STATE OF ALASKA
GROUNDFISH FISHERIES

ASSOCIATED INVESTIGATIONS IN 2011

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TABLE OF CONTENTS

STATE OF ALASKA GROUNDFISH FISHERIES AND ASSOCIATED INVESTIGATIONS IN 2011

AGENDA ITEM VII. REVIEW OF AGENCY GROUNDFISH RESEARCH, STOCK ASSESSMENT, AND MANAGEMENT

A. Agency Overview

1. Description of the State of Alaska commercial groundfish fishery program:

The Alaska Department of Fish and Game (ADF&G) has jurisdiction over all commercial groundfish fisheries within the internal waters of the state and to three miles offshore along the outer coast. A provision in the federal, Gulf of Alaska (GOA) Groundfish Fishery Management Plan (FMP) gives the State of Alaska limited management authority for demersal shelf rockfish (DSR) in federal waters east of 140^{o} W. longitude. The North Pacific Fisheries Management Council (NPFMC) took action in 1997 to remove black and blue rockfish from the GOA FMP. In 2007 the dark rockfish was removed from both the GOA and the Bering Sea and Aleutian Islands (BSAI) FMP. Thus in these areas the state manages these species in both state and federal waters. The state also manages the lingcod resource in both state and federal waters of Alaska. The State of Alaska manages some groundfish fisheries occurring in Alaska waters in parallel with NOAA fisheries, adopting federal seasons and in some cases allowable gear types as specified by NOAA. The information related in this report is from the state-managed groundfish fisheries only.

The State of Alaska is divided into three maritime regions for marine commercial fisheries management. The Southeast Region extends from the Exclusive Economic Zone (Equi-distant line) boundary in Dixon Entrance north and westward to 144^{o} W. longitude and includes all of Yakutat Bay (Appendix II). The Central Region includes the Inside and Outside Districts of Prince William Sound (PWS) and Cook Inlet including the North Gulf District off Kenai Peninsula. The Westward Region includes all territorial waters of the Gulf of Alaska south and west of Cape Douglas and includes North Pacific Ocean waters adjacent to Kodiak, and the Aleutian Islands as well as all U.S. territorial waters of the Bering, Beaufort, and Chukchi Seas.

a. Southeast Region

The **Southeast Region** Commercial Fisheries Groundfish Project is based in Sitka with the groundfish project leader, fisheries biologist, and one full-time fisheries technician located there. One full-time biologist, one full-time fisheries technician and one full time research analyst for this project are based in Douglas. Seasonal technicians and port samplers are employed in Petersburg, Ketchikan and Sitka. The project also receives biometrics assistance from the regional office in Douglas and from headquarters in Juneau.

The **Southeast Region's** groundfish project has responsibility for research and management of all commercial groundfish resources in the territorial waters of the Eastern Gulf of Alaska as well as in federal waters for demersal shelf rockfish (DSR), black, blue, and dark rockfishes, and lingcod. The project cooperates with the federal government for management of the waters of

the adjacent EEZ. The project leader participates as a member of the NPFMC Gulf of Alaska Groundfish Plan Team and produces the annual stock assessment for DSR for consideration by the NPFMC. In 2011, as in 2011, the project leader also served as member of the NPFMC Plan Team Halibut Bycatch Working group. The goals of the working group are to determine a best method for extrapolating the catch of bycatch on the International Pacific Halibut Commission (IPHC) survey to the halibut fishery as a way to comply with Annual Catch Limit (ACL) requirements.

Project activities center around fisheries monitoring, resource assessment, and in-season management of the groundfish resources. In-season management decisions are based on data collected from the fisheries and resource assessment surveys. Primary tasks include fish ticket collection, editing, and data entry for both state and federally-managed fisheries; dockside sampling of sablefish, lingcod, Pacific cod, and rockfish landings; and logbook collection and data entry. Two resource assessment surveys were conducted during 2011. The Southeast Groundfish project is funded in part with NOAA Grant NA08NMF4070534. The R/V *Medeia,* home ported Juneau, conducts a variety of groundfish research activities in Southeast Region waters.

b. Central Region

Central Region groundfish staff is headquartered in Homer and is comprised of a regional groundfish management biologist, a regional groundfish/shellfish research project leader, a groundfish sampling coordinator, a groundfish fish ticket entry position, two marine research biologists, one GIS analyst, five to six seasonal technicians, and one seasonal commercial catch sampler. An assistant area management biologist and a seasonal commercial catch sampler are also located in Cordova and regional support is in Anchorage. The groundfish management biologist serves as a member of the North Pacific Fishery Management Council's (NPFMC) Gulf of Alaska Groundfish Plan Team and the research project leader serves on the NPFMC Non-Target Species Committee. The R/V *Pandalus*, home ported in Homer, and the R/V *Solstice,* in Cordova, conduct a variety of groundfish research activities in Central Region waters.

Groundfish responsibilities include research and management of groundfish species harvested in territorial waters of **Central Region**. Within Central Region, groundfish species of primary interest include sablefish, Pacific cod, pollock, lingcod, rockfishes, skates, sharks, and flatfishes. Data are collected through commercial catch sampling, fishermen interviews, logbooks, onboard observing, and through ADF&G trawl and remotely operated vehicle (ROV) surveys. Commercial harvest data (fish tickets) are processed in Homer for state and federal fisheries landings in Central Region ports. For some fisheries, logbook data are required and these are collected and entered to provide additional information including catch depth and harvest data.

c. Westward Region

The **Westward Region** Groundfish management and research staff is located in Kodiak and Dutch Harbor. Kodiak staff is comprised of a regional groundfish management biologist, an area groundfish management biologist, an assistant area groundfish management biologist, a groundfish research project leader, a groundfish research project assistant biologist, a groundfish dockside sampling coordinator, a trawl survey biologist, two seasonal fish ticket processing technicians, and several seasonal dockside samplers. A full-time area management biologist, an assistant area groundfish management biologist and a seasonal fish ticket processing technician

are located in the Dutch Harbor office. Seasonal dockside sampling also occurs in Chignik, Sand Point, and King Cove. The R/V *Resolution*, R/V *K-Hi-C*, and R/V *Instar* hail from Kodiak and conduct a variety of groundfish related activities in the waters around Kodiak, the south side of the Alaska Peninsula, and in the eastern Aleutian Islands.

Major groundfish activities include: fish ticket editing and entry for approximately 11,000 tickets from both state and federal fisheries, analysis of data collected on an annual multi-species trawl survey encompassing the waters adjacent to the Kodiak archipelago, Alaska Peninsula and Eastern Aleutians, management of black rockfish, state-waters Pacific cod, lingcod, and Aleutian Island state-waters sablefish fisheries, conducting dockside interview and biological data collections from commercial groundfish landings, and a number of research projects. In addition, the Westward Region has a member on the NPFMC Bering Sea/Aleutian Island Groundfish Plan Team (Dave Barnard) and the Gulf of Alaska Groundfish Plan Team (Nick Sagalkin).

d. Headquarters

The 1996 Magnuson-Stevens Act called for developing regional fishery databases coordinated between state and federal agencies. The Alaska Fisheries Information Network (AKFIN), created in 1997, accomplishes this objective. The AKFIN program provides the essential fishery catch data needed to manage Alaska's groundfish and crab resources within the legislative requirements of the Act in Section 303(a)5. Alaska has diverse data collection needs that are similar to other states but the extensive geographic area and complexity of fisheries management tools used in Alaska have resulted in AKFIN becoming a cooperative structure that is responsive to the needs to improve data collection. The Pacific States Marine Fisheries Commission (PSMFC) manages the AKFIN grant with the funding shared by the ADF&G statewide AKFIN contract and the PSMFC sponsored AKFIN Support Center (AKFIN-SC) in Portland, Oregon. The ADF&G has primary responsibility for collecting, editing, maintenance, analysis, and dissemination of these data and performs this responsibility in a comprehensive program.

The overall goal of ADF&G's AKFIN program is to provide accurate and timely fishery data that is essential to management, pursuant to the biological conservation, economic and social, and research and management objectives of the fishery management plans for groundfish and crab. The specific objectives related to the groundfish fisheries are:

1) to collect groundfish fishery landing information, including catch and biological data, from Alaskan marine waters extending from Dixon Entrance to the BSAI;
2) to determine ages for groundfish samples using age structures (as otoliths, vertebrae, and spines) arising from statewide commercial catch and resource survey sampling conducted by ADF&G;
3) to provide the support mechanisms needed to collect, store, and report commercial groundfish harvest and production data in Alaska;
4) to integrate existing fishery research data into secure and well maintained databases with consistent structures and definitions;
5) to increase the quality and accuracy of fisheries data analysis and reporting to better meet the needs of ADF&G staff, AKFIN partner agencies, and the public, and to make more of

this information available via web-access while maintaining the department's confidentiality standards;
6) to provide GIS services for AKFIN fishery information mapping to ADF&G Division of Commercial Fisheries staff and participate in GIS and fishery data analyses and collaboration with other AKFIN partner agencies;
7) to support economic analysis as needed prior to implementation of state and federal fishery regulations; and
8) to provide internal oversight of the AKFIN contract between the ADF&G and the Pacific States Marine Fisheries Commission (PSMFC).

Groundfish species include walleye pollock, Pacific cod, sablefish, skates, various flatfish, various rockfish, Atka mackerel, lingcod, sharks, and miscellaneous species.

The foundation of the state's AKFIN project is an extensive port sampling system for collection and editing of fish ticket data from virtually all of the major ports of landing from Ketchikan to Adak and the Pribilof Islands, with major emphasis on Sitka, Homer, Kodiak, and Dutch Harbor. The port sampling program includes collection of harvest data, such as catch and effort, and also the collection of biological data on the species landed, and age determination based on samples of age structures collected from landed catches. A dockside sampling program provides for collection of accurate biological data (e.g., size, weight, sex, maturity, and age) and verifies self reported harvest information submitted on fish tickets from shoreside deliveries of groundfish throughout coastal Alaska. In addition, the Gulf of Alaska Groundfish FMP and the Bering Sea and Aleutian Islands Groundfish FMP require the collection of groundfish harvest data (fish tickets) in the north Pacific. The AKFIN program is necessary for management and for the analytical and reporting requirements of the FMPs.

The state's AKFIN program is supported by a strong commitment to development and maintenance of a computer database system designed for efficient storage and retrieval of the catch and production data on a wide area network and the internet. It supports the enhancement of the fish ticket information collection effort including; regional fishery monitoring and data management, GIS database development and fishery data analysis, catch and production database development and access, the Age Determination Unit laboratory, database management and administration, fisheries data collection and reporting, fisheries economic projects, and fisheries information services.

Local ADF&G personnel maintain close contact with fishers, processors and enforcement to maintain a high quality of accuracy in the submitted fish ticket records. Following processing, the data are electronically transferred to Headquarters. The research analyst working with this project works as part of a team to maintain a master statewide groundfish fish ticket database. Data feeds to Headquarters are merged to this master database. Data are routinely reviewed for accuracy with corrections applied as required. Within the confines of confidentiality agreements, raw data are distributed to the NMFS (both NMFS-ARO and NMFS-AFSC), the NPFMC, the Commercial Fisheries Entry Commission (CFEC), the Pacific States Fisheries Information Network (PACFIN) and the AKFIN Support Center on a regularly scheduled basis. Summary groundfish catch information is also provided back to regional ADF&G offices as well as to the State of Alaska Board of Fisheries, NMFS, NPFMC and the AKFIN Support Center.

The fishery information collected by the AKFIN program is not only essential for managers and scientists who must set harvest levels and conserve the fisheries resources, but it is also valuable for the fishermen and processors directly involved in the fisheries, as well as the general public. To meet those needs, the department has designed, implemented, and continues to improve database systems to store and retrieve fishery data, and continues to develop improvements to fishery information systems to provide data to other agencies and to the public.

The department also conducts economic analyses of these data for use in the NPFMC arena. The need for an economic analysis component of the AKFIN program arises from jurisdictional obligations, pressing economic needs, and impacts of environmental regulations. The ADF&G is the management agency for state fisheries under its jurisdiction, and also a lead agency in policy making for federal fisheries of the region through its role in the NPFMC and the Pacific Salmon Commission (PSC). Economic analysis of seafood and fishery management policy is essential for the state to determine how proposed policies will impact the industry, Alaska regions, and coastal localities of the state. The role of state personnel is especially crucial under the rationalization plan currently being refined by the NPFMC, which will directly impact the state managed groundfish fisheries in the Gulf of Alaska.

Groundfish fishery milestones for this ongoing ADF&G AKFIN program are primarily the annual production of catch records and biological samples. In calendar year 2011 ADF&G AKFIN staff processed 19,690 groundfish fish tickets, collected 34,098 groundfish biological samples and measured 15,918 age structures (see tables below for regional breakdown). These basic measures of ongoing production in support of groundfish marine fisheries management by AKFIN funded ADF&G staff are representative of the level of annual productivity by the AKFIN program since its inception in 1997. (Contact: Lee Hulbert)

Groundfish Fish Tickets Processed -Calendar Year 2011

ADF&G Region	
1 - Southeast	3,239
2 - Central	2,751
4 - Westward; Kodiak, AK Pen.	12,160
4 - Westward; BSAI	1,540
Total	19,690

Groundfish Biological Data Collection - Calendar Year 2011

ADF&G Region	AWL Samples Collected	Age Structures Measured
1 - Southeast	7,018	7,141
2 - Central	9,249	4,852
4 – Westward	17,831	3,925
Total	34,098	15,918

Intergency Electronic Reporting System (contact Gail Smith)

ADF&G maintains a commercial harvest database, based on landing report receipts – fish tickets. These data are comprehensive for all commercial salmon, herring, shellfish, and groundfish from 1969 to present. Data are stored in an Oracle relational database and available to Headquarters and regional staff via the State of Alaska wide-area network.

Beginning in 2001, the agencies tasked with commercial fisheries management in Alaska (ADF&G, NMFS, IPHC) began development of a consolidated landing, production, and IFQ reporting from a sole source – the Interagency Electronic Reporting System (IERS). The goal is to move all fisheries dependant data to electronic reporting systems. The web-based reporting component of this system is ***eLandings.*** The desktop application for the at-sea catcher processor fleet is ***seaLandings***. Vessels using the seaLandings application email landing and production reports to the centralized database as an email attachment. ***tLandings*** was developed to address electronic reporting on-board salmon tender vessels. The application and the landings reports are stored on a portable hard drive and delivered to the shoreside processor for upload to the eLandings database. Fisheries management agencies use a separate application, the ***IERS Agency Interface***, to view and edit landing reports. The IERS management/development team are developing and implementing an electronic logbook application, ***eLogbook***, currently used by groundfish catcher processors. The ***eLogbook*** will be modified to accommodate groundfish and crab catcher vessels and implemented in the future. The IERS has been in successful operation in the groundfish and IFQ halibut/sablefish fisheries since July 2006.

Our approach, throughout this project has been staged implementation, which allows a small staff to successfully manage this ambitious project. We expect the IERS will be fully implemented with the salmon fishery by the end of the 2014 season. Statewide shellfish and herring fisheries will be addressed in 2015.

The IERS features include electronic landing and production reports, real time quota monitoring, immediate data validation, and printable (.pdf) fish ticket reports. The IERS provides processors with a web-based electronic catch and production data extraction using an XML output. ADF&G personnel, funded by AKFIN, Rationalized Crab Cost Recovery funds and IFQ Halibut/Sablefish Cost Recovery funds, participate in the IERS project on the development, implementation, and maintenance levels. During 2011, the IERS recorded more than 47,500 landing reports in crab, groundfish and salmon fisheries.

The IERS is extensively documented on a public and secure wiki at https://elandings.alaska.gov/confluence/

Local ADF&G personnel in six locations throughout the state of Alaska (Petersburg, Sitka, Juneau, Homer, Kodiak and Dutch Harbor) maintain close contact with groundfish fishers, processors and state/federal enforcement to maintain a high quality of accuracy in the submitted fish ticket records. The Interagency Electronic Reporting System – eLandings , seaLandings, tLandings and eLogbook applications, with immediate data validation and business rules, has improved data quality and allows personnel to function at a higher level. User support on a 24/7

basis is being provided by GCI, an Alaska based telecommunications company. IFQ reporting support is provided by the NMFS Data Technicians.

Landing and production data are submitted to a central database, currently hosted by the State of Alaska, validated and reviewed, and pulled to the individual agency databases. Landing data are available to agency personnel within seconds of submission of the report. Printable documentation of the landing report and the Individual Fishery Quota debit are created within the applications. Signed fish tickets continue to be submitted to local offices of ADF&G for additional review and comparison to other data collection documents. These documents include vessel/fisher logbooks, agency observer datasets, and dockside interviews with skippers.

Within the confines of confidentiality agreements, raw data are distributed to the State of Alaska Commercial Fisheries Entry Commission (CFEC) and to the National Marine Fishery Service NMFS-ARO and AKFIN Support Center on a monthly schedule. The CFEC merges the ADF&G fish ticket data with fisher permit and vessel permit data. This dataset is then provided to the AKFIN Support Center, which distributes the data to the professional staff of the North Pacific Fishery Management Council (NPFMC) and summarized data to the Pacific States Fisheries Information Network (PACFIN). Summary groundfish catch information is also posted on the ADF&G Commercial Fisheries website: http://www.cf.adfg.state.ak.us/geninfo/finfish/grndfish/grndhome.php.
Summarized data are provided to the State of Alaska Board of Fisheries, the North Pacific Fisheries Management Council, and to the State of Alaska legislature as requested.

e. Gene Conservation Laboratory

In the past, the ADF&G Gene Conservation Laboratory collected genetic information on black rockfish, light and dark dusky rockfish, and pollock (a list of *Sebastes and* pollock tissue samples stored at ADF&G's Gene Conservation Laboratory can be found in Appendix III).

f. Age Determination Unit

The ADFG's centralized statewide age reading program at the Age Determination Unit (ADU; also known as the Otolith Lab or the Age Lab) in Juneau continued to provide age data to ADF&G regional managers in 2011. Age structures from 11,495 groundfish representing 18 species were received from statewide commercial and survey harvest sampling efforts. A total of 9,101 age data were released back to managers, which included data from samples received in previous years, but processed in 2011. Over 2,808 additional age data were produced through precision testing, and an additional 4,225 data were produced through training and calibration procedures. A total of 47,358 age structure measurement records were produced (representing over 26,346 specimens) were measured. The majority (>70%) of funding for this project is through AKFIN, and the remaining is from state funding. The ADU employed six people in 2011 for approximately 55 work months to age groundfish and invertebrate age structures and conduct associated work, for example, sample preparation, data entry, archiving of data and samples, age structure measurements, and project work.

Quality of age data is routinely assessed through second-reading of at least 15% of the sample, either by the initial reader or by a reader with equal or greater experience. Species-specific

control limits are imposed to further guide release of age data; transgression of control limits direct reviewing of some or the entire sample.

In 2011 the ADU was in production status for all species received except for gadids from commercial fisheries. Aging of sablefish dominated the reading schedule. This is due to substantial increases in sampling of sablefish and the use of these data in age structured models. Effort continued toward increasing objective information (age structure measurements, age validation) to strengthen foundation of pattern interpretation for all species.

Substantial project work is conducted by the ADU and is in varying stages of implementation and completion. Notable projects include: bomb radiocarbon age validation, culture of walleye pollock for known otolith accretion, tagging and release of walleye pollock, and development of the seminal "ADU Data Filter". Most of the bomb radiocarbon age validation work is in the writing stages, although completion of reports is on hold due to other high priority work. Culture of walleye pollock to produce known otolith accretion values at age continued in 2011. These fish reached age-5 in April 2011, and have been under tank culture at the NMFS Auke Bay Marine Station, Juneau Alaska since their capture in 2006 at age-0. This project reached maturity in 2011 and it will conclude April 2012. An interim Regional Information Report was produced (Munk 2011); this report suggested that contemporary aging practice of walleye pollock should be revisited because the known otolith accretion from cultured pollock is suggesting that walleye pollock are currently being underaged. In 2011, ADU staff tagged and released 49 wild pollock in Auke Bay for a three year total of 2,699 tagged pollock. The longest distance for a recovery (of a tag which did not include the fish) was approximately 20 miles (north of Benjamin Island in Lynn Canal), and the longest time between tagging and recovery was approximately 1 year. Pollock and other fish tagging updates are available at http://tagotoweb.adfg.state.ak.us/ADU/Tagged.aspx. In 2011, ADU staff commenced development of the ADU Data Filter. This filter models age structure dimensions-at-age, and eventually will compare the established range to 100% of produced age data, highlighting specimens which are not within expected ranges. These "exceptions" will then be reviewed for possible age mis-assignment, data entry errors, etc. The phases of work conducted in development of the ADU Data Filter are: modeling age-at-age structure dimension (usually otolith weight) and creation of lookup tables of values; creation of a computer interface; testing and evaluating proof of concept; and development of protocols for implementation. The first species of application is sablefish, and will be followed by lingcod and yelloweye rockfish once the project components are established for sablefish. This project will evaluate the performance of the data filter for one year and report outcome, prior to full implementation in the ADU program.

The ADU Oracle database *AegIS*, Age Information System, was used for logging in samples, importing and exporting of data, importing field data, and direct entry of age structure measurements. We completed development of an online age structure invoicing system, *OASIS*, which was first deployed late 2010, and this system was fully utilized in 2011. All samples sent to the ADU are first invoiced online, which provide for standardization of sample information prior to receipt of the sample.

The ADU participated in the Canada-US Groundfish Committee's working group, Committee of Age Reading Experts (CARE). We participated in the biennial workshop, age structure exchanges, and committee work including developing narrative for an age reading manual. (Contact Kristen Munk)

2. Description of the State of Alaska recreational groundfish fishery program (Sport Fish Division)

ADF&G manages all recreational groundfish fisheries within the internal waters of the state, in coastal waters out to three miles offshore, and throughout the EEZ. The Alaska Board of Fisheries extended existing state regulations governing the sport fishery for all marine species into the waters of the EEZ off Alaska in 1998. This was done under provisions of the Magnuson-Stevens Fishery Conservation and Management Act, which stipulate that states may regulate fisheries that are not regulated under a federal fishery management plan or other applicable federal regulations. No recreational fisheries are included in the Gulf of Alaska Fishery Management Plan.

Most management and research efforts are directed at halibut, rockfish, and lingcod, the primary groundfish species targeted by the recreational fishery. Statewide data collection programs include an annual mail survey to estimate overall harvest (in number of fish) of halibut, rockfishes (all species combined), lingcod, Pacific cod, sablefish, and sharks (all species combined), and a mandatory logbook to assess harvest of selected species in the charter boat fishery. The statewide bottomfish coordinator (Scott Meyer) coordinates federal data requests and develops scientifically-based advice for assessment and management of halibut and groundfish.

Regional programs with varying objectives address estimation of recreational fishery statistics including harvest and release magnitude and biological characteristics such as species, age, size, and sex composition. Research was funded through state general funds and the Federal Aid in Sport Fish Restoration Act. There are essentially two maritime regions for marine sport fishery management in Alaska. The Southeast Region extends from the EEZ boundary in Dixon Entrance north and westward to Cape Suckling, at approximately 144^{o} W. longitude. The Southcentral Region includes state and federal waters from Cape Suckling to Cape Newenham, including Prince William Sound (PWS), Cook Inlet, Kodiak, the Alaska Peninsula, the Aleutian Islands, and Bristol Bay.

a. Southeast Region Sport Fish

Regional staff in Douglas coordinates a data collection program for halibut and groundfish in conjunction with a region wide Chinook salmon harvest studies project. The project leader, assistant project biologist for the northern southeast Alaska ports, the project biometrician, and the project research analyst are based in Juneau, while the assistant project biologist for the southern southeast Alaska ports is based out of Ketchikan. A total of 25 technicians worked at the major ports in the Southeast region, where they interviewed anglers and charter operators and collected data from sport harvests of halibut and groundfish while also collecting data on sport harvests of salmon. Data collected on groundfish were limited to species composition, lengths of harvested rockfish, halibut and lingcod, and sex of lingcod; no otoliths or other age structures

were collected. Data were provided to the Alaska Board of Fisheries, other ADF&G staff, the public, and a variety of other agencies such as the NPFMC and the IPHC.

The Regional Management Coordinator and Area Management Biologists in Yakutat, Haines, Sitka, Juneau, Petersburg, Craig, and Ketchikan are responsible for groundfish management in those local areas. The demersal shelf rockfish and lingcod sport fisheries are managed under the direction of the Demersal Shelf Rockfish Delegation of Authority and Provisions for Management (5 AAC 47.065) and the Lingcod Delegation of Authority and Provisions for Management (5 AAC 47.060) for allocations set by the Alaska Board of Fish.

b. Southcentral Region Sport Fish

The **Southcentral Region** groundfish staff consisted of two Regional Management Biologists as well as Area Management Biologists and assistants for the following areas: (1) PWS and the North Gulf areas, (2) Lower Cook Inlet, and (3) Kodiak, Alaska Peninsula, and the Aleutian Islands. In addition, a region-wide harvest assessment project was based in the Homer office, consisting of a project leader, project assistant, and six technicians. The research project biometrician was located in Anchorage. Ongoing assessment of sport harvest and fishery characteristics at major ports throughout the region is the primary activity. Data were collected from harvested halibut, rockfishes, lingcod, and sharks, and anglers and charter boat operators were interviewed for fishery performance information. All age reading was done in Homer, and the staff members are active participants in the Committee of Age Reading Experts (CARE). Seasonal technicians collected data from the sport harvest at seven major ports in the region, and two of them read all rockfish and lingcod age structures. Halibut otoliths were collected from the harvest and will be forwarded to the IPHC for age reading.

Southcentral Region staff is responsible for management of groundfish fisheries in state and federal waters. For all species, the lack of stock assessment information has hindered development of abundance-based fishery objectives. As a result, management is based on building a conservative regulatory framework specifying bag and possession limits, seasons, and methods and means that are hoped to provide for sustained yield over the long term. Lack of stock assessment information coupled with increasing effort and harvest in several groundfish sport fisheries accentuate the need for a comprehensive management plan and harvest strategy.

Typical duties included providing sport halibut harvest statistics to IPHC and NPFMC, assisting in development and analysis of the statewide charter logbook program and statewide harvest survey, providing information to the Alaska Board of Fisheries, advisory committees, and local fishing groups, drafting and reviewing proposals for recreational groundfish regulations, and dissemination of information to the public.

B. By Species

1. Pacific cod

Catch rate and biological information is gathered from fish ticket records, port sampling programs, a tagging program, and during stock assessment surveys for other species. A mandatory logbook program was initiated in 1997 for the state waters of Southeast Alaska.

Commercial landings in Southeast, Central Region and the Westward Region are sampled for length, weight, age, sex, and stage of maturity.

a. Research

The **Westward Region** has continued the cod-tagging program that was initiated in 1997 in the Central, Western, and Eastern Gulf of Alaska. Approximately 1,247 fish were tagged in 2011, bringing the total number of tags released to 18,670. By year's end, 62 tags had been recovered. Fish spent from 100 to 500 days at liberty; a few over 1,000 days. Recovery rates averaged 5.6% per year. While the vast majority of Pacific cod are recovered within 10-20 km of their tagging location, much longer recapture distances are possible. Several fish were recaptured more than 500 km from their tagging location. The relatively small number of long distance recaptures show movement of cod is occurring from the Shumagin Islands and Unlaska into the Bering Sea, the Alaska Peninsula to Kodiak waters, and several fish tagged in Kodiak waters were recovered in Cook Inlet and Southeast Alaska.

b. Stock Assessment

No stock assessment programs were active for Pacific cod during 2011.

c. Management

Regulations adopted by the Alaska Board of Fisheries during November 1993 established a guideline harvest range (GHR) of 340 to 567 mt for Pacific cod in the internal waters of **Southeast Alaska**. The internal waters of Southeast Alaska are comprised of two areas, the Northern Southeast Inside (NSEI) Subdistrict and the Southern Southeast Inside (SSEI) Subdistrict.The GHR was based on average historic harvest levels rather than on a biomass-based ABC estimate. This fishery has the most participation in the winter months, and in season management actions such as small area closures are implemented to spread out the fleet and reduce the risk of localized depletions. Pacific cod in state waters along the outer coast are managed in conjunction with the Total Allowable Catch (TAC) levels set by the federal government for the adjacent EEZ.

In 1996, the Alaska Board of Fisheries (BOF) adopted Pacific cod Management Plans for fisheries in five groundfish areas, **Prince William Sound**, **Cook Inlet**, **Kodiak**, **Chignik** and **South Alaska Peninsula**. The plans did not restrict participation to vessels qualified under the federal moratorium program. Included within the plans were season, gear and harvest specifications. State-waters fishing seasons were set to begin seven days after the close of the initial federal season in all areas except Cook Inlet, which begins 24 hours after the closure and Chignik, which has a regulatory opening date of March 1; however, in 2011 the BOF adjusted state-waters seasons in Prince William Sound (PWS) for pot gear and jig gear to open 24 hours following the closure of the initial federal season; and for longline gear in PWS to open seven days following the initial federal season closure or concurrent with the individual fishing quota (IFQ) halibut season opening date, whichever occurs later. The BOF restricted the state-waters fisheries to pot or jig gear in an effort to minimize halibut bycatch and avoid the need to require

onboard observers in the fishery. However, in 2009 a new BOF regulation became effective permitting use of longline gear in PWS. This change was largely in response to the very low levels of effort and harvest and the high level of interest from the longline gear group. With the exception of longline gear in PWS, guideline harvest levels (GHL) are allocated by gear type; however in 2011 the BOF adopted caps for PWS whereas longline gear will close when 85% of the GHL is reached and pot gear will close when 90% of the GHL is reached.

In October 2011, the BOF held a special meeting to coordinate state-managed Pacific cod fisheries with changes occurring in the federal fisheries due to the implementation of gear sector splits (differential allocations of the TAC by gear type), and adjust Pacific Cod Management Plans and related regulations accordingly. The BOF adopted regulatory changes to align the parallel seasons with the federal seasons for each legal gear type. In PWS, the parallel longline season was aligned with the federal catcher vessel less than 50 foot hook-and-line gear sector. Different parallel season closures by gear type resulted in different seasons for each gear type in the state-waters seasons, and the department considered these changes manageable. The annual GHLs are based on the estimate of acceptable biological catch (ABC) of Pacific cod as established by the NPFMC. Current GHLs are set at 25% of the Western Gulf ABC to be reserved for the South Alaska Peninsula Area, 25% of the Central Gulf ABC to be apportioned between the Kodiak, Chignik and Cook Inlet Areas and 25% of the Eastern Gulf ABC for the Prince William Sound Area. Action by the BOF in 2004 reduced the GHL in Prince William Sound to 10% of the Eastern Gulf ABC with a provision to increase subsequent GHLs to15% and then 25% if the GHL is achieved in a year; in 2011 the Prince William Sound GHL was set at the maximum level of 25% after achieving the GHL the two previous years, and in 2011 the BOF removed the step-up provision, as there was no mechanism to lower the GHL to previous levels

Additional regulations include a 58’ vessel size limit in the Chignik and South Alaska Peninsula Areas. For the Cook Inlet Area the BOF also adopted a harvest cap for vessels >58’ that limited harvest to a maximum of 25% of the GHL. The fishery management plans also provided for removal after October 31 of restrictions on exclusive area registrations, vessel size, and gear limits to increase late season production to promote achievement of the GHL. In addition, observers are occasionally used on day-trips to document catches and at-sea discards in the nearshore pot fisheries.

In February of 2006 the Alaska Board of Fisheries adopted a Pacific cod Management Plan for a nonexclusive Aleutian Islands District, west of 170° W longitude, state-waters fishery. Included within the plan were season, gear and harvest specifications. The fishery GHL was set by regulation at three percent based on the estimate of acceptable biological catch (ABC) of Pacific cod as established by the NPFMC for the Bering Sea – Aleutian Islands area with a maximum of 70% of the GHL available before June 10. By regulation the fishery opened on or after March 15, at the conclusion of the initial parallel catcher-vessel trawl fishery for Pacific cod in the federal BSAI Area. Non-pelagic trawl, longline, jig and pot gear were all permissible in the 2006 fishery.

In October of 2006 the Alaska Board of Fisheries amended the Pacific cod Management Plan for the **Aleutian Islands**. Beginning in 2007 a new regulation set the opening date of the fishery at

four days after the initial closure of the federal Bering Sea – Aleutian Islands catcher vessel trawl season. Additional regulations introduced new vessel size limits of 125' or less overall length for pot vessels, 100' or less overall length for trawl vessels and 58' or less overall length for longline and jig vessels. In 2009, vessels participating in the B season were restricted to under 60' overall length for all legal gear types. In 2010, this regulation was once again changed to allow pot vessels 125' or less to participate in the B season beginning August 1. Prior to August 1, during the B season, all vessels must still be less than 60'.

The NPFMC recently established sector allocations for the federal CGOA Pacific cod fisheries. The NPFMC's action established unique Pacific cod harvest allocations for pot, jig, trawl, and longline gear vessels. Beginning in 2012, the federal/parallel Pacific cod season for each federal gear sector will be prosecuted independently of other Pacific cod federal gear sectors, likely resulting in staggered federal season closure dates. Prior to federal sector allocations, all gear types competed for federal/parallel Pacific cod during a single derby-style fishery. In order to coordinate state-waters Pacific cod fisheries a Board of Fisheries meeting was held in October 2011 to adopt or amend regulations anticipating these federal changes. In most cases, starting in 2012, state-waters fisheries opened independently for each gear type.

There is no bag, possession, or size limit for Pacific cod in the recreational fisheries in Alaska, and the season is open year-round. Recreational harvest of Pacific cod is estimated through the Statewide Harvest Survey (SWHS). Limited information is collected through the Sport Fish Division's Southcentral Region port sampling program. Specifically, numbers of cod kept and released by stat area is recorded by ADF&G groundfish staff for each vessel-trip interview. Size and age data are collected opportunistically. No information is collected in the Southeast Region creel survey program on the Pacific cod sport fishery.

d. Fisheries

Most of the Pacific cod harvested in **Southeast Alaska** are taken by longline gear in the NSEI Subdistrict during the winter months. Pots have been the dominant gear in **Cook Inlet** and longline gear the dominant gear in recent **Prince William Sound** fisheries. Overall Pacific cod harvest from the Cook Inlet and PWS areas during the parallel season has declined in recent years. In the **Westward Region**, trawl gear takes over 60% of the harvest, with the remainder split between longline, jig, and pot gear. In the Aleutian Islands trawl gear took 60% of the harvest, pot gear took 31%, and the remainder was split between longline and jig gear. Trawl gear was used primarily during the A season and pot gear in the B season.

Prior to 1993 much of the cod taken in **Southeast** was utilized as bait in fisheries for other species. In recent years in Southeast Alaska the Pacific cod harvest has been largely sold for human consumption. In 2011 26% of the Pacific cod catch was recorded as being used for bait. In other areas of the state, Pacific cod are harvested in both state and federal waters and utilized primarily as food fish. Harvests of Pacific cod in the Southeast state-managed (internal waters) fishery during 2011 totaled 270 mt.

The 2011 GHLs for the state-waters Pacific cod seasons in the Cook Inlet and Prince William Sound Areas of the **Central** Region were 2,018 mt and 651 mt, respectively. Harvest from the

Cook Inlet Area state-waters Pacific cod fishery totaled 1,996 mt and the Prince William Sound Area harvest totaled 723 mt. In 2012 Cook Inlet will receive its maximum allocation of 3.8% of the CGOA ABC, which was increased to that level by the BOF in 2004, and the PWS allocation will receive its maximum allocation of 25.0% of the EGOA ABC. The Kodiak and South Alaska Peninsula Areas obtained their maximum GHL 'step up' provisions for 2000 and all subsequent years. The Kodiak Area will receive 12.5% of the Central Gulf ABC and the South Alaska Peninsula will receive 25% of the Western Gulf ABC in all future years. The Chignik Area achieved its maximum GHL 'step' up in 2003.

Estimates of the 2011 recreational harvest of Pacific cod are not yet available from the statewide harvest survey, but the 2010 estimates were 9,291 fish in **Southeast** and 27,258 fish in **Southcentral Alaska**. The average estimated annual harvest for the most recent five-year period (2005-2010) was 9,761 fish in **Southeast** Alaska and 16,982 fish in **Southcentral** Alaska.

2. Rockfishes

Commercial rockfish fisheries are managed under three assemblages: demersal shelf (DSR), pelagic shelf (PSR), and slope rockfish. DSR include the following species: yelloweye, quillback, china, copper, rosethorn, canary, and tiger. PSR include black, blue, dusky, dark, yellowtail, and widow. Slope rockfish contain all other *Sebastes* species, except *Sebastolobus*, which are defined separately.

a. Research

In the **Southeast Region** port sampling effort for rockfish expanded in 2008 to include the sampling of DSR caught as bycatch in the IFQ halibut fishery. The sampling of the halibut fishery was started in part to obtain more samples in years that the directed fisheries was not opened. The mandatory logbook program for all groundfish fisheries continued. The logbook program is designed to furnish detailed catch and effort information, and to obtain more detailed information regarding specific harvest location. The port-sampling program collects biological samples. In 2011 the directed fishery for DSR opened in the Southern Southeast Outside (SSEO) area of the Southeast Outside District (SEO). Length, weight and age structures were collected from 249 yelloweye rockfish caught in the directed fishery. The remaining areas of SEO, the East Yakutat (EYKT), Central Southeast Outside (CSEO) and Northern Southeast Outside (NSEO) Sections, did not open to directed fishing because the portion of the TAC allocated to those areas was not large enough to support an orderly fishery. The directed fishery for DSR opened in internal waters. Landings were minimal in NSEI, but the full SSEI quota was harvested. No biological samples of yelloweye rockfish were collected from the internal waters fishery. An additional 1,173 yelloweye rockfish biological samples were collected from the commercial halibut fishery in SEO.

Rockfish habitat mapping projects continue in the **Southeast Region**. The objective of this project is to continue to collect and evaluate data in the Eastern Gulf of Alaska for the purpose of identifying potential habitats in this important fishing ground. To date ADF&G has mapped approximately 2,238 km^2 of seafloor. This represents over 7% of the total habitat inside the 100-fm contour along the outer coast of Southeast. More importantly, over 1118 km^2 of rocky habitat has been mapped, approximately 37% of what is estimated to occur. No habitat mapping

occurred in 2011. (Contact Kristen Green). Work is also in progress on an age-structured assessment model for yelloweye rockfish. (Contact Dave Carlile).

Skipper interviews and port sampling of commercial rockfish deliveries in **Central Region** during2011 occurred in Homer, Seward, Whittier, Anchorage and Cordova. Efforts throughout the year were directed at the sampling of rockfish delivered as bycatch to other groundfish and halibut fisheries, primarily slope and demersal shelf species. The directed jig fishery in the Cook Inlet Area that targets pelagic rockfish begins July 1 and historically had been the focus of rockfish sampling during the last half of the year. However, very limited fishing effort had drastically reduced sampling opportunities from 2006 to 2009 until an increase in effort in 2010 and 2011 resulted in additional sampling opportunity. In 2011, harvest of pelagic shelf rockfish was twice the amount in 2010 and back to the same level as 2005. This resulted in the sampling goal (n=510) for the directed jig fishery being achieved for the first time since 2004. Sample data collected included date and location of harvest, species, length, weight, sex, and gonad condition. Otoliths were collected from most sampled fish. Homer staff determined ages of 1,090 pelagic and demersal shelf rockfish otoliths. Otoliths from all other rockfish species were sent to the Age Determination Unit. Additional sampling occurred during the Cook Inlet and PWS trawl surveys. (Contact Elisa Russ).

Development continued on a marine habitat GIS in **Central Region**. A final bathymetry grid for the 2009 Chugach Islands multibeam survey was completed. The area mapped was 102 km^2 and represents import recreational fishing grounds for DSR in Lower Cook Inlet. A new effort was initiated to re-compile all existing xyz bathymetry data for Central Region. This task had been completed in 2006 and a regional 50 m mosaic was produced. This early mosaic has proved very useful in preliminary characterization of hard and soft seafloor features for the region. More accurate and precise methods of interpolating the wide mixture of bathymetry resolutions are available and will be used for this new effort. All NOAA xyz data sets have been acquired and organized by buffered nautical chart areas. Mosaics will be created for each chart area which will make future GIS work easier and more manageable. Margaret Spahn was coordinating this project but has recently retired Mike Byerly is currently overseeing this work until this position is filled. (Contact Mike Byerly or Dr. Ken Goldman).

The **Westward Region** continued its port sampling of the commercial rockfish and Pacific cod harvests in 2011. Rockfish sampling consisted mainly of black rockfish with opportunistic sampling of duskys, darks, and other miscellaneous *Sebastes* species. Skippers were interviewed for information on effort, location, and bycatch. Length, weight, gonadal maturity, and otolith samples were collected (Contact Sonya El Mejjati). Staff from the Kodiak office has completed aging black rockfish otoliths through the 2011 season while a number of Pacific cod otoliths remain to be read.

The **Westward Region** also continued several studies on Western Gulf of Alaska black and dark rockfish. Daily and seasonal movement data were collected from 85 black rockfish and 55 dark rockfish tags that were released off the east side of Spruce Island, just north of the port of Kodiak. The acoustic tagging of black rockfish and dark rockfish ended in 2010 and is currently being analyzed. In addition, hydroacoustic surveys of black and dark rockfish were conducted in 2011 in the Northeast, Southeast, Southwest, Westside, and Mainland District of the Kodiak

Management Area and the South Peninsula Management Area in an effort to generate biomass estimates for both black and dark rockfish; data is currently being analyzed. Surveying of the Northeast District in the Kodiak Management Area will continue in 2012 (Contact Carrie Worton).

The **Division of Sport Fish—Southeast Region** continued to collect catch and harvest data from rockfish as part of a marine harvest onsite survey program with rockfish harvests tabulated back to 1978 in some selected ports. Rockfish objectives included estimation of 1) species composition, 2) weight and length composition, and 3) the geographic distribution of harvest by the fleets by port. Primary species harvested in Southeast Alaska included yelloweye, black, copper, and quillback rockfish. Approximately 6,198 rockfish were sampled from the sport harvests at Ketchikan, Craig, Klawock, Wrangell, Petersburg, Juneau, Sitka, Gustavus, Elfin Cove, and Yakutat in 2011 (Contact Mike Jaenicke).

The **Division of Sport Fish—Southcentral Region** continued collection of harvest and fishery information on rockfish as part of the harvest assessment program. Rockfish objectives included estimation of 1) species composition, 2) age, sex, and length composition, and 3) the geographic distribution of harvest by the fleets by port. Approximately 3,588 rockfish were sampled from the sport harvests at Seward, Valdez, Whittier, Kodiak, and Homer in 2011 (Contact Barbi Failor).

The Division of Sport Fish published a paper on the effectiveness of deepwater release at improving the discard survival of yelloweye rockfish. This project used mark-recapture to generate a maximum likelihood estimate of the 17-day survival probability of yelloweye rockfish (n = 182) caught by hook-and-line (depth range = 18 – 72 m) and subsequently released at depth. The average survival probability for yelloweye released at depth was remarkably high (0.988, 95% CI = 0.426 – 0.999) and positively correlated with individual total length. Survival probability was not significantly influenced by capture depth or exposure to barotrauma and other capture stressors. Submergence success of yelloweye rockfish released at the water's surface was 0.221 (95% CI = 0.149 – 0.315) and suggests that the maximum survival potential of individuals released at the surface is low. The results of this study indicate that the average survival of discarded yelloweye rockfish can be substantially improved with the use of deepwater release (Contact Sam Hochhalter).

b. Stock Assessment

The **Southeast Region** conducts a multi-year stock assessment survey for DSR in the Southeast District. Biomass is estimated by management area as the product of yelloweye rockfish density determined from line transect surveys, the area of rocky habitat within the 100 fm contour, and the yelloweye rockfish average weight. Yelloweye rockfish density for the stock assessment is based on the most recent estimate by management area. Yelloweye rockfish densities for each area are multiplied by the current year's average commercial fishery weight of yelloweye rockfish specific to that management area. During the last submersible survey in 2009, density surveys were conducted in EYKT. The SSEO area was last surveyed in 2005, CSEO was last surveyed in 2007 and NSEO was surveyed in 2001. The most recent density estimates by area range from 1,068 to 3,557 yelloweye rockfish per km^2. Allowable biological catch for the SEO is set by multiplying the lower bound of the 90% confidence interval of total biomass for

yelloweye rockfish by the natural mortality rate (0.02) and increasing the biomass estimate by 2–4.0% (depending on the current year's weight ratio of other species landed in the DSR assemblage). There is no stock assessment information available for NSEI and SSEI. New rockfish density surveys are planned for August 2012 in CSEO, however the Delta submersible we have used for all surveys since 1989 is no longer available for use. For 2012, we are planning on collaborating with the Central Region staff to utilize their expertise to conduct rockfish surveys with an ROV in lieu of a submersible. No surveys for non-DSR species, (e.g. black rockfish) have been conducted since 2002.

Central Region conducts ROV surveys along the north Gulf of Alaska coast from the Kenai Peninsula to Prince William Sound to monitor the local abundance of lingcod and DSR in selected index sites. These sites are on the order of 100's of sq km and tend to be relatively isolated rocky banks boarded by land masses, deep fjords, and / or expanses of deeper soft substrates. A rocky bank surrounding and extending to the south of outer Pye Island was mapped with multibeam during a department survey in 2008. A three nm no-transect zone has been in effect for Outer Pye Island since 1996 and encompasses this area acting as a de facto preserve. Additionally, there is a 10 nm fixed and trawl gear closure surrounding outer Pye Island. The seafloor features within the mapped area were delineated and an ROV survey to estimate DSR abundance and biomass was conducted there in May 2010. Yelloweye rockfish density was estimated at 2,836 fish / km^2 (cv = 0.23) for rocky / hard substrates and 2,042 fish / km^2 (cv = 0.25) for the survey area. These estimates were higher though not significantly (95% CI's) from Nuka Island which is located just west and is open to fishing. Population estimates from ROV surveys have not yet been used to set harvest limits or incorporated into a stock assessment. (Contact Mike Byerly or Dr. Ken Goldman).

In the **Westward Region** hydroacoustic equipment was deployed in a preliminary effort at stock assessment of black and dark rockfish. Surveyed areas included the Westside District of the Kodiak Management Area and the Chignik Management Area (contact Carrie Worton).

c. Management

Management of DSR in the **Southeast Region** is based upon a combination of GHRs, seasons, gear restrictions, and trip limits. Directed commercial harvest of DSR is restricted to hook-and-line gear. Directed fishing quotas are set for the four outside water management areas (NSEO, CSEO, SSEO, and EYKT) vased on the stock assessment. Directed fishery quotas for the two internal water management areas (NSEI and SSEI) are set at 25 mt annually. Regulations adopted in 1994 include trip limits (within any 5 day period) of 6,000 pounds per vessel in all areas except for EYKT where the trip limit is 12,000 pounds, and added a requirement that logbook pages must be submitted with fish tickets for each fishing trip. At the Board of Fisheries meeting in early 2006 the season for the directed fishery of DSR in SEO was changed to occur in the winter only from January 5th until the day before the start of the commercial halibut IFQ season, or until the annual harvest limit is reached whichever occurs first. At this meeting the total allowable catch (TAC) for DSR was allocated 84% to the commercial sector and 16% to the sport sector. At the 2009 Board of Fisheries meeting it was decided that the anticipated harvest of DSR in the subsistence fisheries would be deducted from the ABC before the split in

allocation is made between commercial and sport fisheries. The 2012 ABC for DSR was 293 mt, which resulted in an allocation of 240 mt to commercial fisheries and 46 mt to sport fisheries (after a deduction of 7 mt for the subsistence fishery) (Green et al. 2011). A significant portion of the total commercial harvest is taken as bycatch mortality during the halibut fishery; each year this is estimated and decremented from the commercial TAC. Prior to the 2012 fishery, we had used IPHC survey data to determine bycatch rate by depth and apply this to the commercial catch to estimate DSR bycatch. In 2012, commercial landing data was used to calculate the commercial bycatch rate of DSR in the halibut fishery and this bycatch rate was applied to the current year's quota to estimate bycatch of DSR. This change in methodology was made since five years of full retention DSR landings are available for analysis and we felt this was more accurate than using the IPHC survey bycatch rate to estimate mortality. Full retention of DSR has been in regulation in state waters since 2002 and in federal waters since 2005.

Sport fishery harvest estimates in the **Southeast Region** have been used since 2005 to add to our knowledge of what we determine to be the total harvest of DSR in other fisheries. (Contact Bob Chadwick).

Management of the commercial black rockfish fishery in the **Southeast Region** is based upon a combination of GHLs and gear restrictions. Directed fishery GHLs are set by management area, and range from 11 mt in EYKT and IBS to 57 mt in SSEOC, totaling 147 mt. A series of open and closed areas was also created so managers could better understand the effect a directed fishery has on black rockfish stocks. Halibut and groundfish fishermen are required to retain and report all black rockfish caught. The directed fishery for black rockfish continues to have very little participation and the total reported harvest for Southeast directed and commercial groundfish and salmon troll bycatch fisheries was 3.6 mt in 2011. Shortspine thornyhead, shortraker rockfish, rougheye rockfish and redbanded rockfish may be taken as bycatch only (no directed fishing). A total of 60 mt of slope rockfish were landed in NSEI and SSEI during 2011, a decrease from the 97 mt reported in 2010.
(Contact Kristen Green).

Rockfish in **Central Region's** Cook Inlet and PWS Areas are managed under their respective regulatory Rockfish Management Plans. Plan elements include a fishery GHL of 68 mt for each area and 5-day trip limits of approximately 0.5 mt in the Cook Inlet District, 1.8 mt in the North Gulf District, and 1.4 mt in PWS. Rockfish regulations underwent significant change beginning in 1996 when the Alaska Board of Fisheries formalized the 68 mt GHL into a harvest cap for all rockfish species in Cook Inlet and PWS and adopted a 5% rockfish bycatch limit for jig gear during the state waters Pacific cod season. In 1998 the board adopted a directed rockfish season opening date of July 1 for the Cook Inlet Area and restricted legal gear to jigs, primarily because the fishery typically targets pelagic shelf rockfish species. At the spring 2000 meeting, the board closed directed rockfish fishing in the PWS area and established a bycatch-only fishery with mandatory full retention of all incidentally harvested rockfish. In November 2004 the board also adopted a full retention requirement for rockfish in the Cook Inlet Area and restricted the directed harvest to pelagic shelf rockfish. Rockfish bycatch levels were also set at 20% during sablefish, 5% during the parallel Pacific cod season and 10% during other directed fisheries. Those rockfish bycatch levels have been maintained in PWS, however in 2010, the board adjusted rockfish bycatch levels for Cook Inlet to 10% during halibut and directed groundfish,

other than rockfish, and 20% nonpelagic rockfish during the directed pelagic shelf rockfish fishery. Proceeds from rockfish landed in excess of allowable bycatch levels are surrendered to the State of Alaska. (Contact Charles Trowbridge).

The **Westward Region** has conservatively managed black rockfish since 1997, when management control was relinquished to the State of Alaska. Area GHLs were set at 75% of the average production from 1978-1995 and sections were created to further distribute effort and thereby lessen the potential for localized depletion. Since 1997, section GHLs have been reduced in some areas that have received large amounts of effort.

In the Kodiak Area, vessels may not possess or land more than 5,000 pounds of black rockfish in a 5-day period. Additionally, vessel operators are required to register for a single groundfish fishery at a time. A registration requirement also exists for the Chignik Area; that area was also designated as super-exclusive for the black rockfish fishery beginning in 2003.

In 2011, 49 mt of black rockfish were harvested from five sections in the Kodiak Area. GHLs were attained in three sections. Harvest in the Chignik and South Alaska Peninsula Management areas remain confidential. In 2010, no vessels made directed black rockfish landings in the Aleutian Islands Area. Fishers are allowed to retain up to 5% of black rockfish by weight incidentally during other fisheries. The incidental harvest in the Aleutian Islands Area is confidential due to limited participation. A voluntary logbook program was initiated in 2000 in the hope of obtaining CPUE estimates as well as more detailed harvest locations; the logbook program was made mandatory in 2005. (Contact: Nick Sagalkin).

Statewide, the majority of sport caught rockfish is taken incidental to recreational fisheries for halibut or while trolling for salmon. Size limits have never been set for rockfish harvested in the sport fishery, although there has been a progression of bag and possession limit changes over the last 20 years.

For the 2011 season, the entire **Southeast Alaska** region's sport bag and possession limit for pelagic rockfish was 5 fish per day, 10 in possession. The non-pelagic rockfish regulations were set as follows:

Southeast Alaska Outside Waters: 1) resident bag limit was 2 fish, only 1 of which could be a yelloweye; 4 fish in possession, of which no more than 2 could be yelloweye; all non-pelagic rockfish caught must be retained until the bag limit is reached; 2) nonresident bag limit was 2 fish, only 1 of which could be a yelloweye, 4 fish in possession, of which no more than 1 could be yelloweye; all non-pelagic rockfish caught must be retained until the bag limit is reached; and an annual limit of 1 yelloweye rockfish, which must be recorded in ink on the back of the sport fishing license or on a harvest record at the time of harvest

Southeast Alaska Inside Waters: 1) resident bag limit was 3 fish, only 1 of which could be a yelloweye; 6 fish in possession, of which no more than 2 could be yelloweye; all non-pelagic rockfish caught must be retained until the bag limit is reached; 2) nonresident bag limit was 2 fish, only 1 of which could be a yelloweye, 4 fish in possession, of which no more than 2 could be yelloweye; all non-pelagic rockfish caught must be retained until the bag limit is reached; and an annual limit of 2 yelloweye rockfish, which must be recorded in ink on the back of the sport fishing license or on a harvest record at the time of harvest;

For the entire Southeast Alaska region, charter operators and crewmembers could not retain rockfish while clients are on board the vessel (Contact Bob Chadwick).

As a result of the pervasive lack of quantitative stock assessment information, rockfish regulations in **Southcentral Alaska** have been designed to discourage targeting of rockfish yet allow for retention of incidental harvest. Bag limits are reduced for demersal and slope species because of their lower natural mortality rates. The bag limit in Cook Inlet was five rockfish daily, only one of which could be a non-pelagic species (DSR or slope species). The bag limit in Prince William Sound during the period May 1-September 15 was four rockfish, no more than two of which could be a non-pelagic species. During the period September 16-April 30, the bag limit was eight rockfish, of which no more than two could be non-pelagic species. During both periods, the first two non-pelagic rockfish caught were required to be retained. The bag limit in the North Gulf Coast area was four rockfish daily, including no more than one non-pelagic rockfish. The bag limit in the Kodiak and Alaska Peninsula areas was five rockfish, no more than two of which could be non-pelagic species, and no more than one of the non-pelagic species could be a yelloweye.

d. Fisheries

Directed fisheries for DSR and black rockfish occurred in **Southeast** in 2011. Effort in the directed black rockfish fishery was minimal with only 3 vessels participating. The directed DSR fishery in 2011 in outside waters was opened in SSEO only for a total harvest of 21.7 mt. There was also a directed DSR fishery in internal waters in 2011 (SSEI and NSEI); the total harvest in SSEI and NSEI combined was 21.9 mt.

The total amount of rockfish (all species) taken as bycatch in all commercial fisheries conducted east of 140^0 W Longitude in 2011 in state and federal water was 409 mt. DSR bycatch made in conjunction with the IFQ halibut fishery in outside as well as internal waters contributed 91 mt toward this total.

In the **Central Region**, total rockfish harvest in 2011 was 84 mt. The 2011 Cook Inlet Area directed rockfish fishery opened July 1 and closed December 31 with a harvest of 20 mt of pelagic shelf rockfish. Total rockfish harvest in the Cook Inlet Area including bycatch to longline, pot and jig fisheries was 30.1 mt. Total rockfish harvest for the PWS Area bycatch-only fishery was 53.9 mt. This included a 3.4 mt incidental catch of demersal and slope rockfish from the walleye pollock trawl fishery and a 48.9 mt incidental harvest of demersal and slope rockfish primarily from the sablefish, Pacific cod, and halibut longline fisheries.

Estimates of **sport harvest** are obtained by three methods – the Statewide Harvest Survey (SWHS), charter vessel logbooks, and, in major ports, creel survey dockside sampling. Harvest reporting areas for these programs are different than commercial reporting areas making direct comparisons difficult. Additionally, species-specific data are available only from creel surveys.

The SWHS reported harvest for the general category of "rockfish", and the charter vessel logbook recorded rockfish harvest in three categories - pelagic, yelloweye, and other non-pelagics. DSR are part of the "non-pelagic" category. Recreational rockfish harvest is typically

estimated in numbers of fish. Estimates of the 2011 harvest are not yet available from the statewide harvest survey, but the 2010 estimates were 105,565 fish in Southeast and 118,476 fish in Southcentral Alaska. The average estimated annual harvest for the most recent five-year period (2006-2010) was 99,667 rockfish (all species) in Southeast Alaska and 106,378 fish in Southcentral Alaska.

3. Sablefish

a. Research

In 2011, sablefish longline surveys were conducted for both the NSEI and SSEI areas. These surveys are designed to measure trends in relative abundance and biological characteristics of the sablefish population. Biological data collected in these surveys include length, weight, sex and maturity stage. Otoliths are collected and sent to the ADF&G age determination unit in Juneau for age reading. The survey CPUE for NSEI was slightly up in 2011 (0.86 lb/hook).
The cost of these surveys is offset by the sale of the fish landed, but in 2011 six commercial fishermen that participated in the surveys were allowed to sell their share of PQS from the total testfish harvested in the survey, thus reducing the total testfish harvest impact on the quota by 54%.

In the SSEI longline survey there has been a downward trend in CPUE since 2006. However, there was a slight increase in survey CPUE in 2011 (1.16 lb/hook) versus 0.75 lb/hook in 2010.

The on-going mandatory logbook program in the sablefish fisheries provides catch and effort data by date, location, and set. In the SSEI sablefish fishery, overall CPUE (adjusted for hook spacing) has been decreasing since 2005. In 2005, However, in 2011 there was an increase in CPUE from 2010 (1.16 lb/hook in 2011 versus 0.75 lb/hook in 2010). In 2006, the SSEI CPUE was 1.41 lb/hook. In the NSEI fishery, the overall CPUE adjusted for hook spacing expressed in round lb/hook was 0.38 in 2011, up slightly from 0.33 lb/hook in 2010.

In 2011, ADF&G canceled the mark/recapture study in NSEI due to mechanical problems with the vessel. Typically, in this survey 5,000 to 7,000 tagged fish are distributed by area and depth in proportion to the harvested commercial catch using logbook data from the three previous years. In 2011, substantial staff time and funds were directed towards conducting the pot survey on a state vessel for the 2012 season, including purchasing pot gear and hauling equipment. A pot tagging survey is planned for May 2012. (contact Kristen Green).

Central Region, ADF&G conducted longline surveys for sablefish from 1996 through 2006 in Prince William Sound. Longline survey effort was extended into the North Gulf District in 1999, 2000 and 2002. All longline surveys were discontinued due to funding issues, and with the goal of transitioning to a pot longline survey, particularly in PWS. Between 1999 and 2005, sablefish were opportunistically tagged in PWS on ADF&G trawl surveys. A sablefish tagging survey was conducted in PWS in 2011 using pot longline gear. There were 1,203 sablefish tagged and 161 recaptured from the commercial fishery in 2011. Seventy-nine percent of recaptured fish moved less than 10 nm and maximum straight line distance was 439 nm. Six fish (3.7%) were recaptured outside of PWS.

Long-term goals include garnering funding to pursue more sablefish tagging; working towards tag-recapture analysis potentially in combination with an age-structured model. (Contact Dr. Ken Goldman).

Skipper interviews and port sampling occurred in Whittier, Valdez, Cordova and Seward for the PWS Area commercial fishery and in Seward and Homer for the Cook Inlet Area fishery. Data obtained included date and location of harvest, length, weight, sex, and gonad condition. Otoliths were removed and sent to the Age Determination Unit. Logbooks are required for both fisheries and provide catch and effort data by date and location. (Contact Elisa Russ).

b. Stock Assessment

In **Southeast**, the department is using mark-recapture methods with external tags and fin clips to estimate abundance and exploitation rates for sablefish in the NSEI Subdistrict. Sablefish are captured with pot gear in May or June, marked with a tag and a fin clip then released. Tags are recovered from the fishery and fish are counted at the processing plants and observed for fin-clips. The allowable biological catch (ABC) for 2011 was based on the 2010 Petersen–estimated number of sablefish fish in NSEI. The forecast for 2011 was made by decrementing the 2010 estimate to account for natural mortality, and adding a number of age-4 recruits equal to that of 2010. Each age class was converted to biomass using the average weight of that age class from the 2010 commercial fishery. The forecast for 2011 was 16,284,116 round pounds of sablefish. An $F_{50\%}$ (=0.070) harvest rate was applied to the point estimate of the forecasted biomass to give a ABC of 1,046,873 round pounds. This represents a 16% decrease from the 2010 ABC (1,250,961 round pounds). In addition to the mark-recapture work, an annual longline survey is conducted in NSEI to provide biological data as well as relative abundance information. In SSEI only an annual longline survey is conducted to provide biological data as well as relative abundance information. Unlike NSEI, the department does not currently estimate the absolute abundance of SSEI sablefish. There appears to be substantial movement of sablefish in and out of the SSEI area, which violates the assumption of a closed population, consequently, Peterson mark-recapture estimates of abundance or exploitation rates are not possible for this fishery. Instead, the SSEI sablefish population is managed based on relative abundance trends from survey and fishery CPUE data, as well as with survey and fishery biological data that are used to describe the age and size structure of the population and detect recruitment events.
(Contact Kristen Green).

c. Management

There are three separate internal water areas in Alaska which have state-managed limited-entry commercial sablefish fisheries. The NSEI and SSEI (**Southeast Region**), and the Prince William Sound Inside District (**Central Region**) each have separate seasons and GHRs. In the Cook Inlet Area there is an open access sablefish fishery.

In the **Southeast Region** both the SSEI and NSEI sablefish fisheries have been managed under a license limitation program since 1984. In 1994 the BOF adopted regulations implementing an equal share quota system where the annual GHL was divided equally between permit holders and the season was extended to allow for a more orderly fishery. In 1997 the BOF adopted this equal share system as a permanent management measure for both the NSEI and SSEI sablefish

fisheries. There are currently 79 permit holders eligible to fish in 2011 in NSEI and 23 permit holders eligible to fish in SSEI.

The SSEI quota was set at 265 mt for 2011, an 8% decrease from the 2010 quota. The quota reduction was based on declining survey CPUE since 2006, and declining survey CPUE from 2006-2009 (there was a slight increase in fishery CPUE in 2010).

During the February 2009 Board of Fisheries (BOF) meeting, the BOF made no changes affecting the regulation of commercial sablefish fisheries. The BOF did however establish bag and possession limits for sablefish in the sportfish fishery.

Commercial sablefish fisheries in outer coastal state waters (0-3 miles) have been managed in conjunction with the federal-managed fishery in the EEZ. There is no open-access sablefish fishery in the Southeast Outside District as there are limited areas that are deep enough to support sablefish populations inside state waters. In some areas of the Gulf, the state opens the fishery concurrent with the EEZ opening. These fisheries, which occur in Cook Inlet Area's North Gulf District and the Aleutian Island District, are open access in state waters, as the state cannot legally implement IFQ management at this time. The fishery GHLs are based on historic catch averages and closed once these have been reached.

Within the **Central Region** the Cook Inlet North Gulf District sablefish GHL is set using an historic baseline harvest level adjusted annually by the same relative change to the TAC in the Central Gulf Area. The 2011 fishery GHL was 25.6 mt. In 2004 the BOF adopted sablefish fishery-specific registration, a logbook requirement, and a 48-hour trip limit of 1.36 mt. in Cook Inlet. For PWS, a limited entry program that included gear restrictions and established vessel size classes was adopted in 1996. The fishery GHL is set at 110 mt, which is the midpoint of the harvest range set by a habitat-based estimate. Fishery management continued to develop through access limitation and in 2003 into a shared quota system wherein permit holders are allocated shares of the harvest guideline. Shares are equal within each of four vessel size classes, but differ between size classes. In 2009, the commissioner's permit requirement was removed by BOF action and regulations adopted which included a registration deadline, logbooks, and catch reporting requirements.

The GHL for the Aleutian Island District is set at 5% of the BSAI TAC. The state GHL can be adjusted according to recent state-waters harvest history when necessary. From 1995 to 2000 the fishery opened concurrently with the EEZ IFQ sablefish fishery. In 2001 the BOF changed the opening date of the state-waters fishery to May 15 so as to provide small vessel operators an opportunity to take advantage of potentially better weather conditions. From 1995 to 2000 all legal groundfish gear types were permissible during the fishery. Effective in 2001, longline, pot, jig and hand troll became the only legal gear types. Vessels participating in the fishery are required to fill out logbooks and processors are required to send the Department weekly processing reports.

The Southeast Alaska **sport fishery** for sablefish was regulated for the first time in 2009. Sport limits in 2011 were 4 fish per day, 4 in possession, with an annual limit of 8 fish applied to nonresidents only. A small number of sablefish were sampled during creel surveys in Southeast

Alaska, suggesting that recreational sablefish harvest at sampled ports was small relative to other species. The sablefish sport fishery in Southcentral Alaska was unregulated in 2011, with no bag, possession, or size limits. No port samplers in Southcentral Alaska encountered sablefish from the sport harvest, again suggesting relatively small harvests.

d. Fisheries

In the **Southeast Region** the 2011 NSEI sablefish fishery opened August 15 and closed November 15. The 87 permit holders landed a total of 478 mt of sablefish. The fishery is managed by equal quota share; each permit holder was allowed 5.5 mt. The 2011 SSEI sablefish fishery opened June 1 and closed November 15. Twenty-six permit holders landed a total of 253 mt of sablefish, each with an equal quota share of 9.4 mt. In SSEI 24 permits were designated to be fished with longline gear and the remaining three fished with pot gear. One of the longline permits did not fish in 2011. (Contact Kristen Green).

In the **Central Region** the 2011 open access sablefish fishery in the Cook Inlet North Gulf District opened at noon July 15 and closed at noon August 15. Ten vessels harvested 26 mt. In 2009, new season dates adopted by the BOF for PWS sablefish were April 15 – August 31. The new season opening date, one month later than in previous years, was adopted to reduce the opportunity for orca depredation on hooked sablefish which predominately occurred prior to May 1. The 2011 PWS harvest totaled 100 mt (Contact Charles Trowbridge).

Within the **Westward Region**, only the Aleutian Islands have sufficient habitat to support mature sablefish populations of sufficient magnitude to permit commercial fishing. All other sections within the region are closed by regulation to avoid the potential for localized depletion from the small amounts of habitat within the jurisdiction of the state. Bycatch from the areas closed to directed fishing is limited to 1% for trawl gear only, no bycatch is allowed for all other gear types. The 2011 Aleutian Island fishery opened on May 15. Additional requirements for the fishery include registration and logbook requirements. The GHL was set at 237 mt for the state managed fishery. The harvest from the 2011 Aleutian Islands sablefish fishery was 115 mt. The season remained open until the November 15 closure date (Contact Trent Hartill or Heather Fitch).

Sablefish recreational harvest estimates were available for the first time from the SWHS for 2010. The estimated harvest was 4,793 fish in Southeast Alaska and 3,992 fish in Southcentral Alaska. Charter operators reported (in logbooks) a guided sport harvest of about 3,927 sablefish in Southeast Alaska and 153 sablefish in Southcentral Alaska in 2010. (Contact Bob Chadwick).

4. Flatfish

a. Research

There was no research on flatfish during 2011.

b. Stock Assessment

There are no stock assessments for flatfish.

c. Management

Trawl fisheries for flatfish are allowed in four small areas in the internal waters of **Southeast Alaska** under a special permit issued by the department. The permits are generally issued for no more than a month at a time and specify the area fished and other requirements. Trawl gear is limited to beam trawls, and mandatory logbooks are required, observers can be required, and there is a 20,000 pound weekly trip limit.

Within **Central Region** flatfish may be harvested in a targeted fishery only under the authority of a permit from the commissioner of ADF&G. The permit may stipulate fishing depth, seasons, areas, allowable sizes of harvested fish, gear, logbooks, and "other conditions" the commissioner deems necessary for conservation or management purposes.

There are no bag, possession, or size limits for flatfish (excluding Pacific halibut) in the recreational fisheries in Alaska. Harvest of flatfish besides Pacific halibut are not explicitly estimated by the SWHS and no information is collected in the creel surveys and port sampling of the recreational fisheries in Southcentral or Southeast Alaska. Flatfish are occasionally taken incidentally to other species and in small shore fisheries, but the recreational harvest is believed to be very small.

d. Fisheries

There has been almost no effort in the **Southeast** fishery for the past nine years, with no harvest reported for the 2009-2011 season. The Southeast flatfish trawl areas are also the sites of a shrimp beam trawl fishery. In the past most of the Southeast harvest was starry flounder. NMFS manages the flatfish fishery and harvest in the state waters of **Westward Region**. No flatfish harvest permits were issued in **Central Region** during 2011.

5. Pollock

State-managed pollock is limited to the Central Region and Aleutian Islands

a. Research

Pollock continue to be a dominant species in the **Central Region** ecosystem. Skipper interviews and biological sampling of **Central Region** commercial pollock deliveries during 2011 occurred in Seward and Kodiak. Sample data collected included date and location of harvest, species, length, weight, sex, and gonad condition. Otoliths were collected from approximately half of sampled fish. Homer staff determined ages of 949 pollock otoliths (Contact Elisa Russ).

Beginning in 1998, spatial patterns of genetic variation were investigated in six populations of walleye pollock from three regions: North America – Gulf of Alaska; North America – Bering Sea; Asia – East Kamchatka. The annual stability of the genetic signal was measured in replicate samples from three of the North American populations. Allozyme and mtDNA markers provided concordant estimates of spatial and temporal genetic variation. These data show significant genetic variation between North American and Asian pollock as well as evidence that spawning aggregations in the Gulf of Alaska, such as Prince William Sound, are genetically distinct and may merit consideration as distinct stocks. These data also provide evidence of inter-annual genetic variation in two of three North American populations. Gene diversity values

show this inter-annual variation is of similar magnitude to the spatial variation among North American populations, suggesting the rate and direction of gene flow among some spawning aggregations is highly variable. This study was published in 2002 in the Fishery Bulletin (Olsen et al. 2002).
(Contact Bill Templin).

b. Stock Assessment

No stock assessment work was conducted on pollock in 2011 (Contact Dr. Ken Goldman).

c. Management

Prince William Sound pollock pelagic trawl fishery regulations were amended by BOF action and for 2009 included a January 13 registration deadline, logbooks, catch reporting, check-in and check-out provisions, and accommodation of a department observer upon request. Prior to 2009 these requirements were stipulated as terms of a commissioner's permit. The Prince William Sound Inside District is divided into three 'sections" for pollock management: Port Bainbridge, Knight Island, and Hinchinbrook, with the harvest from any section limited to a maximum of 60% of the GHL. Additionally, the fishery is managed under a 5% maximum bycatch allowance that is further divided into five species or species groups. For **Cook Inlet** directed fishing for pollock is managed under a "Miscellaneous Groundfish" commissioner's permit. However, due to pelagic trawl closures associated with Steller sea lion conservation measures no directed fishing has occurred in the Cook Inlet Area since 2000. (Contact Charlie Trowbridge).

d. Fisheries

The 2011 **Prince William Sound** fishery opened on January 20 with a GHL of 1,651 mt. The Hinchinbrook section closed by emergency order at 12:00 midnight February 1 while the Knight Island and Bainbridge sections closed by emergency order at 7:00 p.m. February 6. Total pollock harvest for all sections combined was 1,538 mt. Total bycatch was 10.2 mt, 0.4 percent of the GHL and was dominated by squid at 6.7 mt. (Contact Charlie Trowbridge).

6. Sharks

a. Research

In 2009, **Central Region** Commercial Fisheries Division began tagging all sharks with spaghetti-type external tags. A research project on the reproductive biology of salmon sharks was initiated in the summer of 2010 continues with the goal of providing an accurate and precise estimate of the timing of reproductive activity (annual vs. biennial) and length-at-maturity via the examination of blood hormone concentrations. (Contact Dr. Ken Goldman)

The **Division of Sport Fish—Southcentral Region** collected harvest and fishery information on sharks through the groundfish harvest assessment program although no specific research objectives were identified. Few samples were collected in 2011. Interviews also provided estimates of the numbers of salmon sharks and spiny dogfish kept and released by ADF&G statistical area (Contact Barbi Failor).

b. Stock Assessment

There is no stock assessment work being conducted on sharks in Central Region. (Contact Dr. Ken Goldman).

c. Management

The Alaska Board of Fisheries prohibited all directed commercial fisheries for sharks in 1998. In 2000 the BOF increased the bycatch allowance in **Southeast Region** for dogfish taken while longlining for other species to 35% round weight of the target species and also allowed full retention of dogfish bycatch in the salmon setnet fishery in Yakutat. This action was an effort to minimize waste of dogfish in these two fisheries and to encourage sale of bycatch. In **Central Region**, bycatch is set by regulation at 20% of the round weight of the directed species on board. However in 2004 the BOF amended Cook Inlet Area regulations to provide for a directed fishery for spiny dogfish in the Cook Inlet area under terms of a permit issued by the commissioner.

Also in 2000 the BOF prohibited the practice of "finning", requiring that all sharks retained must be sold or utilized and have fins, head and tail attached at the time of landing. "Utilize" means use of the flesh of the shark for human consumption, for reduction to meal for production of food for animals or fish, for bait or for scientific, display, or educational purposes.

Recreational fishing for sharks is allowed under the statewide Sport Shark Fishery Management Plan adopted by the BOF in 1998. The plan recognizes the lack of stock assessment information, the potential for rapid growth of the fishery, and the potential for over harvest, and sets a statewide daily bag limit of one shark and a season limit of two sharks of any species except spiny dogfish which have a daily bag limit of five. Recreational demand for spiny dogfish remains low and they are widely considered a nuisance species. There is, however, a directed charter boat fishery for salmon sharks in Southcentral Alaska, primarily in Prince William Sound. Pacific sleeper sharks are occasionally caught but rarely retained.

d. Fisheries

No applications for permits to target spiny dogfish in Cook Inlet were received in 2011.

Estimates of recreational shark harvest in 2011 are not yet available from the SWHS, but in 2010 an estimated 17 sharks of all species were harvested in Southeast Alaska and 315 sharks were harvested in Southcentral Alaska. The precision of these estimates is low; the Southeast estimate has a CV of 100% and the Southcentral estimate has a CV of 30%. The statewide charter logbook program also required reporting of the number of salmon sharks kept and released in the charter fishery. Charter anglers are believed to account for the majority of the recreational salmon shark harvest. The 2010 reported charter harvest from logbooks was 8 salmon sharks in Southeast Alaska and 19 salmon sharks in Southcentral Alaska.

7. Lingcod

a. Research

Since 1996, 9,175 lingcod have been tagged and 463 fish recovered in Southeat Region. Opportunistic tagging of 17 lingcod in the vicinity of Sitka occurred during 2011. Length, sex and tagging location are recorded for all tagged fish. Dockside sampling of lingcod caught in the

commercial fishery continued in 2011 in Sitka and Yakutat with over 1,740 fish sampled for biological data. Otoliths were sent to the ADU in Juneau for age determination. (Contact Kristen Green).

In the **Central Region**, skipper interviews and port sampling were conducted in Cordova, Whittier, Seward and Homer. Data obtained included date and location of harvest, length, weight, sex and age. There were 579 lingcod samples collected and 84% were from the Prince William Sound Area, as there was very little effort in the directed fishery in the Cook Inlet Area. Otoliths were sent to the ADU in Juneau for age determination. Gonad condition was generally not determined as nearly all fish were delivered gutted (Contact Elisa Russ).

The Division of Sport Fish—Southeast Region continued to collect catch, harvest, and biological data from lingcod as part of a marine harvest survey program with lingcod harvests tabulated back to 1987 in some selected ports. Data collected in the program include statistics on effort, catch, and harvest of lingcod taken by Southeast Alaska sport anglers. Ports sampled in 2011 included Juneau, Sitka, Craig/Klawock, Wrangell, Petersburg, Gustavus, Elfin Cove, Yakutat, and Ketchikan. Length and sex data were collected from 1,486 lingcod in 2011, primarily from the ports of Sitka, Ketchikan, Craig, Gustavus, Elfin Cove, and Yakutat (Contact Mike Jaenicke).

The **Division of Sport Fish—Southcentral Region** continued collection of harvest and fishery information on lingcod through the groundfish harvest assessment program. Lingcod objectives include estimation of 1) the age, sex, and length composition of lingcod harvests by ports and 2) the geographic distribution of harvest by each fleet. A total of 929 lingcod were sampled from sport harvest at Seward, Valdez, Whittier, Kodiak, and Homer in 2011. These ports accounted for the majority of recreational lingcod harvest in Southcentral Alaska (Contact Barbi Failor).

b. Stock Assessment

The **Southeast Region** is not currently able to reliably estimate lingcod biomass or abundance. Lacking abundance estimates, and given the complex life history and behavior of lingcod, impacts to lingcod populations from fishing are difficult to assess. Analysis of catch per unit effort data (CPUE) from fishery logbooks, in terms of fish per hook-hour for 1988–1998, showed that CPUE had declined between 21 to 62% in areas where a directed fishery and increased recreational catch had developed. Consequently the quota for lingcod was reduced in all areas in 2000. Commercial logbook data for the period 2002–2009 shows CPUE in fish per hook hour trending up since 2000 in CSEO but down from 2008 to 2010. CSEO CPUE was up in 2011. There is not much fishery data available in NSEO or SSEOC. EYKT CPUE has been fairly stable since 2000 with a slight increase in the past few years. IBS has been fairly stable since 2004 with an increase in the past two years.

Central Region conducts ROV surveys along the north Gulf of Alaska coast from the Kenai Peninsula to Prince William Sound to monitor the local abundance of lingcod and DSR in selected index sites. These sites are on the order of 100's of sq km and tend to be relatively isolated rocky banks boarded by land masses, deep fjords, and / or expanses of deeper soft substrates. A rocky bank surrounding and extending to the south of outer Pye Island was mapped with multibeam during a department survey in 2008. A three nm no-transect zone has

been in effect for Outer Pye Island since 1996 and encompasses this area acting as a de facto preserve. Additionally, there is a 10 nm fixed and trawl gear closure surrounding outer Pye Island. The seafloor features within the mapped area were delineated and an ROV survey to estimate lingcod abundance and biomass was conducted there in May 2010. Lingcod density was estimated at 3206 fish / km^2 (cv = 0.21) for rocky / hard substrates and 2159 fish / km^2 (cv = 0.22) for the survey area. These estimates were higher though not significantly (95% CI's) from Nuka Island which is located just west and is open to fishing. Population estimates from ROV surveys have not been incorporated into a stock assessment. (Contact Mike Byerly or Dr. Ken Goldman).

c. Management

Management of lingcod in **Southeast Alaska** is based upon a combination of GHRs, season and gear restrictions. Regulations include a winter closure for all users, except longliners, between December 1 and May 15 to protect nest-guarding males. GHLs were greatly reduced in 2000 in all areas and allocations made between directed commercial fishery, sport fishery, longline fisheries, and salmon troll fisheries. This was the first time sport catch was included in a quota allocation. The 27" minimum commercial size limit remains in effect and fishermen are requested to keep a portion of their lingcod with the head on, and proof of gender to facilitate biological sampling of the commercial catch. Vessel registration and trip limits are allowed when needed to stay within allocations. The directed fishery is limited to jig or dinglebar troll gear. In 2003 the Board of Fish (BOF) established a super-exclusive directed fishery registration for lingcod permit holders fishing in the IBS Subdistrict.

Regulations for the **Central Region commercial** lingcod fishery include open season dates of July 1 to December 31 and a minimum size limit of 35 inches (89 cm) overall or 28 inches (71 cm) from the front of the dorsal fin to the tip of the tail. In 1997, the BOF adopted a jig only gear requirement for the directed lingcod fishery in the Cook Inlet Area. Resurrection Bay, near Seward is closed to commercial harvest of lingcod. In 2009, a new BOF regulation permitted retention of lingcod in PWS waters following closure of the directed season.

In **Southeast Alaska**, the sport fishery for lingcod prior to 2000 had a open season of May 1 to November 30, and a region wide bag and possession limit of two per day, four in possession, with no size limits. Area-specific exceptions to this included: 1) The Pinnacles area near Sitka has been closed to sport fishing year-round for all groundfish since 1997, and 2) the nonresident sport anglers bag and possession limit for the Sitka Sound LAMP area was one per day, two in possession during 1997-2000.

Beginning in 2000, the open season has been set at May 16 to November 30. Sport harvests of lingcod in Southeast Alaska as of the year 2000 have been incorporated into a region wide lingcod management plan, which reduced GHLs for all fisheries (combined) in seven management areas, and allocated a portion of the GHL for each area to the sport fishery. Since 2000, harvest limits reductions, size limits, and mid-season closures have been implemented by emergency order in various management areas to ensure sport harvests do not exceed allocations.

In 2011, lingcod daily bag limits for all anglers were one fish per day, and two fish in possession for residents, and one fish in possession for nonresidents. There were no size limits for resident anglers. Throughout central outside and northern Southeast Alaska, nonresident anglers were allowed to keep only fish between 30 and 35 inches, or fish 55 inches or longer. In southern Southeast Alaska, nonresident anglers were allowed to keep only fish between 30 and 40 inches, or fish 55 inches or longer. In the Yakutat area, nonresidents were allowed to retain fish between 30 and 45 inches, or fish 55 inches or longer. Nonresidents were also constrained by a two fish annual limit. Seasons varied by area. (Contact Robert Chadwick).

Conservative harvest strategies were established in 1993 for recreational lingcod fisheries in **Southcentral Alaska** in light of the lack of quantitative stock assessment information. Resurrection Bay was closed to lingcod fishing year-round to rebuild the population, although no formal rebuilding plan was put in place. The season was closed region-wide from January 1 through June 30 to protect spawning and nest guarding lingcod. Daily bag limits in 2011 were 2 fish in all areas except the North Gulf, where the daily bag limit was one fish. All areas except Kodiak had a minimum size limit of 35 inches to protect spawning females (Contact Matt Miller or Tom Vania).

d. Fisheries

Lingcod are the target of a "dinglebar" troll fishery in **Southeast Alaska**. Dinglebar troll gear is power troll gear modified to fish for groundfish. Additionally lingcod are landed as significant bycatch in the DSR and halibut longline and salmon troll fisheries. At the 2009 Board of Fisheries meeting a regulation was adopted that allowed Southeast management staff to adjust the lingcod bycatch levels in the halibut fishery to maximize the harvest of the lingcod longline allocations. For example, in years when the halibut catch limits are low the bycatch of lingcod can be set higher without the risk of going over the longline allocation. The directed fishery landed 132 mt of lingcod in 2011. An additional 63 mt was landed as bycatch in halibut and other groundfish fisheries and 10 mt in the salmon troll fishery).

Central Region commercial lingcod harvests have primarily occurred in the North Gulf District of Cook Inlet and PWS. In 2011, the Cook Inlet GHL was 24 mt and the PWS GHL was 16 mt. Lingcod harvests in 2011 totaled 4.2 mt in Cook Inlet and 20.1 mt in PWS. Approximately 19 percent of the lingcod harvest in Cook Inlet resulted from directed jig effort. In PWS, approximately 79 percent of lingcod harvest was from directed longline effort. In both areas, the remaining harvest resulted from bycatch to other directed (primarily halibut) longline fisheries. The Outside District of PWS closed at noon August 14 and the Inside District closed at noon October 6 when district GHLs were achieved. (Contact Charlie Trowbridge).

No directed effort occurred for lingcod in the **Westward Region** during 2011. A large jump in the amount of incidental harvest in the bottom trawl fisheries occurred in 2008. In response, ADF&G reduced bycatch limits in 2009 from 20% to 5%. Incidental harvest totaled 23 mt in 2007, 250 mt in 2008, 39 mt in 2009, and 31 mt in 2010. The majority of the harvest occurred in the Kodiak Area with a minor amount occurring in the Chignik Area.

Recreational lingcod harvest estimates for 2011 are not yet available from the statewide mail survey, but in 2010 an estimated 8,967 lingcod were harvested in Southeast Alaska while 23,251 lingcod were taken in Southcentral Alaska. The average estimated annual harvest for the most recent five-year period (2006-2010) was 12,549 fish in Southeast Alaska and 22,980 fish in Southcentral Alaska.

8. Other species

In 1997 the BOF based a new policy that would strictly limit the development of fisheries for other groundfish species in Southeast. Fishermen are required to apply for a "permit for miscellaneous groundfish" for all fisheries that do not already have specific regulations and permits do not have to be issued if there are management and conservation concerns. At this time that includes all species except sablefish, rockfish, lingcod, flatfish, and Pacific cod. Most other groundfish species taken in state waters are taken as bycatch in fisheries for other groundfish and halibut. The state also has a regulation that requires that the bycatch rate of groundfish be set annually for each fishery by emergency order unless otherwise specified in regulation.

A commissioner's permit is required before a directed fishery may be prosecuted for skates. This permit may restrict depth, dates, area, and gear, establish minimum size limits, and require logbooks and/or observers, or any other condition determined by the commissioner to be necessary for conservation and management purposes. A commissioner's permit is also required before any trawl fishery besides the existing beam trawl fishery for flatfish may be prosecuted in the Southeast District.

Skates may be harvested in a directed fishery within the **Central Region** only under the authority of commissioner's permit. The permit may stipulate fishing depth, seasons, areas, allowable sizes of harvested fish, gear, logbooks, and "other conditions" the commissioner deems necessary for conservation or management purposes. A directed fishery in the Prince William Sound Area for big and longnose skates was prosecuted under this authority in 2009 and 2010, however, the fishery was deemed unsustainable and no permits were issued in 2011. Skates may also be retained as bycatch up to 20% during other directed fisheries for groundfish or halibut.

In the **Central Region**, skates may also be retained as bycatch up to 20% during other directed fisheries for groundfish or halibut. Bycatch harvest in 2011 of combined big and longnose skates in the **Prince William Sound Area** was 91.2 mt and 5.6 mt in the **Cook Inlet Area**.

In 2009, **Central Region** Commercial Fisheries Division began tagging all big, longnose and Aleutian skates greater than 70 cm total length with spaghetti-type tags. Starting in 2010, all skate species of all sizes were tagged on ADF&G surveys. In addition to 261 longnose skate, 34 big skate, 23 Aleutian skate, and 357 sandpaper skate tagged in PWS, six big skates were tagged with pop-off satellite transmitters as part of a collaborative project between Thomas Farrugia, a graduate student with the University of Alaska, Fairbanks and ADF&G. There were 20 longnose and 2 big skates tagging during Kachemak Bay the trawl survey. (Contact Dr. Ken Goldman) The recreational halibut fishery is the focus of a statewide research and management effort. Data on the recreational fishery and harvest are collected through port sampling in Southeast and

Southcentral Alaska. Harvest estimates are provided annually to the IPHC for use in an annual stock assessment, and to the NPFMC. The council's Scientific and Statistical Committee has periodically reviewed the state's estimation and projection methods, and the council incorporates the information in the design and analysis of regulations for the sport charter fishery (Contact Scott Meyer).

C. Other Related Studies

Staff in the **Central Region** continued the development of an Oracle database, currently named "Sedna", for historical multi-species large-mesh and small mesh trawl survey data. Though these surveys originated as Tanner crab and shrimp surveys many groundfish species are captured and in fact compose most of the catches in recent years. They therefore, represent a valuable tool for monitoring groundfish population trends and collecting biological data. The Sedna database project is currently in MS Access and is awaiting transition to Oracle by regional staff. Queries are complete for calculating cpue and biomass estimates from all trawl surveys and survey areas. All data are being additionally captured in a GIS for spatial analysis. The long-term goal is to have the database house all Central Region commercial fisheries survey and port sampling data in a GIS relational format.

The department manages state groundfish fisheries under regulations set triennially by the Board of Fisheries. The department announces the open and closed fishing periods consistent with the established regulations, and has authority to close fisheries at any time for justifiable conservation reasons. The department also cooperates with NMFS in regulating fisheries in the offshore waters.

1. Dixon Entrance Area

Total removals (including those from test fishing) from the Dixon Entrance area (Alaska statistical areas 325431, 315431, 325401, and 315401) has dropped since last year due to a decline in sablefish removals from that area. The table below lists the catch by species group from 1988 through 2011 rounded to the nearest mt.

Year	# Permits	# Landings	DSR	Other Rock	Sablefish	Other	Total
1988	20	25	3	3	82	3	91
1989	8	7	1	1	20	0	22
1990	16	17	3	5	182	1	191
1991	24	21	6	12	150	2	170
1992	19	19	3	5	150	1	159
1993	27	26	6	14	232	1	253
1994	27	26	1	20	216	2	239
1995	21	18	0	20	137	0	157
1996	16	14	1	12	83	0	96
1997	37	30	1	18	103	0	122
1998	26	23	1	8	95	0	104
1999	23	24	0	7	71	0	78
2000	27	22	0	14	49	0	63
2001	23	29	1	14	86	0	101
2002	30	46	1	11	106	0	118
2003	29	44	8	12	89	2	111
2004	23	33	5	9	114	2	130
2005	23	26	<1	9	138	<1	148
2006	43	32	1	12	167	1	181
2007	32	31	<1	19	165	1	184
2008	27	32	1	16	101	<1	118
2009	29	34	1	18	132	2	153
2010	34	35	2	17	107	2	128
2011	31	28	<1	16	112	2	130

2. Marine Reserves

In September of 1997 the ADF&G submitted proposals to both the BOF and the NPFMC requesting that they implement a small no-take marine reserve in **Southeast**. The purpose of these proposals was to permanently close a 3.2 sq. mile area off Cape Edgecumbe to all bottomfish and halibut fishing (including commercial, sport, charter, bycatch and subsistence) and anchoring to prevent over-fishing and to create a groundfish refuge. Two large volcanic pinnacles that have a diversity and density of fishes not seen in surrounding areas dominate the Edgecumbe Pinnacles Marine Reserve. The pinnacles rise abruptly from the seafloor and sit at the mouth of Sitka Sound where ocean currents and tidal rips create massive water flows over this habitat. These two pinnacles provide a very unique habitat of rock boulders, encrusted with *Metridium*, bryozoans and other fragile invertebrate communities, which attracts and shelters an extremely high density of juvenile rockfishes. The area is used seasonally by lingcod for spawning, nest-guarding, and post-nesting feeding. Yelloweye rockfish and pelagic rockfish species as well as large numbers of prowfish and Puget Sound rockfish also densely inhabit the

pinnacles. This closure protects the fragile nature of this rare habitat, and prevents the harvest or bycatch of these species during critical portions of their life history. In February 1998 the BOF approved of the reserve and the NPFMC approved of the reserve at their June 1998 meeting. The NPFMC recommended to the BOF that they consider closure of the area to salmon trolling which would make the area a complete-no take zone. In February 2000 the BOF rejected closing the area to salmon trolling. The area is an important "turn-around" area for commercial trollers and the BOF did not believe there was sufficient conservation benefit to warrant closing the area to salmon fishing.

3. User Pay/ Test Fish Programs

The department receives receipt authority from the state legislature that allows us to conduct stock assessment surveys by recovering costs through sale of fish taken during the surveys. Receipt authority varies by region. In **Southeast Alaska** several projects are funded through test fish funds (total receipt authority is approximately 600k), notably the sablefish longline assessments and mark-recapture work, the king crab survey, the herring fishery and some salmon assessments.

4. GIS

The ADF&G Division of Commercial Fisheries Headquarters Office is using ArcGIS 9.2 for general map production, project planning and spatial analysis. Basemaps are maintained in ArcGIS format. Statistical area charts have been updated using ArcGIS 9.0 and the NAD83 datum. All data and map requests are made in NAD83 (the State of Alaska standard) or will be converted into NAD83, if possible. Final output and all metadata will be in NAD83. Users in other divisional and area offices use ArcGIS 8, ArcView 3.x, and MapInfo 9.0 for their GIS work.

Hardcopy and digital groundfish and shellfish statistical area charts are available. Digital are available in Abode PDF and can be viewed or downloaded at http://www.cf.adfg.state.ak.us/geninfo/statmaps/charts.php . (Contact Mike Plotnick)

5. Logbooks

In 1997 logbooks became mandatory for all state-managed commercial fisheries in Southeast Alaska. Logbooks for rockfish and lingcod had been mandatory for a number of years. All usable longline and jig logbook data through 2011 has been entered.

Number of commercial fishery logbooks collected by fishery, target species, and year.

SE	Longline				Jig/dinglebar			
Year	DSR	Pacific cod	Slope Rock	Sablefish (includes pot gear)	Lingcod	Black rockfish	DSR	PSR
1986	21	1						
1987	25							
1988	20							
1989	19							
1990	50	1	2					
1991	232	8	1					
1992	259	7						
1993	190	8						
1994	197	9	3		108			
1995	140	13			215			
1996	261	8			252	31	6	
1997	204	98	4	466	177	64	8	1
1998	177	135	15	552	153	70	3	4
1999	165	223	9	405	89	21	1	1
2000	153	97	4	421	153	30		
2001	128	48	2	332	44	2	2	
2002	143	27	5	276	53	31	4	0
2003	115	53	closed	298	54	37	2	closed
2004	139	97	closed	283	40	23	3	closed
2005	17	53	closed	249	52	23	2	closed
2006	8	65	closed	241	97	8	0	closed
2007	2	83	closed	200	115	2	0	closed
2008	27	113	closed	190	91	2	0	closed
2009	37	87	closed	164	152	3	0	closed
2010	30	85	closed	170	104	5	0	closed
2011	25	78	closed	137	113	5	0	closed

Since 1998, marine recreational charter operators have been required to log port of landing, effort and harvest, and ADF&G statistical area for every charter trip made. In 2011, catch and harvest were reported for each individual angler, along with their name and fishing license number (if required). Other data collected for each vessel trip included port of landing, statistical area fished, effort for salmon and bottomfish, and harvest and/or release (in numbers) of Chinook, coho, sockeye, other salmon, halibut, pelagic rockfish, yelloweye rockfish, other rockfish, lingcod, sablefish, and salmon sharks. The Sport Fish Division conducted a three-year evaluation of logbook data, including comparisons to an independent end-of-season survey of anglers, to estimates from the statewide harvest survey, and to data from onsite interviews. This evaluation was presented to the North Pacific Fishery Management Council in October and December 2009.

Web Pages

ADF&G Home Page: http://www.adfg.alaska.gov
Commercial Fishing home page:
http://www.adfg.alaska.gov/index.cfm?adfg=fishingCommercial.main
News Releases: http://www.adfg.alaska.gov/index.cfm?adfg=newsreleases.main

Sport Fishing home page: http://www.adfg.alaska.gov/index.cfm?adfg=fishingSport.main
Age Determination Unit Home Page: http://tagotoweb.adfg.state.ak.us/
Region 1 Groundfish Home Page:
http://www.cf.adfg.state.ak.us/region1/finfish/grndfish/grndhom1.php
Region II Groundfish Home Page:
http://www.adfg.alaska.gov/index.cfm?adfg=CommercialByFisheryGroundfish.groundfishareas
ADF&G Groundfish Overview Page:
http://www.adfg.alaska.gov/index.cfm?adfg=CommercialByFisheryGroundfish.main
Commercial Fisheries Entry Commission: http://www.cfec.state.ak.us/
State of Alaska home page: http://www.alaska.gov
Gene Conservation Laboratory Home Page:
http://www.adfg.alaska.gov/index.cfm?adfg=fishinggeneconservationlab.main
Demersal shelf rockfish stock assessment document:
http://www.afsc.noaa.gov/refm/docs/2011/GOAdsr.pdf
Adobe PDF versions of groundfish charts can be viewed or downloaded at
http://www.adfg.alaska.gov/index.cfm?adfg=CommercialByFisheryGroundfish.groundfishmaps

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Stichert, M.A. 2011. Fishery management plan for the Chignik Area state-waters Pacific cod season, 2012. Alaska Department of Fish and Game, Division of Commercial Fisheries, Fishery Management Report No 11-64, Anchorage.

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APPENDIX I. ALASKA DEPARTMENT OF FISH AND GAME PERMANENT FULL-TIME GROUNDFISH STAFF DURING 2011.

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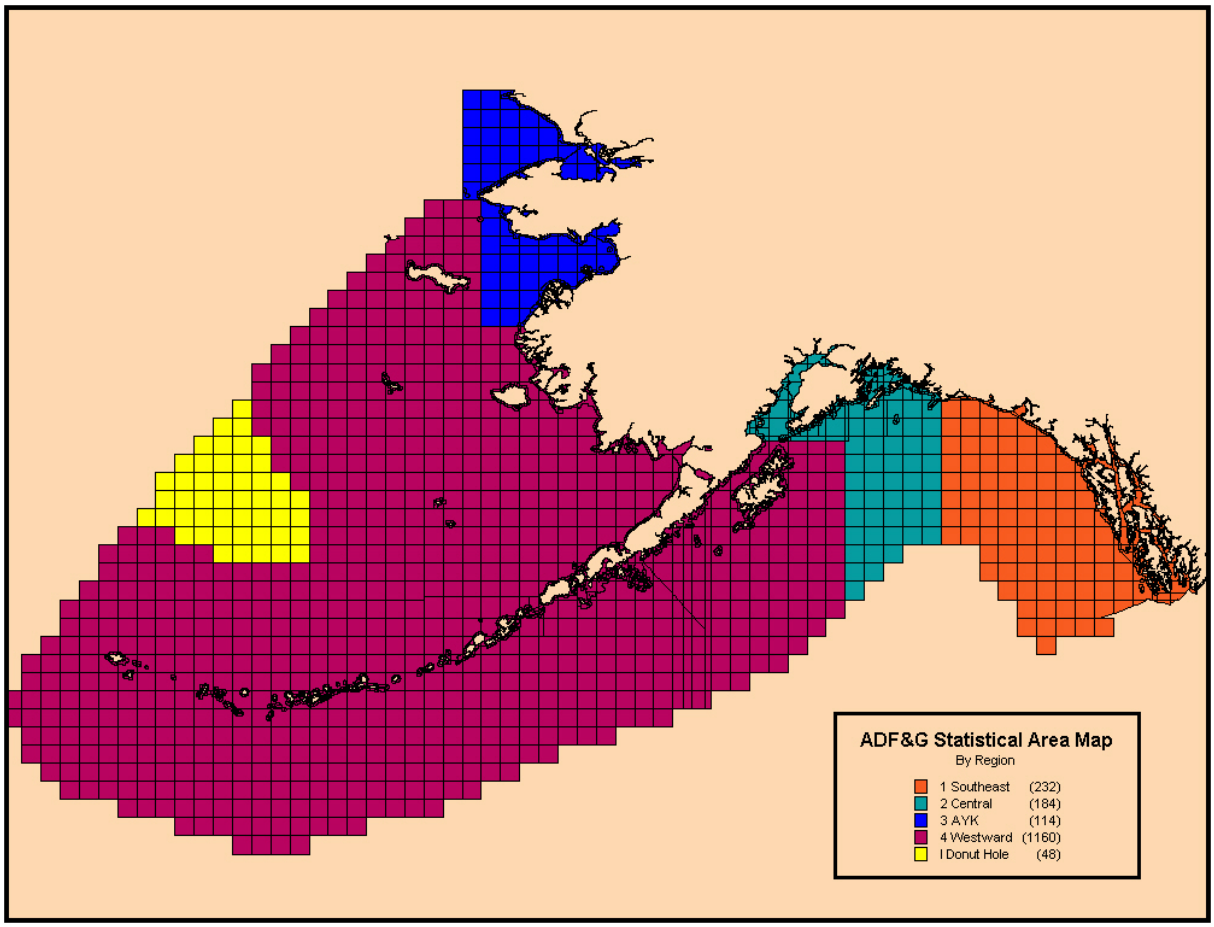
Fishery Scientist/Biometrician Steve Fleischman Division of Sport Fish-RTS 333 Raspberry Road Anchorage, AK 99518-1599 (907) 267-2388	PWS Assistant Area Biol. Sam Hochhalter P.O. Box 669 Cordova, AK 99574-0669 (907) 424-3212	

Appendix II. Map Depicting State of Alaska Commercial Fishery Management Regions.



Appendix III. Tissue samples of *Sebastes* species and pollock collected for genetic analyses and stored at Alaska Department Fish and Game, Gene Conservation Laboratory, Anchorage. Species, sampling location year collected, sample size, and tissue type are given.

Species	Location	Year	Sample size	Tissues
Yelloweye rockfish *Sebastes ruberrimus*				
	Gravina,Danger,Herring	1991	27	muscle, liver, eye
	Knight Is./Naked Islands area	1998	100	fin
	Whittier	2000	97	fin
		2000	50	fin
	Kachemak Bay	1999	58	fin
	Kodiak Island	1999	115	fin
	Resurrection Bay	1999	100	fin
	Fairweather Grounds	1999	100	fin
	Flamingo Inlet	1998	46	fin, larvae
	Tasu Sound	1998	50	fin
	Topknot	1998	49	fin

Species	Location	Year	Sample size	Tissues
	Triangle Island	1998	63	fin, larvae
	Sitka	1998	49	fin
	SE Stat Areas 355601, 365701 (CSEO)	1999	100	fin
Black rockfish *S. melanops*				
	Carpa Island	1998	40	fin
	Castle Rock near Sand Point	1999	60	fin
	Akutan	1999	100	fin
	Dutch Harbor	2000	6	fin
	Chignik	2000	100	fin
	Ugak Bay, Kodiak Island	1997	100	muscle,liver,heart,eye
	Eastside Kodiak Is.: Ugak and Chiniak Bays	1998	100	fin
	Southwest side Kodiak Island	1998	86	fin
	Westside Kodiak Island	1998	114	fin
	Kodiak Island	1996	2	muscle,liver,heart,eye
	North of Fox Island	1998	24	fin
	Resurrection Bay - South tip Hive Island	1997	82	muscle,liver,heart,eye,fin
	Yakutat Bay	2003	130	fin
	Valdez	2000	13	fin
		2001	50	fin
	Whittier	2000	16	fin
		2001	93	fin
	Oregon - Pacific Northwest	1999	50	muscle, liver, heart
	Washington - Pacific Northwest	1998	20	fin
	Sitka	1998	50	fin
	SE Stat Areas 355631, 365701 (CSEO)	1999	83	fin
	Sitka Sound Tagging study	1999	200	fin
Dusky rockfish *S. ciliatus*				
	Sitka	2000	23	liver, fin
		2000	23	fin
	Sitka Black RF Tagging study	1999	15	muscle,liver,heart,eye
	Harris Bay - Outer Kenai Peninsula	2002	37	muscle
	North Gulf Coast - Outer Kenai Peninsula	2003	45	fin
	Resurrection Bay	1998	3	fin
	Eastside Kodiak Is.: Ugak, Chiniak, Ocean Bays	1998	100	muscle,liver,heart,eye
	Kodiak Island	1997	50	muscle,liver,heart,eye

Species	Location	Year	Sample size	Tissues
Walleye pollock *Theragra chalcogramma*				
	Exact location unknown; see comments	1997	402	fin
	Bogoslof Island	1997	120	muscle,liver,heart
		1998	100	muscle
		2000	100	muscle,liver,heart
	Eastern Bering Sea	1998	40	muscle,liver,heart
	Middleton Island	1997	100	fin
		1998	100	muscle,liver,heart
		2000	100	muscle,liver,heart
	NE Montague/E Stockdale	1997	100	fin
	Orca Bay, PWS	1997	100	fin
	Prince William Sound	2000	100	muscle,liver,heart
	Port Bainbridge	1997	100	fin
		1998	100	muscle,liver,heart
	PWS Montague	1999	300	heart
	Eastern PWS	1999	94	heart
	Resurrection Bay	1998	120	fin
	Kronotsky Bay, E. Coast Kamtchatka	1999	96	muscle,liver,heart,eye,fin
	Avacha Bay	1999	100	
	Shelikof Strait	1997	104	muscle,liver,heart,eye,fin
		1998	100	muscle,liver,heart
		2000	100	muscle,liver,heart