STATE OF ALASKA
GROUNDFISH FISHERIES

ASSOCIATED INVESTIGATIONS IN 2009

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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 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 Gulf of Alaska FMP and in 2007 to do the same with dark rockfish, thus the state manages these species in both state and federal waters (of the GOA). 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 NMFS, adopting Federal seasons and in some cases allowable gear types as specified by NMFS. 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 demersal shelf rockfish, black and blue rockfishes, dark rockfish and lingcod in the EEZ. 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 North Pacific Fisheries Management Council's Gulf of Alaska Groundfish Plan Team and produces the annual stock

assessment for demersal shelf rockfish for consideration by the North Pacific Fishery Management Council.

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. Four resource assessment surveys were conducted during 2009. The Southeast Groundfish project is funded in part with NOAA Grant NA08NMF4070534.

b. Central Region

Central Region groundfish staff is headquartered in Homer and is comprised of a regional groundfish management biologist, a regional shellfish/groundfish research project leader, a groundfish sampling coordinator, a groundfish fish ticket entry position, three marine research biologists, five to six seasonal technicians, and one seasonal commercial catch sampler. An area management biologist and a seasonal commercial catch sampler are also located in Cordova and regional support comes from Anchorage. The research project leader also serves as a member of both the North Pacific Fishery Management Council's Gulf of Alaska Groundfish Plan Team and Non-Target Species Committee. The R/V *Pandalus*, home ported in Homer, and the R/V *Solstice*, home ported in Cordova, conduct a variety of groundfish-related 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. Stock assessment data are collected through port sampling, and through ADF&G trawl, jig, scuba, 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 data-entered to provide additional depth to 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* are home ported in 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 North Pacific Fisheries Management Council's 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 Alaska Department of Fish and Game's (ADF&G) statewide AKFIN contract and the PSMFC sponsored AKFIN Support Center (AKFIN-SC) in Juneau, Alaska. The ADF&G has primary responsibility for collecting, editing, maintenance, analysis, and dissemination of these data and performs this responsibility in a comprehensive program.

With few exceptions, groundfish resources in Alaska's Exclusive Economic Zone (from 3 to 200 nautical miles offshore) are managed by the National Marine Fisheries Service (NMFS), and groundfish within 3 nautical miles of shore are managed by the state of Alaska. Two fishery management plans (FMPs) require the collection of groundfish harvest data (fish tickets) in the north Pacific: the Gulf of Alaska Groundfish FMP, and the Bering Sea and Aleutian Islands Groundfish FMP. The AKFIN program is necessary for management and for the analytical and reporting requirements of the FMPs.

Implementation of the FMP for the Commercial King and Tanner Crab Fisheries in the Bering Sea and Aleutian Islands (BSAI) resulted in additional responsibilities for data collection, analysis, and reporting by the state, which manages the 17 stocks of crabs covered by the FMP.

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 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 collect crab fishery landing information, including catch and biological data, from the BSAI;
3) 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;
4) to provide the support mechanisms needed to collect, store, and report commercial groundfish and shellfish harvest and production data in Alaska;

5) to integrate existing fishery research data into secure and well maintained databases with consistent structures and definitions;
6) 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 over the Internet while maintaining the department's confidentiality standards;
7) to provide GIS services for AKFIN fishery information mapping to ADF&G Division of Commercial Fisheries staff and participate in GIS and fishery data analysis and sharing with other AKFIN partner agencies;
8) to support economic analysis as needed prior to implementation of state and federal fishery regulations; and
9) 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. Crab species in the BSAI include red, blue, golden, and scarlet king crab; several Tanner crab species; snow crab; and hair crab.

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 fish and crab 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 and of crab in the BSAI region.

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, Bering sea crab data collection and reporting, various fishery 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 is 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 is routinely reviewed for accuracy with corrections applied as required. Within the confines of confidentiality agreements, raw data is distributed to the National Marine Fishery Service (both NMFS-ARO and NMFS-AFSC), the North Pacific Fishery Management Council (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 staff 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 2009 ADF&G AKFIN staff processed 17,842 groundfish fish tickets, collected 16,816 groundfish biological samples and measured 17,362 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 it's inception in 1997. (Contact: Lee Hulbert)

Groundfish Fish Tickets Processed - Calendar Year 2009

ADF&G Region	
1 - Southeast	3,692
2 - Central	3,014
4 – Westward; Kodiak, AK Penn.	9,920
4 – Westward; BSAI	1,216
Total	17,842

Groundfish Biological Data Collection - Calendar Year 2009

ADF&G Region	AWL Samples Collected	Age Structures Measured
1	3,881	13,278
2	7,675	1,667
4 - Kodiak	5,260	2,417
Total	16,816	17,362

Intergency Electronic Reporting System (contact Gail Smith)

The Alaska Department of Fish and Game 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 is stored in an Oracle relational database and available to regional staff via the State of Alaska wide-area network.

The three resource management agencies tasked with commercial fisheries management in Alaska are the Alaska Department of Fish and Game (ADF&G), the International Pacific Halibut Commission (IPHC), and the National Marine Fisheries Service – Alaska Region (NMFS-AK). Beginning in 2001, these agencies developed a consolidated landing, production, and IFQ reporting from a sole source. This collaborative effort, the Interagency Electronic Reporting System (IERS), was developed with initial funding provided through the Pacific States Marine Fisheries Commission. The web-based reporting component of this system is ***eLandings*** and the desktop application for the at-sea catcher processor fleet is ***seaLandings***. Vessels using the seaLandings application email landing and production report to the centralized database as an email attachment.

The IERS has been in successful operation in the groundfish and IFQ halibut/sablefish fisheries since July 2006. Program standards and goals for this project have been met. The ADF&G is currently in the final phase to implement the system with salmon fisheries and hopes to have the system in use for all Alaska fisheries by 2011.

During 2009, the IERS recorded more than 26,000 landing reports in crab, groundfish and salmon fisheries.

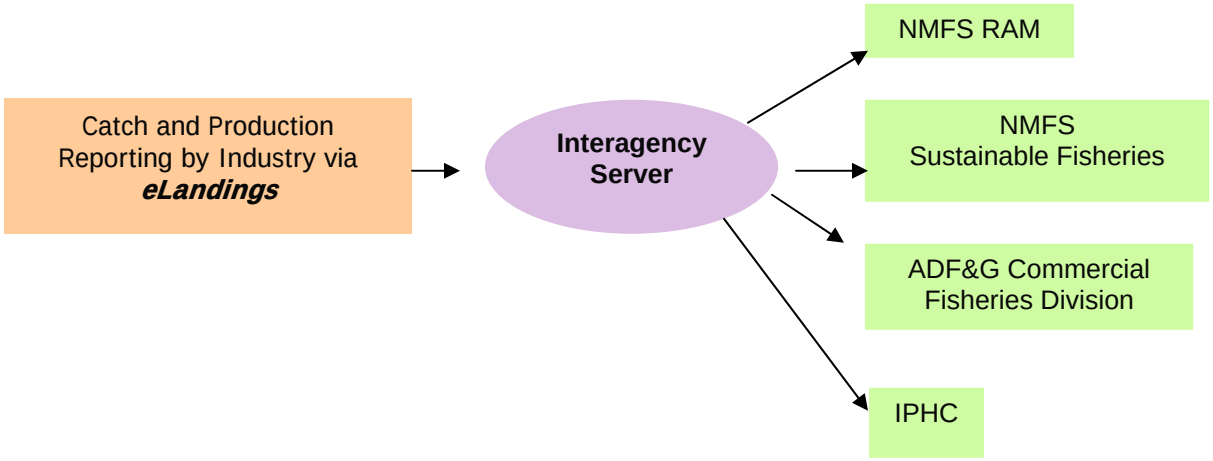
Alaska Department of Fish and Game personnel, funded by AKFIN, participate in the IERS project on the development, implementation, and maintenance levels. The IERS provides processors with a web-based online electronic catch and production reporting program. The IERS features include electronic landing and production reports, real time quota monitoring, immediate data validation, and printable (.pdf) fish ticket reports. To date, IERS is required in all groundfish and IFQ crab fisheries and extensively used in the Western Gulf and Bering Sea crab fisheries and halibut/sablefish IFQ fisheries – statewide. The ADF&G is implementing the ***eLandings*** System in salmon fisheries. Approximately seventy-five percent of all commercial landings occur to small and mid-sized tender vessels, at sea.

To accommodate tender landings from small salmon catcher vessels, the ADFG developed the ***tLandings*** application. This application allows vessels with no internet connection to conduct electronic reporting using a laptop computer. The application and the data are stored on a 2 gb flash drive. When the tender delivers to the shoreside processor, in addition to the transfer of fish, the flash drive is handed off to the office staff.

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 in this fishery by the end of the 2012 season.

The web-based application provides the seafood industry with the ability to submit landing reports (fish tickets), IFQ fisher/processor quota harvest, and processor production information from a single application. The information submitted via the web application, ***eLandings***, is stored in a single repository database. The ADF&G, the IPHC, and the NMFS-AK copy data submitted by industry to their individual data systems.

DATA FLOW MODEL



The Interagency Electronic Reporting System provides several benefits for fisheries management agencies and industry, when compared to paper-based systems. The most obvious benefit is a sole source reporting site for landing and production data. Fisheries managers, individual processing facilities, and the parent company will have the ability to obtain landing report catch and production information immediately. Additional benefits include:

- Significant reduction of redundant reporting to management agencies.
- Consolidated trip level landing reports that accommodate fishery permit stacking.
- Immediate data validation when the landing, IFQ, or production report is submitted.
- Real time harvest data availability to management agencies.
- Staged reporting to accommodate the work flow of industry.
- Application function to allow processors to import or export the catch and production information they submit, facilitating one time data entry for processors.

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, and tLandings 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 NMFS Data Technicians and to GCI, an Alaska based telecommunications company.

Landing and production data are submitted to a central database, hosted by the State of Alaska, validated and reviewed, and pulled to the individual agency databases. Landing data is 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 is distributed to the State of Alaska Commercial Fisheries Entry Commission (CFEC) daily 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 is 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) in Juneau continued to provide age data to ADFG regional managers in 2009. Age structures from 13,120 groundfish representing 13 species were received from statewide commercial and survey harvest sampling efforts. A total of 13,278 age data were released back to managers, which included data from samples received in previous years. Over 3,728 additional age data were produced through precision testing. A total of 31,000 otoliths (representing $\geq$16,305 specimens) were measured. The majority (>53%) of funding for this project is through the Alaska Fisheries Information Network, and the remaining is from State funding. Five people were employed for approximately 37 work months to age groundfish and invertebrate age structures or conduct associated work, for example, sample preparation, data entry, archiving, otolith measurements, and project work. Two employees are full-time and funded year round and other employees were seasonal.

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 2009 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 need for 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.

The ADU continued radiocarbon studies to validate age of species and identify regional differences in the radiocarbon signal. Staff have validated a subset of ages for at least 9 species to date, with an additional 6 species having some specimens processed with radiocarbon values occurring in the "non-ambiguous years" of the radiocarbon curve, which indicate accurate ages for these specimens. Validated species and their highest validated age are as follows: sablefish (48y), thornyhead (46y), dusky/dark (44y), black (43y), tiger (46y), shortraker (49y), rougheye (46y), redbanded (43y), and silvergrey (43y) rockfishes. Yelloweye and quillback rockfish were previously validated and published by Moss Landing Marine Lab, and used age data produced by ADF&G. In 2009, we continued to submit for radiocarbon analysis, black rockfish otolith core samples from 3 Alaska locales in order to evaluate regional differences in the bomb radiocarbon profile. Preliminary information suggests that the radiocarbon signal west of Kodiak may differ from the highly utilized radiocarbon reference curve for Southeast Alaska. Data from this research were presented at 2 scientific symposia: the 2009 Radiocarbon Conference, and the 2009 International Otolith Symposium.

The ADU also continued their culture of pollock from the 2006 year class. These fish have been under tank culture for 3.5y at the NMFS Auke Bay Marine Station, Juneau Alaska. Growth is monitored with quarterly live sampling of fish size and annual subsampling for otoliths. In 2009, ADU staff also tagged and released 1536 wild pollock in Auke Bay, for a 2 year total of 2535 tagged pollock. We recovered 5 tagged pollock; 2 of these were from releases made in 2008.

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 commenced development of an online age structure invoicing system, *OASIS*, which is anticipated to be online in early 2010. Refinements to the ADU website (http://tagotoweb.adfg.state.ak.us/ADU/) were made and included an upgrade to the "Tagged Fish Alert" webpage which listed ADFG contact information in the event of recovery of a tagged fish and also a status of pollock tag recoveries. (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 halibut, rockfishes (all species combined), lingcod, Pacific cod, and sharks, 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 Exclusive Economic Zone (Equi-distant line) 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 is Mike Jaenicke, with assistant project biologists located in Ketchikan (Kathleen Wendt) and Juneau (Diana Tersteeg). The project biometrician (Sarah Power) is located in Juneau. 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 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 three of them read all rockfish and lingcod age structures. Halibut otoliths were collected from the harvest and will be forwarded to the International Pacific Halibut Commission 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 precluded 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 the International Pacific Halibut Commission (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 1,005 fish were tagged in 2009, bringing the total number of tags released to 16,437. By year's end, 48 tags had been recovered. Results to date show that while the vast majority of Pacific cod are recovered within 15 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 into the Bering Sea, the Alaska Peninsula to Kodiak waters, and several fish tagged in Kodiak waters were recovered in Southeast Alaska.

b. Stock Assessment

No stock assessment programs were active for Pacific cod during 2009.

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 Area (NSEI) and the Southern Southeast Inside Area (SSEI).The GHR was based on average historic harvest levels rather than on a biomass-based ABC estimate. This fishery is most intense in the winter months, in season management actions are small area closures intended 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 adopted Pacific cod Management Plans for fisheries in 5 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. Fishing seasons 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. 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. The annual GHLs are based on the estimate of allowable 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.

Additional regulations include a 58’ vessel size limit in the Chignik and South Alaska Peninsula Areas and allocations between gear types in all five 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 plans were season, gear and harvest specifications. The fishery GHL was set by regulation at three percent based on the estimate of allowable 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.

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 stat area for each vessel-trip interview. No size or age data are collected. 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 area during the winter months. Pots have been the dominant gear in both the **Cook Inlet and Prince William Sound** areas. 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. Specifically in 2009 less than 5% 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 2009 totaled 279 mt, the same as was landed in 2008.

The 2009 GHLs for the state-managed Pacific cod seasons in the Cook Inlet and Prince William Sound Areas of the **Central** Region were set at 1,182 mt and 221 mt, respectively. Harvest from the Cook Inlet Area state-managed Pacific cod fishery totaled 1,149 mt while the Prince William Sound Area harvest totaled 320 mt. This was the first year the PWS GHL has been achieved since the fishery began. The high harvest was attributable to the addition of longline as a legal gear and harvest rates that exceeded expectations. Harvest from the 2008 state managed Aleutian Islands Pacific cod fishery totaled 5,313 mt, 33 mt more than 2007. Harvest from the 2008 state managed fishery in the Kodiak Area totaled 4,735 mt, while 3,042 mt of cod were harvested in the Chignik Area, and the South Alaska Peninsula Area harvest totaled 6,133 mt. 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. Action by the Alaska Board of Fisheries during 2004 increased the Pacific cod allocation in the Cook Inlet Area to its maximum allowable 3.75% of the Central Gulf ABC, the maximum allowed under regulation and Prince William Sound remains at its minimum allocation of 10% of the Eastern Gulf ABC.

Estimates of the 2009 recreational harvest of Pacific cod are not yet available from the statewide harvest survey, but the 2008 estimates were 9,547 fish in **Southeast** and 15,224 fish in **Southcentral Alaska**. The average estimated annual harvest for the most recent five-year period (2004-2008) was 9,533 fish in **Southeast** Alaska and 11,611 fish in **Southcentral** Alaska. There are no estimates of average weight in the sport harvest in either region.

2. Rockfishes

Commercial rockfish fisheries are managed under three assemblages: demersal shelf (DSR), pelagic shelf (PSR), and slope rockfish. Demersal Shelf Rockfish include the following species: yelloweye, quillback, china, copper, rosethorn, canary, and tiger. Pelagic shelf rockfish (PSR) include black, blue, dusky, dark, yellowtail, and widow. Black and blue rockfish were removed from the PSR assemblage in the federal fisheries management plan (FMP) and placed totally under state management in 1998. The North Pacific Fisheries Management Council (NPFMC) removed dark rockfish also from the PSR assemblage in the FMP and turned management of them over to the State effective January 1, 2009. Slope rockfish contain all other *Sebastes* species.

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 mandatory logbook program for all groundfish fisheries continued. The logbook program is designed to furnish detailed catch and effort information, to estimate at-sea discards, and to obtain more detailed information regarding specific harvest location. The port-sampling program provides species composition from the landed catch and an opportunity to collect biological samples. In 2009 the directed fishery for demersal shelf rockfish (DSR) opened in the East Yakutat Section (EYKT) and Southern Southeast Outside (SSEO) areas of the Southeast Outside District (SEO). Length, weight and age structures were collected from 678 yelloweye rockfish caught in the directed fishery. The remaining areas of SEO, Central Southeast Outside (CSEO) and Northern Southeast Outside (NSEO), 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 but landings were minimal and no biological samples of yelloweye rockfish were collected from the internal waters fishery. Over 800 yelloweye rockfish landed as bycatch in the commercial halibut fishery were also sampled for AWL data throughout the halibut season in southeast Alaska.

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 2100 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 980 km^2 of rocky habitat has been mapped, approximately 32% of what is estimated to occur. The goals of this project are to: Produce a GIS compatible sun-illuminated multibeam mosaic of these areas complete with bathymetric contour mosaics and a geological habitat interpretation of the mosaics. Quantification of rockfish habitat based on the geological interpretation of multibeam data is subcontracted to Moss Landing Marine Laboratories. The most recent collections of data were from two areas in SSEO, Learmonth Bank and offshore of Cape Addington. The geologic interpretations for these areas were completed in 2009. (Contact Cleo Brylinsky).

Skipper interviews and port sampling of commercial rockfish deliveries in **Central Region** during 2009 occurred in Homer, Seward, Whittier, Anchorage and Cordova. Efforts during the first half of the year were directed at the sampling of rockfish delivered as bycatch in other groundfish and halibut fisheries, primarily slope and demersal shelf species. The directed jig

fishery that targets pelagic rockfish begins July 1 and is normally the focus of rockfish sampling during the last half of the year. However, very limited fishing effort has drastically reduced sampling opportunities since 2006. Sample data collected included date and location of harvest, species, length, weight, sex, and gonad condition. Otoliths were collected from most sampled fish. Homer office staff determined ages of pelagic and demersal 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 Charles Trowbridge).

Work continued in 2009 on the development of a marine habitat GIS for **Central Region**. Additional NOAA multibeam bathymetry and backscatter data were collected. Bathymetry data were gridded and incorporated while preliminary attempts were undertaken to analyze the backscatter data. Margaret Spahn, ADF&G Homer, the lead on this project started a graduate program in September, 2007 at Oregon State University in geography to develop more skills to further this project. . Multibeam and side scan sonar projects continue to be one of the major focal areas of the Central Region commercial fisheries research program. The Nuka Island/Pye Island area was mapped in 2008; ROV assessment work on yelloweye rockfish and lingcod are occurring there and in Resurrection Bay in 2009.

Experiments were conducted in August, 2007 to test two assumptions of strip transect sampling with an ROV. The experiments assessed the responsive movement of rockfishes and lingcod to an ROV under different artificial light levels and assessed the detection of those animals. Results show that lingcod and yelloweye rockfish have very little response to the ROV (i.e. were not attracted to or moved away from it), even under differing light levels making it a valid tool for assessing abundance in these species. ADF&G is pursuing research on abundance estimates for these species in areas along the outer Kenai coast and Prince William Sound.; (Contact Mike Byerly or Dr. Ken Goldman).

The **Westward Region** continued its port sampling of the commercial rockfish and Pacific cod harvests in 2009. 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 Mejiati). Staff from the Kodiak office has completed aging black rockfish otoliths through the 2009 season while a number of Pacific cod ototlihs remain to be read.

The **Westward Region** also continued several studies on Western Gulf of Alaska black and dark rockfish. The acoustic tagging of black rockfish and dark rockfish continued throughout 2009. An array of 18 moored receivers was deployed on the east side of Spruce Island, just north of the port of Kodiak. Tags were surgically implanted in 85 black rockfish and 55dark rockfish to monitor their daily and seasonal movements. In addition, hydroacoustic surveys of black and dark rockfish in the Eastside, Southeast, and Afognak Districts of the Kodiak Management Area were conducted in 2009 in an effort to generate biomass estimates and develop a management strategy for both black and dark rockfish. Surveys are planned for the Westide District of the Kodiak Area and the Chignik Management Area in 2010 (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, and quillback rockfish. Approximately 4,450 rockfish were sampled at Ketchikan, Craig, Klawock, Wrangell, Petersburg, Juneau, Sitka, Gustavus, Elfin Cove, and Yakutat in 2009 (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. Nearly 4,200 rockfish were sampled from the sport harvests at Seward, Valdez, Whittier, Kodiak, and Homer in 2009 (Contact Barbi Failor).

The Division of Sport Fish also conducted research into the effectiveness of deepwater release devices in reducing barotrauma-induced mortality of released demersal shelf rockfish. Objectives included estimation of 17-day survival probability (for multiple successive sample events) of yelloweye and quillback rockfish released with a deepwater release mechanism and estimation of the proportion of hook-and-line caught rockfish released at the surface that are able to submerge on their own. The goal of the project is to evaluate the efficacy of deepwater release devices for demersal rockfish species of concern in Alaska and to inform decisions on the potential role of including these devices or other harvest restrictions in the management of the fishery. Limited studies will continue in 2010 (Contact Sam Hochhalter).

b. Stock Assessment

The **Southeast Region** uses line-transect methods, conducted from the submersible "Delta", to collect density estimates of yelloweye rockfish. Biomass is the product of density, average weight, and area of rock habitat. A new density survey was conducted in EYKT in 2009. Yelloweye rockfish density for the current stock assessment is based on the latest best estimate by management area. The CSEO and SSEO areas were last surveyed in 2007 and 2005 respectively, NSEO was surveyed in 2001. Density estimates by area range from 1,068 to 2,196 adult yelloweye per km^2.

In the **Southeast Region** no black rockfish surveys were conducted in 2009.

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

In the **Central Region** no rockfish stock assessment surveys were conducted in 2009.

c. Management

Management of DSR is based upon a combination of guideline harvest ranges, seasons, gear restrictions, and trip limits. The state has management authority for demersal shelf rockfish in both state and federal waters of **Southeast Alaska**.

Directed harvest of demersal shelf rockfish is restricted to hook-and-line gear. Directed fishing quotas are set for the 4 outside water management areas (SEO) individually and are based on the poundage remaining after assigning a 2% harvest rate to the adult yelloweye biomass estimate

and estimating bycatch (reported and nonreported) mortality. Directed fishery quotas for the two internal water management areas 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 TAC before the split in allocation is made between commercial and sport fisheries. This change was not adopted in time for the 2009 fishery.

The 2009 TAC for DSR in SEO was 362 mt which resulted in an allocation of 304 mt to commercial fisheries and 58 mt to sport fisheries. A significant portion of the total commercial harvest is taken as bycatch mortality during the halibut fishery. We continue to use the method for bycatch determination we developed in 2006 to which recognizes the significance of depth as a component of the bycatch rate. Using this method the estimate of yelloweye that was anticipated to be caught as bycatch by the halibut fleet in outside waters in 2009 ranged from 72-209 mt (95%CI) with the point estimate at 141 mt. Because yelloweye comprised 96% of the landed catch of DSR we add 4% to this to account for other species. This brought the estimated catch for DSR in 2009 to 146 mt. Full retention of DSR has been in regulation in state waters since 2002 and in Federal water since 2005. Landed catch of DSR in the halibut fishery in 2009 was 136 mt which was just 7% under the estimation for DSR provided using the new method.

The commercial fishery for DSR in SEO opened in SSEO and EYKT in 2009 with 30 mt and 48 mt quotas respectively. Sport fishery harvest estimates have been used since 2005 to add to our knowledge of what we determine to be the total harvest of DSR in other fisheries. The preliminary estimate of total sport fishery removals for 2009 was 50 mt. (Contact Cleo Brylinsky).

Management of black rockfish is based upon a combination of guideline harvest limits and gear restrictions. The state has management authority for black rockfish in both state and federal waters of Southeast Alaska. Directed fishery guideline harvest limits are set by management area, and range from 11.3 mt in 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 with 1.1 mt landed in directed and bycatch fisheries combined in 2009.

Shortspine thornyhead, shortraker rockfish, rougheye rockfish and redbanded rockfish may be taken as bycatch only (no directed fishing). A total of 96.5 mt of slope rockfish were landed in NSEI and SSEI during 2009. This is down slightly from 119 mt landed in 2008.

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 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 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. 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 guideline harvest levels 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 2009, 55 mt of black rockfish were harvested from seven sections in the Kodiak Area. Guideline harvest levels were attained in three sections. In the Chignik Management Area 6 mt of black rockfish were harvested. The 2009 black rockfish harvest in the South Alaska Peninsula areas remains confidential because of minimum participation. In 2009 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. The staff of the Westward region is currently seeking an economically feasible and statistically valid means to conduct stock assessments on the rockfish resources of the region. 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 2007-2009 seasons, 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: 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; 3) Charter operators and crewmembers could not retain rockfish while clients are on board the vessel (Contact Robert 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 lower 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). The bag limit in Prince William Sound was four rockfish, no more than one of which could be a non-pelagic species. The bag limit in the North Gulf Coast area was four rockfish daily, including no more than one non-pelagic rockfish. The Alaska Board of Fisheries has allowed a 10-rockfish bag limit in the Kodiak and Alaska Peninsula areas because of lower levels of effort and predominance of pelagic species in the catch.

d. Fisheries

Directed fisheries for demersal shelf rockfish and black rockfish occurred in **Southeast** in 2009. Effort in the directed black rockfish fishery was minimal with only 3 vessels participating. The directed DSR fishery in 2009 in outside waters was opened in two areas, EYKT and SSEO for a total harvest of 76 mt. There was also a directed DSR fishery in internal waters (SSEI and NSEI); the total harvest was 6.5 mt.

The total amount of rockfish (all species) taken as bycatch in all commercial fisheries conducted east of 140^0 W Longitude in 2009 in state and Federal water was 545 mt. DSR bycatch made in conjunction with the IFQ halibut fishery in outside as well as internal waters contributed 172 mt to this total. All rockfish harvested in state-managed fisheries in Southeast is taken by hook-and-line gear either in directed fisheries or incidental to fisheries for other species.

The 2009 **Cook Inlet Area** directed rockfish fishery opened July 1 and closed December 31 with a harvest of 1.4 mt. Total rockfish harvest including bycatch to longline, pot and jig fisheries was 14 mt. Total rockfish harvest for the PWS Area rockfish bycatch-only fishery was 53.6 mt. This included a 10 mt incidental catch of demersal and slope rockfish from the walleye pollock trawl fishery and a 43 mt incidental harvest of demersal and slope rockfish primarily from the sablefish 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 is 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 2009 harvest are not yet available from the statewide harvest survey, but the 2008 estimates were 118,997 fish in Southeast and 107,388 fish in Southcentral Alaska. The average estimated annual harvest for the most recent five-year

period (2004-2008) was 95,335 rockfish (all species) in Southeast Alaska and 96,858 fish in Southcentral Alaska.

Creel survey data for Sitka indicates that 4,500 individual yelloweye (approximately 16 mt) were retained by anglers in an area roughly equivalent to the CSEO in 2009. This is a 39% decrease in the estimated harvest (by number of fish) of yelloweye in Sitka compared to the 2008 season, and is 49% below the 2001 yelloweye creel harvest estimate of 8,854 fish. Projections based on creel and SWHS data for SWHS Area B (Prince of Wales Island) indicate that approximately 1,800 yelloweye (approximately 7 mt) were retained in 2009 in the SSEO area of Prince of Wales Island. These numbers do not include harvest of other species of DSR although yelloweye compromise the majority of the sport harvested DSR by biomass harvested in CSEO (~86%) and SSEO (~69%), based on the 2009 projections.

3. Sablefish

a. Research

In 2009, 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 cost of these surveys is offset by the sale of the fish landed.

In the NSEI survey, the 2009 overall CPUE (kg/hook) was 1.15, down slightly from 2008 (1.17). The most frequently encountered bycatch species were Shortspine thornyhead (*Sebastolobus alascanus*) and skates (*Raja* spp. and *Bathyraja* spp.) comprising 44% and 35% of the total bycatch count respectively. In the SSEI longline survey there has been a downward trend in CPUE since 2006. In 2009 CPUE was .36 kg/hook compared to .51 kg/hook in 2006. Spiny dogfish (*Squalus acanthias*) were the most abundant bycatch species, comprising 24% of the bycatch count. Skates (*Raja* spp. and *Bathyraja* spp.) were the next most abundant, comprising 18%.

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 2009 it was .14 round kg/hk compared to 0.17 round kg/hook in 2008. In 2005 the CPUE was .24 kg/hook. In the NSEI fishery, the overall CPUE adjusted for hook spacing expressed in round kg/hook was 0.35 in 2009 down from 0.41 in 2008. This drop is the first following a steady upward trend seen in fishery CPUEs for this area throughout the last decade.

In 2009, ADF&G continued a mark/recapture study in NSEI, tagging and releasing 7,071 sablefish. Pot gear was used to capture the fish from June 1st to 23rd one and a half months prior to the start of the fishery which commenced on August 15, 2009. Using pot gear to capture the fish for tagging has minimized the apparent “hook shyness” pattern of tag returns observed in 1997, 1998 and 1999 when longline gear was used to catch fish for tagging. Tagged fish are distributed by area and depth in proportion to the harvested commercial catch using logbook data from the three previous years (contact Deidra Holum).

Within **Central Region,** ADF&G initiated a limited tagging study in 1999 within PWS. Fish tagged were captured on the biennial bottom trawl survey. Tagging was continued through the 2003 survey. Longline surveys were conducted through 2006 and may be reconstituted in the future. (Contact Dr. Ken Goldman).

Skipper interviews and port sampling occurred in Whittier, Valdez, Cordova and Seward for the PWS Area 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 (Contact Charles Trowbridge).

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 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 2009 was based on the 2008 Petersen–estimated number of sablefish fish in NSEI. The forecast for 2009 was made by decrementing the 2008 estimate to account for natural mortality, and adding a number of age-4 recruits equal to that of 2008. Each age class was converted to biomass using the average weight of that age class from the 2008 commercial fishery. The forecast for 2009 was 13,775,900 round pounds of sablefish. An $F_{45\%}$ (=0.104) harvest rate was applied to the point estimate of the forecasted biomass to give a preliminary ABC of 1,290,868 round pounds. This ABC represented a 20% decrease from the previous stock assessment done in 2006 and forecasted for 2007. 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 (Contact Sherri Dressel). In SSEI only an annual longline survey is conducted to provide biological data as well as relative abundance information.

A longline survey, using ADF&G vessels, has been conducted in **Prince William Sound** annually since 1996. Mean CPUE between 1996 and 2002 ranged from 0.08 to 0.17 sablefish/hook, with an overall mean CPUE of 0.12 (all years combined). Longline survey effort was extended into the North Gulf District in 1999, 2000 and 2002. The 2005 and 2006 PWS survey covered all of PWS, and data will be analyzed to determine the veracity of the data for setting harvest limits on the PWS fishery. Survey costs are partially offset by the sale of fishes caught in the survey, however, Central Region staff is considering a switch to a pre-fishery pot survey that would use tag and recapture methods to set harvest limits, which would not sell the catch (Contact Dr. Ken Goldman).

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 guideline harvest ranges. 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 guideline harvest level 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.

Due to declines in fishery CPUE and preliminary results from our mark-recapture work, ADF&G reduced the NSEI quota 35% in 1999 to 1,415 mt where it remained through 2000. Beginning in 2001 a biomass estimate was available and the NSEI area total allowable catch (TAC) was set using an $F_{40\%}$ applied to the lower 90% confidence limit of the forecasted estimate of biomass. The TAC is then decremented by estimating mortality in other fisheries before the directed fishery quota is set. The quota was decreased in 2001 to 990 mt and to 909 mt for 2002 and 2003. In 2004 the quota was increased to 1,018 mt. The 2005 directed fishery quota was 931 mt with 106 permit holders (longline). In 2006 the 2005 quota was used rather than base the quota on the recommendation put forward by the biometrician. There were 105 permit holders eligible to fish in NSEI in 2006. Data collected during 2006 was used to determine an updated stock assessment forecasted for 2007. The use of this updated stock assessment with the forecast for 2007 resulted in a drop in the TAC to 675 mt down 28% from the TAC used in 2006. There were 103 permit holders participating in the fishery in 2007. In 2008 the stock assessment from 2006 and the forecast for 2007 were used to set the TAC for the 2008 fishery. In 2008 there were 96 permit holders eligible to fish. A stock assessment was conducted in 2008 with a forecast for 2009 and is referenced in the "stock assessment" section of this report. New management measures were adopted for the determination of the 2009 ABC. The point estimate rather than the lower 90% confidence level was used, the amount of fish equal to the average of the previous three years of test fishing was decremented from the ABC and an $F_{45\%}$ harvest rate was used rather than an $F_{40\%}$ rate as in the past. The updated stock assessment combined with the changes listed above resulted in a 22% drop to the allowable harvest objective (AHO) for 2009. There were 88 permit holders eligible to fish in 2009. The Commercial Fisheries Entry Commission predicts that the number of permits will continue to be reduced and that the resulting number of permanent permits for this fishery will be approximately 76.

The SSEI quota was set at 288 mt for 2009, a 9% decrease from the 316 mt quota used from 2000 through 2008. From 2000 to 2005 there were 28 permit holders (4 pot gear, 24 longline) legally permitted to fish in this fishery. In 2006 the Commercial Fisheries Entry Commission (CFEC) allowed 4 permits back into the fishery bringing the total permits to 32 (28 longline and 4 pot gear). For the 2009 fishery CFEC denied 4 permits leaving 25 longline and 3 pot permits allowed to harvest sablefish in this fishery.

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.

The Southeast Alaska **sport fishery** for sablefish was regulated for the first time in 2009. Sport limits were initially established in 2009 at two fish of any size per day, 4 in possession, with an annual limit of 8 fish. These were subsequently modified to 4 fish per day, 4 in possession, and the annual limit of 8 fish was applied to nonresidents only. The creel surveys in Southeast Alaska began collecting information on the number of harvested sablefish at all sampled ports, and encountered a regional total of 19 harvested sablefish landed at the sampled ports during the 2009 season indicating that harvest in the non guided sport fishery is low. The number of sablefish harvested by the sport charter fleet was also requested by the department. These numbers were required to be recorded on the logbooks under the "other" column. Harvest in numbers from internal waters of Southeast Alaska reported on logbooks was 3,847 sablefish. There is some question about whether this number is a high or low estimate since the 2009 logbooks were not printed with "sablefish" but rather "other" for the column counted.

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 2009 fishery GHL was 27 mt. In 2004 the BOF adopted sablefish fishery-specific registration, logbook requirements and a 48-hours trip limit of 1.3 mt. For PWS, a limited entry program that included gear restrictions and established vessel size classes was adopted in 1996. 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 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. Central Region staff annually conduct dockside interviews and sample landings from these fisheries in the ports of Cordova, Whittier, Homer and Seward.

The GHL for the Aleutian Island District is set roughly 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 Board of Fish 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 sablefish **sport fishery** in Southcentral Alaska was unregulated in 2009, with no bag, possession, or size limits. Port samplers throughout Southcentral Alaska encountered and sampled only one sablefish from the sport harvest.

d. Fisheries

In the **Southeast Region** the 2009 NSEI sablefish fishery opened August 15 and closed November 15. The 88 permit holders landed a total of 486 mt of sablefish. The fishery is managed by equal quota share; each permit holder was allowed 5.5 mt. The 2009 SSEI sablefish

fishery opened June 1 and closed November 15. Twenty-seven permit holders landed a total of 270 mt of sablefish, each with an equal quota share of 10.3 mt. In SSEI 25 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 2009. (Contact Cleo Brylinsky)

In the **Central Region** the 2009 open access sablefish fishery in the Cook Inlet North Gulf District opened at noon July 15 and closed at noon October 9, the latest season closing date since the management plan was adopted in 1998. Thirteen vessels harvested 25 mt. Despite similar fishing effort similar to previous years, very few landings achieved the 3,000 lb, 48-hour trip limit. 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 2009 PWS harvest totaled 99.5 mt. Biological sampling, conducted in-season, gathered age, length, weight, sex and gonad condition data. Effort, location and CPUE information were gathered via mandatory logbooks. (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 2009 Aleutian Island fishery opened on May 15, 2009. Additional requirements for the fishery include registration and logbook requirements. The GHL was set at 246 mt for the state managed fishery. The harvest from the 2009 Aleutian Islands sablefish fishery was 127 mt. The season remained open until the November 15 closure date (Contact Heather Barnhart).

4. Flatfish

a. Research

There was no research on flatfish during 2009.

b. Stock Assessment

There are no stock assessments for flatfish.

c. Management

Trawl fisheries for flatfish are allowed in three 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 eight years, with no harvest reported for the 2008-2009 season. The Southeast flatfish trawl areas are also the sites of a shrimp beam trawl fishery. In the past most of the Southeast harvest is 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 2009.

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. assessment in 2009 included commercial fishery catch sampling. Skipper interviews and biological sampling of **Central Region** commercial pollock deliveries during 2009 occurred in Kodiak. Sample data collected included date and location of harvest, species, length, weight, sex, and gonad condition. Otoliths were collected from most sampled fish. Homer office staff determined ages of pollock otoliths (Contact Charles Trowbridge).

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 2009 (Contact Dr. Ken Goldman).

c. Management

Prince William Sound pollock 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. 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. (Contact Robert Berceli). 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.

d. Fisheries

The 2009 **Prince William Sound** fishery opened on January 20 with a GHL of 1,651 mt. The Hinchinbrook section closed by emergency order at 6:00 p.m. February 11 while the Knight Island and Bainbridge sections closed by emergency order at noon March 21. Total pollock harvest for all sections combined was 1,474 mt. Unlike past years when the bycatch was dominated by squid, fishery bycatch was dominated by rockfish and sharks at 9.6mt and 8.6 mt respectively.

6. Sharks

a. Research

In the **Central Region** spiny dogfish and Pacific sleeper sharks were tagged annually from 1997 to 2006 as part of the PWS longline survey for sablefish, and since 2000 during bottom trawl surveys in Cook Inlet and PWS. Through 2003, over 400 each of spiny dogfish and Pacific sleeper sharks have been tagged. To date, ten tagged sleeper sharks have been recovered from PWS; maximum time-at-large was 1,259 days and most sharks moved less than 20 km between tagging and recapture locations. No spiny dogfish have been recovered. In 2005 muscle tissue samples from 49 spiny dogfish caught in the PWS longline survey were sent to Alaska Department of Environmental Conservation for analysis of mercury levels. Results were received in 2006 and incorporated into DEC's Fish Monitoring Program. Total mercury concentrations ranged from 0.1 to 1.3 ppm with a mean concentration of 0.8 ppm. (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 2009, most from a modest salmon shark fishery in Prince William Sound. 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

Among **Central** Region assessment projects sharks are caught in trawl surveys and the PWS longline survey. Catch per unit effort for Pacific sleeper shark ranged from 1.1 fish/set in 1996 to 4.3 fish/set in 1999. Spiny dogfish CPUE has ranged from 0.9 to 9.2 fish/set except for a dramatic increase to 51.3 fish per set in 1998. The high catch rates of spiny dogfish in 1998 appear to have been an anomaly (Contact 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. 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

The Department received no requests for permits to target spiny dogfish in Cook Inlet during 2009.

Estimates of **recreational shark harvest** in 2009 are not yet available from the Statewide Harvest Survey, but in 2008 an estimated 231 sharks of all species were harvested in Southeast Alaska and 686 were harvested in Southcentral Alaska. Confidence in these estimates is low. The statewide charter logbook program also required reporting of the number of salmon sharks kept and released in the charter fishery. Charter anglers account for the vast majority of the recreational salmon shark harvest. In 2008, charter logbook data indicated harvests of 26 salmon sharks in Southeast Alaska and 68 salmon sharks in Southcentral Alaska.

7. Lingcod

a. Research

Beginning in the spring of 1996 and over the fourteen years since, in the **Southeast Region** 9,111 lingcod have been tagged and 446 fish recovered. Opportunistic tagging of 35 lingcod in Sitka Sound occurred during 2009. Length, sex and tagging location are recorded for all tagged fish. Dockside sampling of lingcod caught in the commercial fishery continued in 2009 in Sitka and Yakutat with over 520 fish sampled for AWL. Otoliths were sent to the ADU in Juneau for age determination. (Contact Cleo Brylinsky)

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. Otoliths were sent to the ADU in Juneau for age determination. Gonad condition was generally not determined as nearly all fish delivered were delivered gutted (Contact Charles Trowbridge).

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 2009 included Juneau, Sitka, Craig/Klawock, Wrangell, Petersburg, Gustavus, Elfin Cove, Yakutat, and Ketchikan. Length and sex data were collected from 1,084 lingcod in 2009, 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 1,035 lingcod were sampled from sport harvest at Seward, Valdez, Whittier, Kodiak, and Homer in 2009. 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), 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. In IBS, EYKT and NSEO the CPUE is relatively flat, SSEOC is difficult to evaluate in terms of CPUE because participation there is very minimal. In EYKT effort has been steady since 2002, CSEO had an increase in directed fishing from 2007 through 2009. The IBS super-exclusive registration area commercial quota was harvested almost exclusively by the directed fishery and as bycatch in the longline fisheries in 2008 and 2009.

c. Management

Management of lingcod in **Southeast Alaska** is based upon a combination of guideline harvest ranges, season and gear restrictions. The state has management authority for lingcod in both state and federal waters. Regulations include a winter closure for all users except longliners between December 1 and May 15 to protect nest-guarding males. Guideline harvest limits 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 must keep 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 established a super-exclusive directed fishery for lingcod 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 2009, lingcod bag limits for all anglers were one fish per day, one in possession. There were no size limits for resident anglers. Nonresident anglers were allowed to keep only fish between 30 and 35 inches and 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 have been established for recreational lingcod fisheries in **Southcentral Alaska** in light of the lack of quantitative stock assessment information. Resurrection Bay is closed to lingcod fishing year-round to rebuild the population, although no formal rebuilding plan is in place. The season is closed region-wide from January 1 through June 30 to protect spawning and nest guarding lingcod. Daily bag limits are 2 fish in all areas except the North Gulf, where the daily bag limit is one fish. All areas except Kodiak have a minimum size limit of 35 inches to protect spawning females (Contact Scott Meyer).

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 longline fishery (35% limit), bycatch in the other longline fisheries and as bycatch in the salmon troll fishery. At the 2009 Board of Fisheries meeting a regulation regarding lingcod bycatch was written such that managers in southeast can adjust the bycatch levels in- season to maximize the opportunity for current bycatch allocations to be met. 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 130 mt of lingcod in 2009 and an additional 81 mt was landed as bycatch in other fisheries. The halibut longline fishery accounted for roughly 60% of lingcod bycatch in the Southeast Region and the salmon troll fishery accounted for 17%.

Central Region commercial lingcod harvests have primarily occurred in the North Gulf District of Cook Inlet and PWS. In 2009, the Cook Inlet GHL was 24 mt and the PWS GHL was 15 mt. Lingcod harvests in 2009 totaled 8.7 mt in Cook Inlet and 29 mt in PWS. The majority of the lingcod harvest in both areas resulted from bycatch to other directed (primarily halibut) longline fisheries. Both Inside and Outside Districts of PWS closed when the total harvest was approximately 18.6 mt and the balance of the harvest was bycatch to ongoing longline fisheries.

No directed effort occurred for lingcod in the **Westward Region** during 2009. 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, and 39 mt in 2009. The majority of the harvest occurred in the Kodiak Area with a minor amount occurring in the Chignik Area.

Recreational lingcod harvest is estimated in numbers of fish. Estimates of the 2009 harvest are not yet available from the statewide mail survey, but in 2008 an estimated 11,899 lingcod were harvested in Southeast Alaska while 24,708 lingcod were taken in Southcentral Alaska. The average estimated annual harvest for the most recent five-year period (2004-2008) was 16,526 fish in Southeast Alaska and 19,812 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.

A data summary was conducted on skate species collected during **Central Region** historical large-mesh trawl, small-mesh trawl, and longline surveys, and commercial fisheries. The project 1) compiled historical ADF&G, NMFS, survey catch and biological data on skate species groups for southcentral Alaska; 2) summarized data to describe the spatial and temporal patterns of survey and fishery catches, and assessed spatial and temporal size and sex distributions for skate species; 3) assessed the feasibility of using ADF&G bottom trawl survey data to produce area-swept estimates of skate biomass; and 4) guided the collection of additional biological data on skate species. This data summary represented a first look at skate distribution, size composition, and survey catch-effort trends for Central Region. Strong regional trends were detected both within and among species and bathymetric trends among species. There were 3,509 skates sampled for biological data (size, weight, and maturity) and 1,595 vertebra collected for age

determination. Age structures were sent to the NMFS, AFSC and Moss Landing Marine Lab. Results of the life history studies are now published on big and longnose skates (*Raja binoculata* and *R. rhina*, respectively). Biomass estimates for those two species were derived from the ADF&G biennial trawl survey in PWS and used to provide a fishery opportunity in 2009 for skates in PWS.

In 2009 Central Region received a capital budget increment of $55K to conduct a trial fishery for big and longnose skates in PWS. Fishery GHLs based upon trawl survey density data were used to set Inside District GHLs of 9 mt for big and 50 mt lb for longnose skates. Trawl survey density data were extrapolated based upon area to the Outside District and yielded GHLs of 13.6 mt and 68 mt for big and longnose skates. The fishery was announced with a registration deadline in order to gauge participation and commissioner's permits with stipulations for logbooks, reporting requirements and accommodation of a department observer were issued to 23 vessels. Management for the relatively small GHLs for big skate proved problematic with one GHL exceeded by a single landing. Five trips were observed and most deliveries sampled for size and sex. A total of 224 vertebrae samples were collected for age determination. Harvests of big skate totaled 21.4 mt and 37.6 mt from the Inside and Outside Districts. Longnose skate GHLs were not achieved in either district and harvest totaled 31.2 mt and 27.0 mt from the Inside and Outside Districts respectively. Work on a "Developing Fisheries" policy, intended to reduce the potential for a fishery to escalate beyond management control, has halted at present.

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 effort in Southcentral Alaska and creel surveys and port sampling in Southeast Alaska. These data are provided annually to the International Pacific Halibut Commission for use in an annual stock assessment, and to the North Pacific Fishery Management Council. The council has used the information in the design and analysis of regulations for the sport charter fishery.

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. These database projects are error-checking, reformatting, and consolidating survey data for all years so they can be captured in a standardized database format to facilitate convenient access for analyses and timely reporting. 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 of Fish and Game 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.

In 1997 at the Southeast Groundfish meeting, the Board of Fisheries adopted a regulation that requires all groundfish fishermen to complete mandatory logbook pages while fishing. These logbook pages must be submitted as part of their landing record and attached to their fish ticket at delivery. The Board also requires that fishermen obtain a conditional use permit when fishing for any species for which specific regulatory language is not in effect. This will allow ADF&G to deny permits for some species and allow exploratory or controlled fishing for others.

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 2009 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	Tr	9	138	Tr	148
2006	43	32	1	12	167	1	181
2007	32	31	Tr	19	165	1	184
2008	27	32	1	16	101	Tr	118
2009	29	34	1	18	132	2	153

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 state of Alaska Department of Fish and Game 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** we have several projects that 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 2009 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

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 2008, 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, pink, and chum salmon, pelagic rockfish, yelloweye rockfish, other rockfish, lingcod, 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.

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Commercial Fishery Division Home Page: http://www.cf.adfg.state.ak.us/
News Releases: http://www.adfg.state.ak.us/news/dept_news.php
Sport Fish Division Home Page:
http://www.sf.adfg.state.ak.us/statewide/sf_home.cfm
Sport Fish Division Southcentral Region Halibut and Groundfish Program:
http://www.sf.adfg.state.ak.us/region2/groundfish/gfhome.cfm
Age Determination Unit Home Page: http://tagotoweb.adfg.state.ak.us/ADU/default.asp
Region 1 Groundfish Home Page:
http://www.cf.adfg.state.ak.us/region1/finfish/grndfish/grndhom1.php
Region II Groundfish Home Page:
http://www.cf.adfg.state.ak.us/region2/finfish/grndfish/grndhom2.php
ADF&G Groundfish Overview Page:
http://www.cf.adfg.state.ak.us/geninfo/finfish/grndfish/grndhome.php.
Commercial Fisheries Entry Commission: http://www.cfec.state.ak.us/
State of Alaska home page: http://www.state.ak.us/
Gene Conservation Laboratory Home Page:
http://www.cf.adfg.state.ak.us/geninfo/research/genetics/genetics.php
Demersal shelf rockfish stock assessment document:
http://www.afsc.noaa.gov/refm/docs/2009/GOAdsr.pdf
Adobe PDF versions of groundfish charts can be viewed or downloaded at
http://www.cf.adfg.state.ak.us/geninfo/statmaps/charts.php

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APPENDIX I. ALASKA DEPARTMENT OF FISH AND GAME PERMANENT FULL-TIME GROUNDFISH STAFF DURING 2009.

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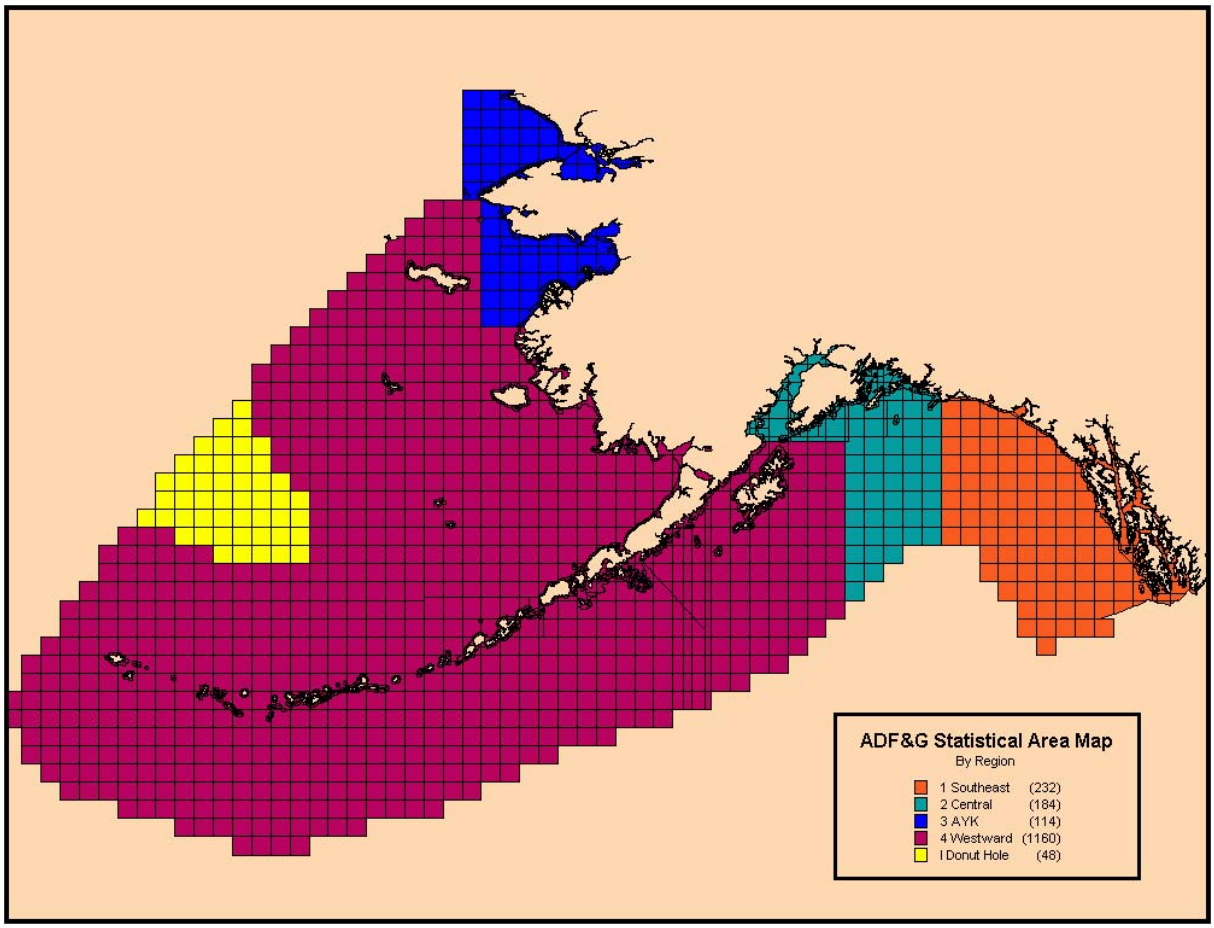
Appendix II. Map Depicting State of Alaska Commercial Fishery Management Regions.



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
	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

Species	Location	Year	Sample size	Tissues
	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
Walleye pollock *Theragra chalcogramma*				
	Exact location unknown; see comments	199	402	fin

Species	Location	Year	Sample size	Tissues
		7		
	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