |                                     |                 |               |                   | Total   |
|------|----------------------|-----------------|--------------------------------------|-------------------------------------|-----------------|---------------|-------------------|---------|
|      | Box Canyon<br>Creek  | Lowell<br>Creek | Seward<br>Lagoon early-<br>run stock | Seward<br>Lagoon late-<br>run stock | Spring<br>Creek | Thumb<br>Cove | SeaLife<br>Center |         |
| 1966 |                      |                 |                                      |                                     |                 |               |                   |         |
| 1967 |                      |                 |                                      |                                     |                 |               |                   |         |
| 1968 |                      |                 |                                      |                                     |                 |               |                   |         |
| 1969 |                      |                 |                                      |                                     |                 |               |                   |         |
| 1970 |                      |                 |                                      |                                     |                 |               |                   |         |
| 1971 |                      |                 |                                      |                                     |                 |               |                   |         |
| 1972 |                      |                 |                                      |                                     |                 |               |                   |         |
| 1973 |                      |                 |                                      |                                     |                 |               |                   |         |
| 1974 |                      |                 |                                      |                                     |                 |               |                   |         |
| 1975 |                      |                 |                                      |                                     |                 |               |                   |         |
| 1976 | 25,100               |                 |                                      |                                     |                 |               |                   | 25,100  |
| 1977 | 50,036               |                 |                                      |                                     |                 |               |                   | 50,036  |
| 1978 | 150,488              |                 |                                      |                                     |                 |               |                   | 150,488 |
| 1979 | 257,540              |                 |                                      |                                     |                 |               |                   | 257,540 |
| 1980 |                      |                 |                                      |                                     |                 |               |                   |         |
| 1981 |                      |                 |                                      |                                     |                 |               |                   |         |
| 1982 |                      |                 |                                      |                                     |                 |               |                   |         |
| 1983 | 54,521               |                 |                                      |                                     |                 |               |                   | 54,521  |
| 1984 |                      | 39,206          |                                      |                                     |                 | 71,427        |                   | 110,633 |
| 1985 |                      | 132,708         | 53,587                               |                                     |                 |               |                   | 186,295 |
| 1986 |                      | 100,900         |                                      |                                     |                 |               |                   | 100,900 |
| 1987 |                      | 95,963          |                                      |                                     |                 |               |                   | 95,963  |
| 1988 |                      | 95,673          | 109,020                              |                                     |                 |               |                   | 204,693 |
| 1989 |                      | 122,800         | 109,464                              |                                     | 75,063          |               |                   | 307,327 |
| 1990 |                      | 216,140         | 112,831                              |                                     |                 |               |                   | 328,971 |
| 1991 |                      | 93,200          | 99,665                               | 273,500                             |                 |               |                   | 466,365 |
| 1992 |                      | 108,390         | 114,810                              | 146,993                             |                 |               |                   | 370,193 |
| 1993 |                      | 104,870         | 107,182                              | 86,560                              |                 |               |                   | 298,612 |
| 1994 |                      | 104,477         | 96,650                               | 68,946                              |                 |               |                   | 270,073 |
| 1995 |                      | 95,256          | 105,554                              | 114,596                             |                 |               |                   | 315,406 |
| 1996 |                      | 115,000         | 186,000                              | 114,000                             |                 |               |                   | 415,000 |
| 1997 |                      | 219,355         | 203,932                              | 98,052                              |                 |               |                   | 521,339 |

Appendix B2.—Coho salmon stocking by year and released site, North Gulf Coast Management Area, 1966–1997.

| Year | Coho salmon fry |           | Coho salmon fingerling |           |                  |            |           |               | Coho salmon smolt |           |                  |             |              |               | Total |                |
|------|-----------------|-----------|------------------------|-----------|------------------|------------|-----------|---------------|-------------------|-----------|------------------|-------------|--------------|---------------|-------|----------------|
|      | Bear Creek      | Bear Lake | Bear Creek             | Bear Lake | Box Canyon Creek | First Lake | Sink Hole | Seward Lagoon | Bear Creek        | Bear Lake | Box Canyon Creek | Grouse Lake | Lowell Creek | Seward Lagoon |       | SeaLife Center |
| 1966 |                 |           |                        | 360,100   |                  |            |           |               |                   |           |                  |             |              |               |       | 360,100        |
| 1967 |                 |           |                        | 246,400   |                  |            |           |               |                   |           |                  |             |              |               |       | 246,400        |
| 1968 |                 |           |                        |           |                  |            |           |               |                   |           |                  |             |              | 42,400        |       | 42,400         |
| 1969 |                 |           |                        |           |                  |            |           |               | 47,900            |           |                  |             |              | 27,100        |       | 75,000         |
| 1970 |                 |           |                        |           |                  |            |           |               | 6,400             |           | 3,200            |             |              | 38,600        |       | 48,200         |
| 1971 |                 |           |                        |           |                  |            |           |               | 50,983            |           |                  |             |              | 10,900        |       | 61,883         |
| 1972 |                 |           |                        | 450,800   |                  |            |           |               | 155,500           |           |                  |             |              | 66,500        |       | 672,800        |
| 1973 |                 |           |                        | 453,300   |                  |            |           |               |                   |           |                  |             |              | 30,200        |       | 483,500        |
| 1974 |                 |           |                        | 450,800   |                  |            |           |               |                   |           |                  |             |              | 100,000       |       | 550,800        |
| 1975 |                 |           |                        | 449,900   |                  | 1,000      |           |               |                   |           |                  |             |              | 100,700       |       | 551,600        |
| 1976 |                 |           |                        | 224,600   |                  |            |           |               | 35,600            |           |                  | 35,200      |              | 100,600       |       | 396,000        |
| 1977 |                 |           |                        | 10,800    |                  |            | 11,500    |               | 35,102            |           |                  | 35,003      |              | 100,456       |       | 192,861        |
| 1978 |                 |           |                        | 225,820   |                  |            |           |               | 28,574            |           |                  | 53,455      |              | 148,999       |       | 456,848        |
| 1979 |                 |           |                        | 225,460   |                  |            |           |               | 40,503            |           |                  | 44,010      |              | 98,566        |       | 408,539        |
| 1980 |                 |           |                        | 150,011   |                  |            |           |               |                   |           |                  | 50,286      |              | 100,757       |       | 301,054        |
| 1981 |                 |           |                        | 246,545   |                  |            |           |               |                   |           |                  | 54,593      |              | 109,958       |       | 411,096        |
| 1982 |                 |           |                        | 227,800   |                  |            |           |               |                   |           |                  | 13,238      |              | 53,970        |       | 295,008        |
| 1983 |                 |           |                        | 198,801   |                  |            |           |               | 50,000            |           |                  |             |              | 82,506        |       | 331,307        |
| 1984 |                 |           |                        | 220,000   |                  |            |           |               |                   |           |                  | 53,100      |              | 67,772        |       | 340,872        |
| 1985 |                 |           |                        | 300,446   |                  |            |           |               |                   |           |                  | 56,134      |              | 50,256        |       | 406,836        |
| 1986 |                 |           |                        | 445,693   |                  |            |           | 122,908       | 17,200            |           | 53,607           |             |              | 88,704        |       | 728,112        |
| 1987 |                 |           |                        | 223,300   | 257,461          |            |           |               |                   |           |                  |             | 57,232       | 65,514        |       | 603,507        |
| 1988 |                 |           |                        | 347,155   |                  |            |           |               |                   |           |                  |             | 63,806       | 118,741       |       | 529,702        |
| 1989 |                 |           |                        |           |                  |            |           |               |                   |           |                  |             | 66,606       | 272,346       |       | 338,952        |
| 1990 |                 | 333,211   |                        | 319,986   |                  |            |           |               | 93,694            | 583,700   |                  |             | 63,733       | 145,619       |       | 1,539,943      |
| 1991 |                 |           | 390,060                |           |                  |            |           |               |                   |           |                  |             | 89,892       | 119,057       |       | 599,009        |
| 1992 |                 |           |                        |           |                  |            |           |               |                   | 51,733    |                  |             | 59,492       | 154,219       |       | 265,444        |
| 1993 | 170,000         | 450,000   |                        |           |                  |            |           |               |                   |           |                  |             | 64,361       | 159,091       |       | 673,452        |
| 1994 |                 | 320,000   |                        |           |                  |            |           |               |                   |           |                  |             | 38,000       | 201,577       |       | 559,577        |
| 1995 |                 | 509,000   |                        |           |                  |            |           |               |                   | 7,400     |                  |             | 50,698       | 133,700       |       | 700,798        |
| 1996 |                 | 350,000   |                        |           |                  |            |           |               |                   | 75,000    |                  |             | 69,000       | 182,000       |       | 676,000        |
| 1997 |                 | 448,700   |                        |           |                  |            |           |               | 153,000           |           |                  |             | 61,687       | 144,112       |       | 807,499        |

Appendix B3.—Sockeye and chum salmon stocking by year and release site, North Gulf Coast Management Area, 1966–1997.

| Year | Chum salmon<br>fingerling |                 | Sockeye salmon |            |          |         |           | Grouse<br>Lake | Total |
|------|---------------------------|-----------------|----------------|------------|----------|---------|-----------|----------------|-------|
|      |                           |                 | Bear Lake      |            |          |         |           |                |       |
|      | Jap<br>Creek              | Spring<br>Creek | Fry            | Fingerling | Presmolt | Smolt   | Smolt     |                |       |
| 1966 |                           |                 |                |            |          |         |           |                |       |
| 1967 |                           |                 |                |            |          |         |           |                |       |
| 1968 |                           |                 |                |            |          |         |           |                |       |
| 1969 |                           |                 |                |            |          |         |           |                |       |
| 1970 |                           |                 |                |            |          |         |           |                |       |
| 1971 |                           |                 |                |            |          |         |           |                |       |
| 1972 |                           |                 |                |            |          |         |           |                |       |
| 1973 |                           |                 |                |            |          |         |           |                |       |
| 1974 |                           |                 |                |            |          |         |           |                |       |
| 1975 |                           |                 |                |            |          |         |           |                |       |
| 1976 |                           |                 |                |            |          |         |           |                |       |
| 1977 |                           |                 |                |            |          |         |           |                |       |
| 1978 |                           |                 |                |            |          |         |           |                |       |
| 1979 |                           |                 |                |            |          |         |           |                |       |
| 1980 |                           |                 |                |            |          |         |           |                |       |
| 1981 |                           |                 |                |            |          |         |           |                |       |
| 1982 |                           |                 |                |            |          |         |           |                |       |
| 1983 |                           |                 |                |            |          |         |           |                |       |
| 1984 |                           |                 |                |            |          |         |           |                |       |
| 1985 | 282,620                   | 173,187         |                |            |          |         |           | 455,807        |       |
| 1986 |                           |                 |                |            |          |         |           |                |       |
| 1987 |                           |                 |                |            |          |         |           |                |       |
| 1988 |                           |                 |                |            |          |         |           |                |       |
| 1989 |                           |                 |                |            |          |         |           |                |       |
| 1990 |                           |                 | 20,185         | 2,240,000  | 317,777  |         |           | 2,577,962      |       |
| 1991 |                           |                 | 1,530,000      |            |          | 74,922  |           | 1,604,922      |       |
| 1992 |                           |                 | 1,795,529      |            |          | 565,489 |           | 2,361,018      |       |
| 1993 |                           |                 | 44,400         | 1,765,861  |          |         |           | 1,810,261      |       |
| 1994 |                           |                 | 170,000        |            |          |         | 570,000   | 740,000        |       |
| 1995 |                           |                 | 330,000        |            |          |         | 993,000   | 1,323,000      |       |
| 1996 |                           |                 | 780,638        |            |          |         | 217,605   | 998,243        |       |
| 1997 |                           |                 | 788,000        |            |          |         | 2,428,000 | 3,216,000      |       |