STATE OF ALASKA
GROUNDFISH FISHERIES

ASSOCIATED INVESTIGATIONS IN 2017

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A. Description of the State of Alaska commercial groundfish fishery program (Division of Commercial Fisheries)

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 nautical miles offshore along the outer coast. A provision in the federal Gulf of Alaska (GOA) Groundfish Fishery Management Plan (FMP) gives the State of Alaska limited management authority for demersal shelf rockfish (DSR) in federal waters east of 140^{o} W. longitude. The North Pacific Fisheries Management Council (Council) acted in 1997 to remove black and blue (now called deacon) rockfish from the GOA FMP. In 2007, dark rockfish was removed from both the GOA and the Bering Sea and Aleutian Islands (BSAI) FMP. Thus, in these areas the state manages these species in both state and federal waters. The state also manages the lingcod resource in both state and federal waters of Alaska. The state manages some groundfish fisheries occurring in Alaska waters in parallel with NOAA Fisheries, adopting federal seasons and, in some cases, allowable gear types as specified by NOAA Fisheries. 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 (EEZ) equidistant 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.

1. Southeast Region

The **Southeast Region** Commercial Fisheries groundfish staff are located in Sitka, Juneau, and Petersburg. Sitka staff is comprised of a fishery biologist, one full-time fishery technician, and a seasonal technician. Staff in Juneau includes the project leader and one full-time fishery biologist, and Petersburg staff includes two fishery biologists and a seasonal fishery technician. In addition, the project provides support for port samplers in Ketchikan to allow sampling of groundfish landings. The project also receives biometric assistance from ADF&G 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 GOA as well as in federal waters for demersal shelf rockfish DSR; black, deacon, and dark rockfishes; and lingcod. The project cooperates with the federal government for management of the waters of the adjacent EEZ. The project leader attends annual meetings of the Council's GOA Groundfish Plan Team and produces the annual stock assessment for DSR for consideration by the 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. Three resource assessment surveys and a marking survey were conducted in 2017. The ADF&G vessel the R/V *Medeia* is home ported in Juneau and is used to conduct the biennial sablefish marking survey, which was conducted in 2017.

2. Central Region

The **Central Region** groundfish staff is headquartered in Homer and consists of a regional groundfish/shellfish management biologist, a regional groundfish/shellfish research project leader, a groundfish port sampling and age reading coordinator, who also serves as the assistant area management biologist, a groundfish/shellfish fish ticket processing and data analysis position, one groundfish/shellfish research biologist, one GIS analyst, three to four seasonal technicians, and one commercial groundfish sampler, who also serves as the primary groundfish age reader. A seasonal commercial groundfish sampler is located in Cordova and in Seward. Regional support is located in Anchorage. The regional groundfish management biologist serves as a member of the Council's GOA Groundfish Plan Team, the groundfish/shellfish research biologist serves on the Council's Scallop Plan Team, and the research project leader serves as a member of the Kasitsna Bay Lab Science Board. The R/V *Pandalus*, home ported in Homer, and the R/V *Solstice*, in Cordova, conduct a variety of groundfish and shellfish research activities in Central Region waters.

Groundfish staff responsibilities include research and management of groundfish species harvested in state waters of **Central Region,** which includes Cook Inlet and PWS areas, as well as in federal waters for black, deacon, and dark rockfishes, and lingcod. Within Central Region, groundfish species of primary interest include sablefish, Pacific cod, walleye pollock, lingcod, rockfishes, skates, sharks, and flatfishes. Data are collected through commercial groundfish sampling, fishermen interviews, logbooks, onboard observing, and through ADF&G trawl, pot, and remotely operated vehicle (ROV) surveys. Commercial harvest information (fish tickets) is processed in Homer for state and federal fisheries landings in Central Region ports. For some fisheries, logbooks are required, and data is collected and entered into local databases to provide additional information, including catch composition, catch per unit effort, depth, and location data.

3. Westward Region

The **Westward Region** Groundfish management and research staff are 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, an assistant groundfish research project biologist, a groundfish dockside sampling program coordinator, a groundfish dockside sampling program assistant biologist, a lead trawl survey biologist, an assistant trawl survey biologist, two seasonal fish ticket processing technicians, and several seasonal dockside sampling technicians. An area management biologist, an assistant area groundfish management biologist and a seasonal fish ticket processing technician are located in the Dutch Harbor office. Seasonal dockside sampling also occurs in Chignik, Sand Point, and King Cove. The R/V *Resolution*, R/V *K-Hi-C*, and R/V *Instar* hail from Kodiak and conduct a variety of groundfish related activities in the waters around Kodiak, the south side of the Alaska Peninsula, and in the eastern Aleutian Islands.

Major groundfish activities include: fish ticket editing and entry for approximately 15,000 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 interviews and biological data collections from commercial groundfish landings; and a number of research projects. In addition, the

Westward Region has a member on the Council's GOA Groundfish Plan Team (Nathaniel Nichols).

4. Headquarters

    a. Alaska Fisheries Information Network

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 ADF&G statewide, AKFIN contract, and the PSMFC sponsored AKFIN Support Center (AKFIN-SC) in Portland, Oregon. ADF&G has primary responsibility for the collection, editing, maintenance, analysis, and dissemination of these data and performs this responsibility in a comprehensive program.

The overall goal of ADF&G's AKFIN program is to provide accurate and timely fishery data that are essential to management, pursuant to the biological conservation, economic and social, and research and management objectives of the FMPs for groundfish and crab. The specific objectives related to the groundfish fisheries are: to collect groundfish fishery landing information, including catch and biological data, from Alaskan marine waters extending from Dixon Entrance to the BSAI;

1) 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;
2) to provide the support mechanisms needed to collect, store, and report commercial groundfish harvest and production data in Alaska;
3) to integrate existing fishery research data into secure and well-maintained databases with consistent structures and definitions;
4) to increase the quality and accuracy of fisheries data analysis and reporting to better meet the needs of ADF&G personnel, AKFIN partner agencies, and the public, and to make more of this information available via web-access while maintaining the department's confidentiality standards;
5) to provide GIS services for AKFIN fishery information mapping to ADF&G Division of Commercial Fisheries personnel and participate in GIS and fishery data analyses and collaboration with other AKFIN partner agencies; and
6) to provide internal oversight of the AKFIN contract between the ADF&G and the PSMFC.

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

The foundation of the state's AKFIN project is an extensive port sampling system for collection and editing of fish ticket data from virtually all 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 the

collection of biological data on the species landed. Age determination is based on samples of age structures collected from landed catches. A dockside sampling program provides for collection of accurate biological data (e.g., size, weight, sex, maturity, and age) and verifies self- reported harvest information submitted on fish tickets from shoreside deliveries of groundfish throughout coastal Alaska. In addition, the GOA Groundfish FMP and the BSAI Groundfish FMP require the collection of groundfish harvest data (fish tickets) in the North Pacific. The AKFIN program is necessary for management and for the analytical and reporting requirements of the FMPs.

The state's AKFIN program is supported by a strong commitment to development and maintenance of a computer database system designed for efficient storage and retrieval of the catch and production data on a wide area network and the internet. It supports the enhancement of the fish ticket information collection effort including regional fishery monitoring and data management; GIS database development and fishery data analysis; catch and production database development and access; the Age Determination Unit laboratory; database management and administration; fisheries data collection and reporting; 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. Groundfish landings are submitted electronically from the interagency electronic reporting system, eLandings, to the eLandings repository database. Signed copies of the fish tickets are submitted to the local office offices of ADF&G within seven days of landing. Data are reviewed, compared to other observations, edited, and verified. Once data are processed by local staff members, the fish ticket data are pulled into the ADF&G database of record; the statewide groundfish fish ticket database. Fish ticket data are immediately available to in-season management via the analysis and reporting tool, OceanAK. Verified fish ticket data are also available immediately after processing from this tool, as well.

Within the confines of confidentiality agreements, raw data are distributed to the National Marine Fishery Service (NOAA Fisheries, both the Alaska Regional office and the Alaska Fishery Science Center), the Council, the Commercial Fisheries Entry Commission (CFEC), and the AKFIN Support Center on a regularly scheduled basis. Summary groundfish catch information is also provided to the Pacific States Fisheries Information Network (PACFIN), the State of Alaska Board of Fisheries (BOF), NOAA Fisheries, Council 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.

Groundfish fishery milestones for this ongoing ADF&G AKFIN program are primarily the annual production of catch records and biological samples. In calendar year 2017, ADF&G AKFIN personnel processed 15,433 groundfish fish tickets, collected 27,509 groundfish biological samples and measured 13,977 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 personnel are representative of the level of annual productivity by the AKFIN program since its inception in 1997 (Contact Lee Hulbert).

Groundfish Fish Tickets Processed - Calendar Year 2017

ADF&G Region	
1 - Southeast	2,539
2 - Central	2,340
4 - Westward; Kodiak, AK Pen.	8,520
4 - Westward; BSAI	1,172
Total	14,571

Groundfish Biological Data Collection - Calendar Year 2017

ADF&G Region	AWL Samples Collected	Age Estimates Produced by Regional Personnel	Age Estimates Produced by the Age Determination Unit
1 - Southeast	6,171	none	5,096
2 - Central	11,637	1,634	773
4 - Westward	9,240	3,737	n/a
Total	27,048	5,371	5,869

b. Interagency Electronic Reporting System - eLandings (Contact Gail Smith).

ADF&G maintains a commercial harvest database, based on landing report receipts – fish tickets. These data are comprehensive for all commercial salmon, herring, shellfish, and groundfish from 1969 to present. Data are stored in an Oracle relational database and available to statewide staff via the OceanAK reporting tool. Data are transferred annually to the Commercial Fisheries Entry Commission, where additional license and value information is merged with all fish ticket records. Once completed, the data are provided to the AKFIN support center, then summarized and made available to PACFIN.

Beginning in 2001, the agencies tasked with commercial fisheries management in Alaska (ADF&G, NOAA Fisheries, IPHC) began development of consolidated landing, production, and IFQ reporting from a sole source – the Interagency Electronic Reporting System (IERS). The goal is to move all fisheries dependent data to electronic reporting systems. The web-based reporting component of this system is eLandings**.** The desktop application for the at-sea catcher processor fleet is seaLandings. Vessels using the seaLandings application email landing and production reports to the centralized database as an email attachment. tLandings was developed to address electronic reporting on-board groundfish and salmon tender vessels. The application and the landings reports are stored on a portable thumb drive and are delivered to the shoreside processor for upload to the eLandings repository database. Fisheries management agencies use a separate application, the IERS Agency Interface, to view and edit landing reports. The IERS management/ development team have implemented an electronic logbook application, eLogbook, currently used by groundfish catcher processors and longline catcher vessels. The eLogbook will be expanded to be used for all federal groundfish and crab catcher vessels, in the near future. The IERS has been successfully operated in Alaska's commercial fisheries since August 2005. To date, more than 900,000 landing reports have been submitted to the eLandings repository database. More than 99% of all groundfish landings are submitted electronically.

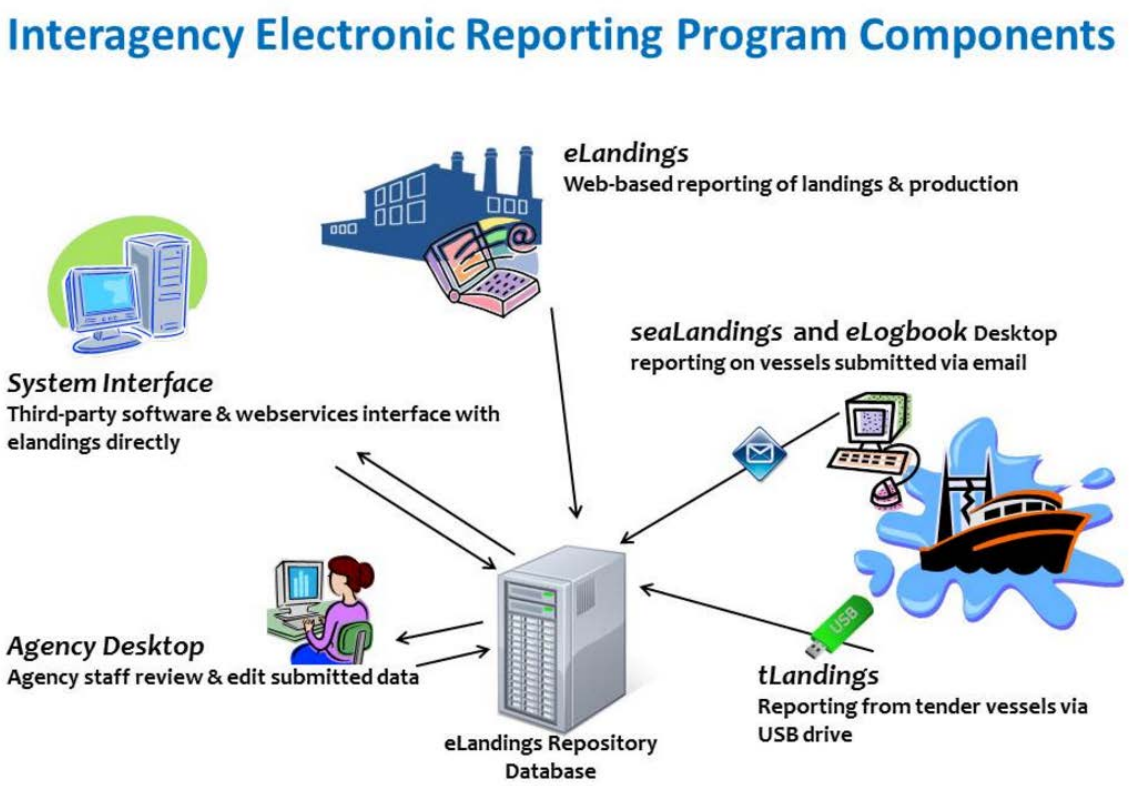


Figure 1. Data are reported by the seafood industry using eLandings web, seaLandings and tLandings. Agency staff review, edit and verify landing and production reports within the eLandings agency desktop tool. Industry can pull harvest data for their company from the database using the eLandings system interface tools.

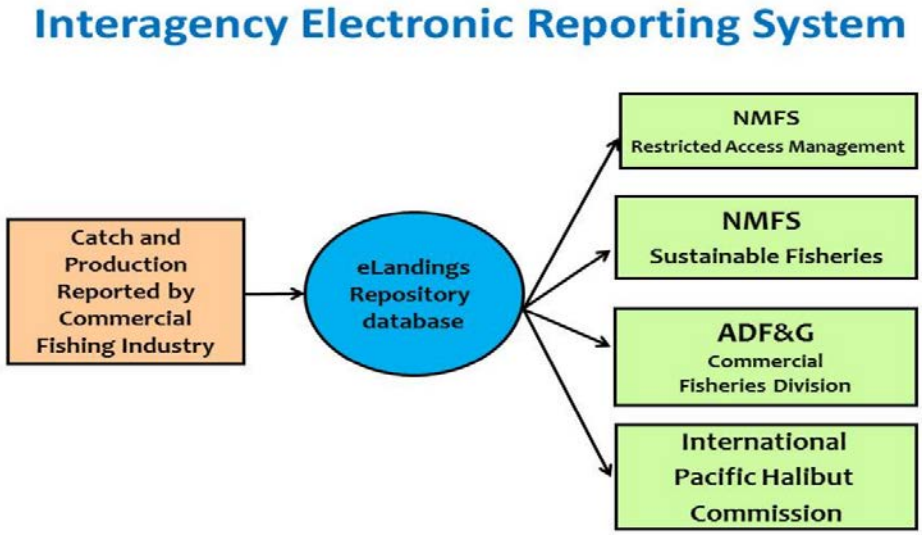


Figure 2. Interagency staff have established methods to pull data from the repository database into their databases of record. The ADF&G fish ticket records are pulled into the commercial fisheries fish ticket database once data verification has occurred.

Our approach, throughout this project, has been staged implementation which allows a small staff to successfully manage this ambitious project. Salmon fisheries are more diverse and seasonal than groundfish and crab fisheries. ADF&G will always support conventional, paper-based reporting for smaller buyers and processors. In November 2015, ADF&G adopted a regulation to require

larger seafood processors to use the tLandings application for all tendered salmon. All tendered groundfish must be reported using the tLandings application, as well. During the 2017 salmon season, 95.4% percent of all salmon landings were submitted electronically. Implementation of statewide electronic reporting of shellfish and herring fisheries will be addressed in 2018.

The IERS features include electronic landing and production reports, real time quota monitoring, immediate data validation, and printable (.pdf) fish ticket reports. The IERS provides processors with web-based electronic catch and production data extraction using an XML output. ADF&G personnel, funded by AKFIN, Rationalized Crab Cost Recovery funds, and IFQ Halibut/Sablefish Cost Recovery funds, participate in the IERS project on the development, implementation, and maintenance levels. During 2017, the IERS recorded 207,213 landing reports in crab, groundfish and salmon fisheries.

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

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

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

Detailed data are distributed to the State of Alaska CFEC annually. As outlined in State of Alaska statue, 16.05.815, detailed groundfish data are available to the NOAA Fisheries-Alaska regional office from the eLandings repository database. The AKFIN Support Center receives groundfish data on a monthly schedule, which is summarized and provided to PACFIN. 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 Council, NOAA Alaska Science Center staff, and summarized data to PACFIN. Summary groundfish catch information is also posted on the ADF&G Commercial Fisheries website:

http://www.cf.adfg.state.ak.us/geninfo/finfish/grndfish/grndhome.php. Summarized data are provided to the BOF, the Council, and to the State of Alaska legislature as requested.

5. 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).

6. Age Determination Unit

The Mark, Tag, and Age (MTA) Laboratory's Age Determination Unit (ADU) is the statewide groundfish and invertebrate age reading program based out of Juneau, AK. The ADU is responsible for providing age data support to regional commercial fisheries programs to monitor population health, assess stock size and growth, and research species life history. The ADU also is responsible for monitoring and improving the quality of age data through precision testing of production data and continual training of age readers. During 2017, the ADU received 9,868 otolith sets from central and southeast Alaska commercial and survey sampling (representing 16 groundfish species). The ADU produced 9,050 ages and distributed 7,907 ages to region managers, including data from samples received in previous years but processed in 2017. Age data quality is assessed through precision monitoring using additional, independent estimates. A random 30% of specimens and reads with outlying fish and otolith size-at-age are selected for precision testing (data are compared to estimated ranges from growth models; otolith measurements are described below). Discrepancies between precision tests and original ages are resolved through development of independent age estimates by the disputing readers. During 2017, quality control procedures resulted in an additional 5,552 age estimates. Personnel learn to interpret seasonal banding patterns through training with experienced age readers and independent reading of preprocessed age structures. Trained personnel also continue to calibrate on preprocessed structures to insure consistency of age estimates. Training and calibration procedures resulted in an additional 1,060 age estimates. Given production, quality control, and training procedures, the ADU recorded 15,662 groundfish ages.

Correlations have been found between fish length, otolith morphometrics, and age. The ADU collects otolith measurements and uses them to identify and resolve age estimation, specimen sequence, data entry, and species identification errors. During processing, otolith length, height, and weight are recorded from a minimum of one age structure per fish (21,710 otoliths in 2017, representing 17 groundfish species). To identify possible age estimation errors, the ADU compares fish length, otolith weight, and age to estimated fish and otolith size-at-age ranges for lingcod, yelloweye rockfish, rougheye rockfish, shortraker rockfish, shortspine thornyhead, and sablefish. Estimated sizes-at-age were developed from von Bertalanffy and exponential growth models, and reasonable error ranges per size were entered into a database table.

To ensure consistency of age criteria across programs, the ADU exchanges specimens and data, attends workshops, and presents research through the Committee of Age Reading Experts (CARE; Working Group of the TSC). In 2017, ADU personnel attended the 2017 CARE meeting, contributed to CARE documents, functioned in CARE working groups, and participated in age structure exchanges to address agency and TSC concerns. Both K. McNeel and A. Rebert attended the 2017 CARE meeting at the Alaska Fisheries Science Center (AFSC) Sand Point facility in Seattle, WA. At the meeting, personnel reviewed yelloweye and rougheye rockfish otolith annual pattern criteria with other agencies, presented research on shortraker rockfish otolith analyses and crustacean age assessment, and attended workshops on lingcod age structure preparation as well as rougheye rockfish pattern interpretation and shape analysis. During the meeting, K. McNeel fulfilled his role as the CARE secretary by recording the meeting minutes for TSC and CARE reporting, was elected as the chair of CARE for the 2017-2019 term and presented the online CARE database for age related publications developed by the MTAL. In addition to the meeting, the ADU initiated two rougheye rockfish otolith exchanges with AFSC and the Northwest Fisheries Science Center in Newport, OR (NWFSC), one yelloweye rockfish exchange with NWFSC, Washington Department of Fish and Wildlife (WDFW), and ADF&G-Homer, and one lingcod otolith exchange with WDFW.

The ADU is funded by State of Alaska, AKFIN, and special project support. In fiscal year 2017 and 2018, approximately 51% of funding was provided by the State of Alaska, 30% by AKFIN, and 19% from research grants. During 2017, the ADU employed seven people (approximately 77 man months) to age, process samples, enter data, maintain sample archives, measure samples, and complete other support tasks for both groundfish and invertebrates.

B. Description of the State of Alaska sport groundfish fishery program (Division of Sport Fish)

ADF&G manages all sport groundfish fisheries within the internal waters of the state, in coastal waters out to three miles offshore, and throughout the EEZ. The Alaska BOF 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 that stipulate that states may regulate fisheries that are not regulated under a federal FMP or other applicable federal regulations. No sport fisheries are included in the GOA FMP.

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

Regional programs with varying objectives address estimation of sport 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.

1. Southeast Region

The Southeast Region extends from the EEZ boundary in Dixon Entrance north and westward to Cape Suckling, at approximately 144^{o} W. longitude. Regional staff in Douglas coordinate a data collection program for halibut and groundfish in conjunction with a regionwide Chinook salmon harvest studies project. The project leader, the project biometrician, and the project research analyst are based in Juneau. Beginning in 2014, the Area Management Biologists in Yakutat, Juneau, Sitka, Petersburg, Ketchikan, and Craig were responsible for the onsite daily supervision of the field technicians. 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.

Biological data collected included lengths of halibut, rockfish, lingcod, and sablefish, sex of lingcod, sex of black rockfish at Sitka, the sport fishery sector (charter or unguided), statistical areas fished, and other basic data. Otoliths were collected from black rockfish harvested at Sitka for estimation of age composition in 2016 and 2017. Data summaries were provided to the Alaska BOF, other ADF&G staff, the public, and a variety of other agencies such as the Council, IPHC, and NOAA Fisheries.

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.

2. Southcentral Region

The Southcentral Region includes state and federal waters from Cape Suckling to Cape Newenham, including PWS, Cook Inlet, Kodiak, the Alaska Peninsula, the Aleutian Islands, and Bristol Bay. 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 seven technicians. The research project biometrician was located in Soldotna. Ongoing assessment of sport harvest and fishery characteristics at major ports throughout the region includes interviews of anglers and charter boat operators and sampling of the sport harvest. Data collected included lengths and sex of halibut, rockfishes, lingcod, sharks, sablefish, and Pacific cod, and age structures from halibut, rockfish, lingcod, and sharks. All age reading was done in Homer, and the staff members are active participants in CARE. Seasonal technicians collected data from the sport harvest at seven major ports in the region, and two of them read rockfish and lingcod age structures. Halibut otoliths were forwarded to the IPHC for age reading.

Southcentral Region staff is responsible for management of groundfish fisheries in state and federal waters. The lack of stock assessment information for state-managed species has prevented 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. Stock status is evaluated by examining time series data on age, size, and sex composition. The lack of stock assessments, coupled with increasing effort and harvest in several groundfish sport fisheries, accentuate the need for developing comprehensive management plans and harvest strategies that include the sport and commercial sectors.

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

II. Surveys

Fishery surveys, where applicable, are addressed in research sections by species.

III. Marine Reserves

Nothing to report for 2017.

IV. Groundfish Research, Assessment, and Management

A. Hagfish

1. Research

In 2016, the Southeast Region began an opportunistic survey for *Eptatretus stoutii* and *E. deani* during the annual shrimp pot surveys to gather information on distribution and life history information including: size at maturity, fecundity, sex ratio, length, and weight frequencies. Survey sampling continued in 2017 and stations were expanded to Clarence Strait based bycatch

occurrence of hagfish during the sablefish longline survey. Samples were collected in Ernest Sound and Behm Canal using longlined 20-L bucket traps dispersed 5.5 m apart with each trap consisting of 9.5 mm escape holes, 1 kg weight, and a 102 mm entry funnel and destruct device. Each set was sampled for count-by-weight (number of hagfish and weight per trap) and a sub-sample of 5 hagfish per trap or 125 per set were frozen and sampled for biological information in the lab. To date 192 hagfish have been sampled with the largest length recordings for *E. deani* at 770 mm for females and 620 mm for males (Contact Andrew Olson).

Figure 3. Preliminary size at 50% maturity with 95% confidence intervals for male (480.3 mm, n=36) and female (506.6 mm, n=74) *E. deani* in southern Southeast Alaska.

2. Assessment

There are no stock assessments for hagfish.

3. Management

A commissioner's permit is required before a directed fishery may be prosecuted for hagfish. This permit may restrict depth, dates, area, and gear, establish minimum size limits, and require logbooks and/or observers, or any other condition determined to be necessary for conservation and management purposes. Gear is restricted to 3,000 gallons in volume using any combination of gear types included Korean style traps, buckets, and barrels per vessel. In 2017, two commissioner's permits were issued for directed fishing of hagfish in the **Southeast Region**.

4. Fisheries

The developing directed fishery for hagfish in the Southeast region has a total guideline harvest level (GHL) of 60,000 lbs. The primary species caught is *E. deani* and a market has been developing for Alaskan hagfish where they are sold for food and their skin is used to make leather

products. Currently in the **Westward**, **Central**, and **Southeast Regions** hagfish are allowed up to 20% as bycatch in aggregate with other groundfish during directed fisheries for groundfish.

B. Dogfish and other sharks

1. Research

Central Region Commercial Fisheries Division initiated research project examining the energetics of salmon sharks in the summer of 2012, which includes the concurrent application of temperature/depth transmitters and accelerometers. The department hopes to continue that work in the future. (Contact Dr. Kenneth J. 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. Interviews were conducted representing 2,222 boat-trips and 11,525 angler-days of effort targeting all species in 2017. Interviewed anglers caught 29 salmon sharks but kept only one and caught 1,482 spiny dogfish and kept 35. Length measurements were obtained from two salmon sharks and four spiny dogfish (Contact Martin Schuster).

2. Assessment

There are no stock assessments for dogfish or sharks.

3. Management

Directed fisheries for spiny dogfish in the Central and Southeast Regions are allowed under terms of a commissioner's permit. The commercial bycatch allowance in the **Southeast Region** is 35% round weight of the target species in longline and power or hand troll fisheries. Full retention of dogfish bycatch is permitted in the salmon set net fishery in Yakutat. In **Central Region**, bycatch had been set at the maximum allowable retention amount in regulation at 20% of the round weight of the directed species on board a vessel; however, from 2014 through 2017, allowable bycatch levels of all shark species in aggregate (includes spiny dogfish) were set at 15% by emergency order.

The practice of "finning" is prohibited; 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.

Sport fishing for sharks is allowed under the statewide Sport Shark Fishery Management Plan adopted by the BOF in 1998. The plan recognizes the lack of stock assessment information, the potential for rapid growth of the fishery, and the potential for over harvest, and sets a statewide daily bag limit of one shark and a season limit of two sharks of any species except spiny dogfish which have a daily bag limit of five. Sport demand for sharks continued to be low in 2017.

4. Fisheries

No applications for commissioner's permits were received in 2017, and no permits have been issued in **Central Region** since 2006. During 2017 in the Cook Inlet Area, there was zero harvest of spiny dogfish and very low harvest in PWS (0.05 mt).

Estimates of the 2017 sport harvest of sharks are not yet available, but harvest in 2016 was estimated at 24 sharks of all species in Southeast Alaska and 235 sharks in Southcentral Alaska. The precision of these estimates was relatively low; the Southeast estimate had a CV of 53% and the Southcentral estimate had a CV of 33%. The statewide charter logbook program also required reporting of the number of salmon sharks kept in the charter fishery. Charter anglers are believed

to account for most of the sport salmon shark harvest. Logbooks indicated a charter harvest of two salmon sharks in Southeast Alaska and eight salmon sharks in Southcentral Alaska in 2016.

C. Skates

1. Research

A population abundance index from the PWS bottom trawl survey is generated for three skate species each year of that survey. The survey occurs in Eastern PWS and the time series begins in 1999 for big and longnose skates and 2001 for Bering skate. Aleutian skates are also captured in the survey, but their occurrence is too low to estimate abundance. Bering skate catch per unit effort (CPUE) in 2017 continued an increasing trend since 2007. Big skate CPUE in 2017 was similar to the previous two surveys being at time-series highs. Longnose skate CPUE fell to a survey low in 2017 (Contact Dr. Kenneth J. Goldman and Mike Byerly).

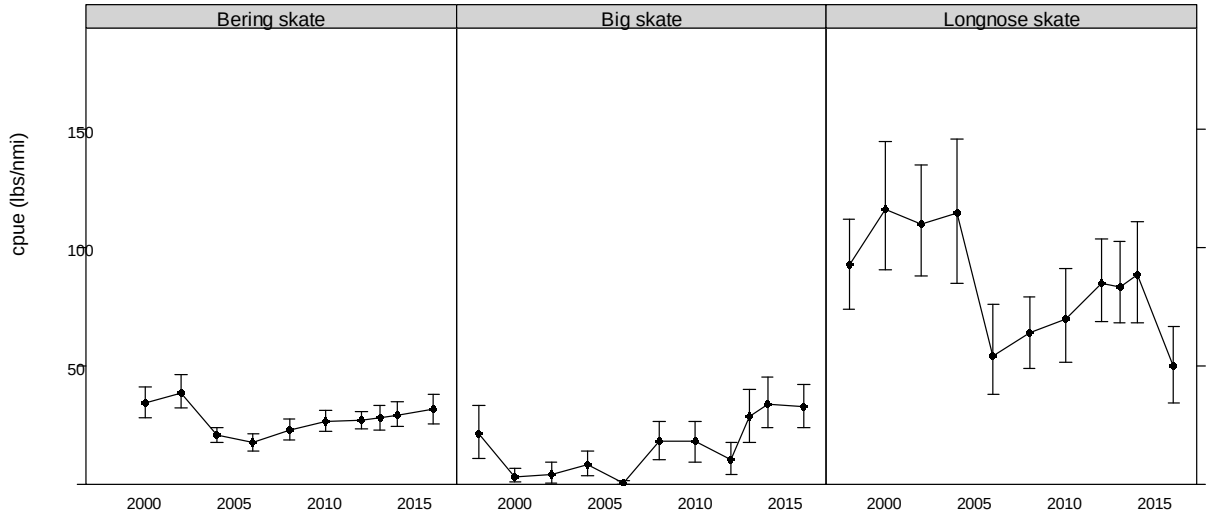


Figure 4. Trawl survey CPUE estimates of skates with 90% confidence intervals in Eastern PWS.

2. Assessment

There are no stock assessments for skates.

3. Management

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 to be necessary for conservation and management purposes.

4. Fisheries

Currently in **Central Region**, skates are harvested as bycatch and had been allowed up to 20% during other directed groundfish fisheries until that allowable amount was reduced to 15% in 2014 and then reduced again by emergency order in 2016 to 5% to align with the National Marine Fisheries Service (NMFS) change in maximum retainable allowances for skates in the GOA. A directed fishery in the PWS for big and longnose skates was prosecuted under the authority of a commissioner's permit in 2009 and 2010. However, the fishery was deemed unsustainable, and no

permits were issued thereafter. The permit stipulated seasons, district, gear, and a logbook requirement. In the Cook Inlet Area, combined big and longnose skate harvest as bycatch was 12.5 mt in 2017, nearly half the 2016 harvest, and continuing a steady decline since 2015. In PWS, skate harvest was 18.1 mt, less than half the 2016 harvest, also continuing a steep decreasing trend since 2015. Due to bycatch limits being set as a percentage of the targeted species, harvest levels of the target species may affect the amount of bycatch that are legally harvested.

In **Southeast Region**, skate landings in internal waters of Northern Southeast Inside (NSEI) and Southern Southeast Inside (SSEI) fluctuated with low harvest in 2017 of 8.2 mt and a high in 2016 of 16.5 mt. Skate harvest fluctuates with current market value.

D. Pacific cod

Catch rate and biological information are 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.

1. Research

Pacific cod are captured in **Central Region** Tanner crab bottom trawl surveys. A population abundance index from the PWS bottom trawl survey is generated each year with coefficient of variation's (cv's) ranging from 0.16 to 0.36 and averaging 0.26. The survey occurs in Eastern PWS and the Pacific cod time series begins in 1991. Estimated CPUE was down in 2017 to the third lowest in the time series.

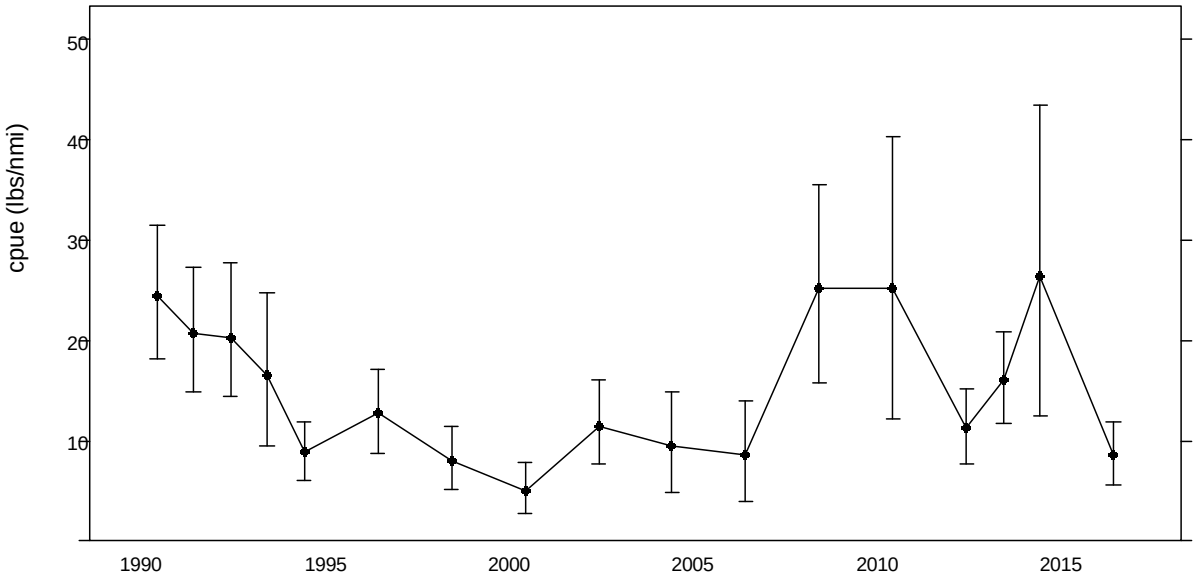


Figure 5. Trawl survey CPUE estimates of Pacific cod with 90% CIs in Eastern PWS.

In the **Central Region**, skipper interviews and biological sampling of commercial Pacific cod deliveries from PWS and Cook Inlet areas during 2017 occurred in Homer, Seward, and Whittier. Sample data collected included date and location of harvest, species, length, weight, sex, and gonad condition. Otoliths were collected from approximately 20% of sampled fish. Data are provided to NMFS for use in stock assessment (Contact Elisa Russ).

2. Assessment

No stock assessment programs were active for Pacific cod during 2017.

3. Management

The internal waters of Southeast Alaska are comprised of two areas, NSEI Subdistrict and SSEI Subdistrict. The GHR was based on average historic harvest levels rather than on a biomass-based acceptable biological catch (ABC) estimate. This fishery has the most participation in the winter months, and in-season management actions such as small area closures are implemented to spread out the fleet and reduce the risk of localized depletion. 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 the GOA, Pacific cod Management Plans area established for fisheries in five groundfish areas: **Prince William Sound**, **Cook Inlet**, **Kodiak**, **Chignik** and **South Alaska Peninsula**. Included within the plans are season, gear and harvest specifications. Initially the state-waters fisheries were restricted to pot or jig gear to minimize halibut bycatch and avoid the need to require onboard observers in the fishery. However, in PWS the use of longline gear has been permitted since 2009 in response to the very low levels of effort and harvest by pot and jig gear and the high level of interest from the longline gear group. Guideline harvest levels (GHL) are further allocated by gear type.

The annual GHLs are based on the estimate of ABC of Pacific cod as established by the Council. Current GHLs are set at 25% of the Central Gulf ABC, apportioned between the Kodiak, Chignik, and Cook Inlet Areas, 25% of the Eastern Gulf ABC for the PWS Area, and 30% of the Western Gulf Pacific cod ABC for the South Alaska Peninsula Area.

Additional regulations include a 58-foot OAL vessel size limit in the Chignik and South Alaska Peninsula Areas. The BOF also adopted a harvest cap for vessels larger than 58 feet that limited harvest to a maximum of 25% of the overall GHL in the Cook Inlet and Kodiak Areas. The fishery management plans also provided for removal of restrictions after October 31 on exclusive area registrations, vessel size, and gear limits to increase late season harvest 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 the **Bering Sea/Aleutian Islands area**, a Pacific cod Management Plan for a nonexclusive Aleutian Islands District, west of 170° W longitude, state-waters fishery has been adopted. Included within the plan are season, gear and harvest specifications. The fishery GHL is set by regulation at 27% of the Aleutian Islands ABC for Pacific cod.

Currently, on January 1, the Aleutian Islands state-waters Pacific cod season opens in the Adak Section, between 175° W long and 178° W long, to vessels 60 feet OAL or less using trawl, pot, and jig gear, and vessels 58 feet OAL or less using longline gear. The state waters of the Aleutian Islands Subdistrict, west of 170° W long, open 4 days after the closure of the federal Bering Sea-Aleutian Islands A season for catcher-vessel trawl fishery is closed, or 4 days after the federal Aleutian Islands Subarea non-CDQ season is closed, or March 15, whichever is earliest. When waters west of 170° W long are open, trawl vessels may not be greater than 100 feet OAL, pot vessels may not be greater than 125 feet OAL, and vessels using mechanical jig or longline gear not greater than 58 feet OAL.

A state-waters Pacific cod fishery management plan has also been adopted in waters of the Bering Sea near Dutch Harbor. The **Dutch Harbor Subdistrict** Pacific cod season is open to vessels 58 feet or less OAL using pot gear, with a limit of 60 pots. The fishery GHL is set at 6.4 percent of

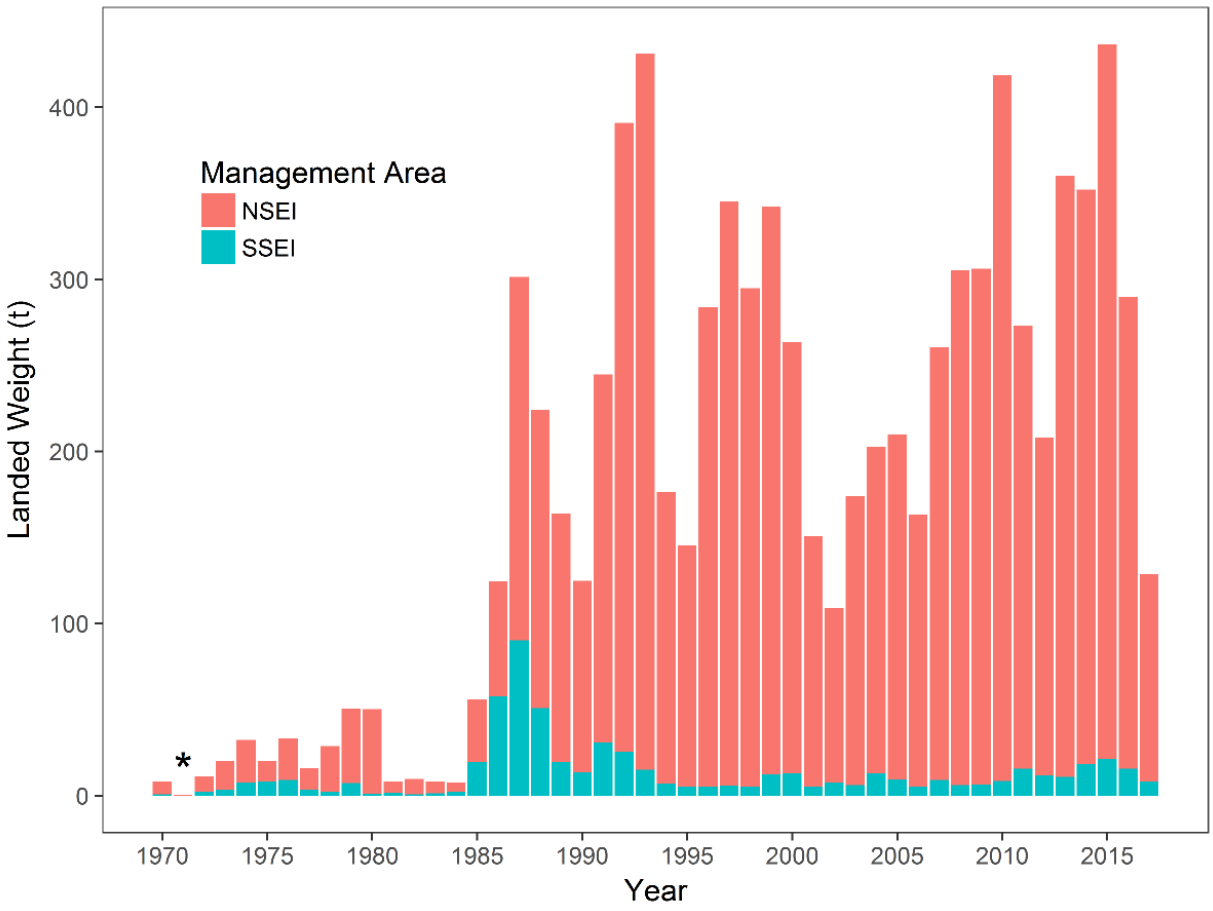
the Bering Sea ABC for Pacific cod. The season opens seven days after the federal Bering Sea–Aleutian Islands pot/longline sector's season closure, and may close and re-open as needed to coordinate with federal fishery openings. The fishery was not opened to jig gear because the federal jig season typically occurs year-round

There is no bag, possession, or size limit for Pacific cod in the sport fisheries in Alaska, and the season is open year-round. Sport harvest of Pacific cod is estimated through the Statewide Harvest Survey (SWHS). The Southcentral Region creel sampling program also collects data on cod catch by stat area (on a vessel-trip basis), and lengths of sport-caught Pacific cod. No information is collected in the Southeast Region creel survey program on the Pacific cod sport fishery.

4. Fisheries

Most of the Pacific cod harvested in **Southeast Alaska** are taken by longline gear in the NSEI Subdistrict during the winter months. For Central Region Pacific cod fisheries, the dominate gear type has been pot gear in **Cook Inlet** and longline gear in **PWS** fisheries. In 2017 in the **Westward Region** parallel Pacific cod fisheries, pot gear vessels take 69% of the total harvest, with the remainder divided between trawl, jig, and longline gear. Pot and jig gear are the only legal gear types during state-waters fisheries in the Kodiak, Chignik, and South Alaska Peninsula Areas; pot gear vessels took more than 99% of the total 2017 state-waters Pacific cod catch in these areas. In 2017 in the Aleutian Islands, trawl gear took 12%, longline gear took 26%, and pot gear took 62% of the harvest.

Prior to 1993 much of the cod taken in **Southeast Alaska** commercial fisheries 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. A total of 129 mt of Pacific cod were harvested in Southeast state-managed (internal waters) fisheries during 2017 with 107 mt harvested from the directed fishery.



*Indicates harvest by less than 3 permit holders, therefore information is confidential.

Figure 6. Annual harvest of Pacific cod in the Northern Southeast Inside (NSEI) and Southern Southeast Inside (SSEI) management areas in Southeast Alaska from 1970–2017 for the direct and bycatch fisheries.

The 2017 GHLs for the state-waters Pacific cod seasons in the Cook Inlet and PWS areas of the **Central** Region were 1,657 mt and 1,968 mt, respectively. The Cook Inlet GHL was down 12% from 2016 while the PWS GHL decreased 7%. Pacific cod harvest from the state-waters seasons was 742 mt from Cook Inlet and minimal harvest (confidential) from PWS. Low harvests in Cook Inlet were attributed to a low CPUE during the fishery, and similarly for PWS, although it was compounded in PWS because the state-waters season for longline did not open until June 17 due to the federal season in the Central GOA remaining open until the regulatory closure, leaving little to no fishing time for longline vessels to participate during the peak fishing period and also before diversifying into other fisheries (e.g. halibut, salmon). Pacific cod harvest during the 2017 parallel seasons was 775 mt from Cook Inlet and 384 mt from PWS, both down significantly from 2016. In Central Region in 2017, state-waters GHLs were not achieved by pot, longline, or jig gear, and fishing with jig was open all year in parallel fisheries. For combined Pacific cod fisheries, in Cook Inlet pot gear harvested 80% and longline gear 20% with jig gear harvesting a negligible amount, and in PWS, longline gear harvested over 99%.

In the **Westward Region**, the Kodiak Area state-waters Pacific cod GHL is based on 12.5% of the annual CGOA Pacific cod ABC while the Chignik Area GHL is based on 8.75% of the annual CGOA ABC. The 2017 South Alaska Peninsula Area state-waters Pacific cod GHL was based on 30% of the WGOA Pacific cod ABC. Legal gear is limited to pot and jig gear during state-waters Pacific cod fisheries in these three areas. The 2017 Pacific cod GHLs were 5,523 mt in the Kodiak

Area, 3,866 mt in the Chignik Area and 10,887 mt in the South Alaska Peninsula Area. Total state-waters Pacific cod catch in the Kodiak, Chignik and South Alaska Peninsula was 1,741 mt, 1,428 mt and 9,158 mt respectively. In the Aleutian Islands District state-waters Pacific cod GHL is based on 27% of the annual AI Pacific cod ABC. Legal gear is limited to non-pelagic trawl, pots, longline and jig gear during state-waters the Pacific cod fishery. The 2017 total state-waters Pacific cod catch in the Aleutian Islands District is confidential due to limited participation. The Dutch Harbor Subdistrict state-waters Pacific cod GHL is based on 6.4% of the annual Bering Sea Pacific cod ABC and is open to pot gear only. In 2017, the total state-waters catch for the Dutch Harbor Subdistrict was 15,081 mt.

Estimates of the 2017 sport harvest of Pacific cod are not yet available from the statewide harvest survey, but the 2016 estimates were 12,333 fish in **Southeast** and 31,183 fish in **Southcentral Alaska**. The estimated annual harvests for the recent five-year period (2012-2016) averaged about 15,015 fish in **Southeast** Alaska and 33,410 fish in **Southcentral** Alaska.

E. Walleye Pollock

1. Research

In the **Central Region** skipper interviews and biological sampling of PWS commercial trawl pollock deliveries during 2017 occurred in Seward and Kodiak. Sample data collected included date and location of harvest, species, length, weight, sex, and gonad condition. Otoliths were collected from approximately half of sampled fish. Homer staff determined ages of 700 pollock otoliths (Contact Elisa Russ).

Beginning in 1998, spatial patterns of genetic variation were investigated in six populations of walleye pollock from three regions: North America – Gulf of Alaska; North America – Bering Sea; Asia – East Kamchatka. The annual stability of the genetic signal was measured in replicate samples from three of the North American populations. Allozyme and mtDNA markers provided concordant estimates of spatial and temporal genetic variation. These data show significant genetic variation between North American and Asian pollock as well as evidence that spawning aggregations in the Gulf of Alaska, such as PWS, 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).

There are no bag, possession, or size limits for pollock in the sport fisheries in Alaska. Harvest of pollock is not explicitly estimated by the SWHS and no pollock harvest information is collected in charter logbooks or creel surveys in Southcentral or Southeast Alaska.

Pollock are captured in Central Region Tanner crab bottom trawl surveys. A population abundance index from the PWS bottom trawl survey is generated each year of that survey with cv's ranging from 0.15 to 0.49 and averaging 0.24. The survey occurs in Eastern PWS and the pollock series begins in 1994. Estimated CPUE was down in 2017 to a survey low.

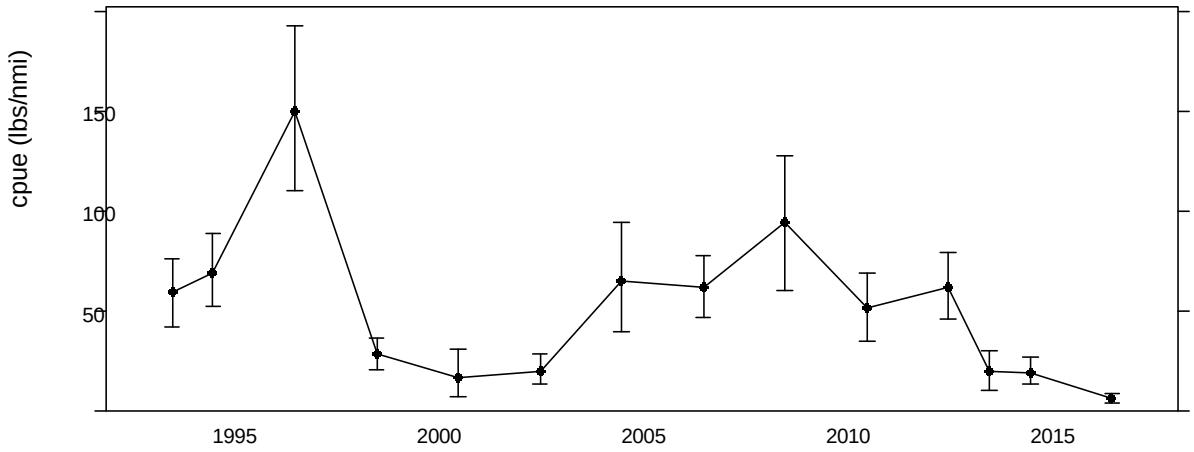


Figure 7. Trawl survey CPUE estimates of Walleye pollock with 90% confidence intervals in Eastern PWS.

2. Assessment

No stock assessment work was conducted by the department on pollock in 2016.

3. Management

Prince William Sound Area pollock pelagic trawl fishery regulations include a January 13 registration deadline, logbooks, catch reporting, check-in and check-out provisions, and accommodation of a department observer upon request. The PWS 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. In 2014, inhouse rockfish bycatch limits for this fishery were put into regulation in the Rockfish Management Plan, allowing only 0.5% rockfish bycatch during this pollock fishery. In 2013, new management measures were implemented to set the PWS pollock GHL at 2.5% of the federal Gulf of Alaska ABC. For **Cook Inlet Area,** directed fishing for pollock is managed under a "Miscellaneous Groundfish" commissioner's permit. Initiated in December 2014, a commissioner's permit fishery for pollock using seine gear was prosecuted through 2016. In **Central Region**, pollock is also retained as bycatch to other directed groundfish fisheries, primarily Pacific cod (Contact Jan Rumble).

4. Fisheries

The 2017 PWS pollock pelagic trawl fishery opened January 20 and continued until the regulatory closure on March 31. There were 15 landings made by eight vessels with a total harvest of 1,879 mt, only 40% of the 4,672 mt GHL, perhaps attributable to the smaller than average fish size (600 gram average) and low exvessel value. Rockfish bycatch during the fishery totaled 2 mt well below the 9 mt allowed as bycatch to the pollock harvested. In the Cook Inlet Area, no seine pollock commissioner's permits were issued in 2017. Pollock was harvested in **Central Region** as bycatch to other groundfish fisheries at low levels; in 2017, 3.7 mt was harvested in Cook Inlet and 1.7 mt in PWS (Contact Jan Rumble).

In Southeast, one commissioner's permit was issued to fish for pollock by purse seine. However, no fishing occurred in 2017 (Contact Mike Vaughn).

F. Pacific Whiting (hake)

1. Research

There was no research conducted on Pacific whiting (hake) in 2017.

2. Assessment

There are no stock assessments for Pacific whiting (hake).

3. Management

A commissioner's permit is required in **Central Region** and **Southeast Region** before a directed fishery may be prosecuted for Pacific Whiting (hake). This permit may restrict depth, dates, area, and gear, establish minimum size limits, and require logbooks and/or observers, or any other condition determined to be necessary for conservation and management purposes.

4. Fisheries

There was no directed fishery for Pacific whiting (hake) in 2017. There was no directed fishery for Pacific whiting (hake) in 2015. Currently in **Central Region** and **Southeast Region** Pacific whiting (hake) are considered other groundfish and are allowed up to 20% as bycatch in aggregate during directed fisheries for groundfish.

G. Grenadiers

1. Research

There was no research conducted on grenadiers in 2017.

2. Assessment

There are no stock assessments for grenadiers.

3. Management

A commissioner's permit is required in **Central Region** and **Southeast Region** before a directed fishery may be prosecuted for grenadiers. This permit may restrict depth, dates, area, and gear, establish minimum size limits, and require logbooks and/or observers, or any other condition determined to be necessary for conservation and management purposes.

4. Fisheries

There was no directed fishery for grenadiers in 2017. Currently in the **Central Region** and **Southeast Region** grenadiers are considered other groundfish and are allowed up to 20% as bycatch in aggregate during directed fisheries for groundfish.

H. Rockfishes

Commercial rockfish fisheries are managed under three assemblages: DSR, pelagic shelf (PSR), and slope rockfish. DSR include the following species: yelloweye, quillback, China, copper, rosethorn, canary, and tiger. PSR include black, deacon, dusky, dark, yellowtail, and widow. Slope rockfish contain all other *Sebastes* species. Thornyhead, *Sebastolobus* species, are defined separately; in Central Region, thornyhead rockfish harvest is combined with slope rockfish for reporting.

1. Research

In the **Southeast Region** biological samples of rockfish are collected from the directed commercial DSR fishery; sampling effort was expanded in 2008 to include the sampling of DSR caught as bycatch in the IFQ halibut fishery. The sampling of the halibut fishery was started in part to obtain more samples in years that the directed fishery was not opened. Fishery data are also collected from the logbook program, which is mandatory for all groundfish fisheries. The logbook program is designed to obtain detailed information regarding specific harvest location. In 2017, length, weight and age structures were collected from 1,573 yelloweye rockfish caught in the directed and halibut commercial longline fisheries. Bone and tissue samples were taken from five female yelloweye rockfish to conduct a pilot study to determine if hormones could be extracted from rockfish age structures within a temporal context. Preliminary results suggested that cortisol and progesterone could be extracted from subsamples of operculum and the concentrations differed across age related bands within the structure. A full proposal was sent to the North Pacific Research Board in 2016 to further investigate the use of operculum to recreate lifetime hormone profiles for individual fish (Contact Kevin McNeel).

Skipper interviews and port sampling of commercial rockfish deliveries in **Central Region** during 2017 occurred in Homer, Seward, Whittier, Kodiak, and Cordova. Efforts throughout the year were directed at the sampling of rockfish delivered as bycatch to other groundfish and halibut fisheries, primarily slope and demersal shelf species. The directed jig fishery in the Cook Inlet Area that targets pelagic rockfish begins July 1 and historically has been the focus of rockfish sampling during the last half of the year. Limited fishing effort drastically reduced sampling opportunities from 2006-2009 until an increase in effort resulted in additional sampling opportunity with sampling goals for Cook Inlet black rockfish being met 2014-2017. Additional rockfish samples were collected from bycatch fisheries in Cook Inlet and PWS with the sampling goal achieved or nearly achieved for yelloweye rockfish in both areas. Sample data collected included date and location of harvest, species, length, weight, sex, gonad condition, and otoliths. Homer staff determined ages of pelagic and demersal shelf rockfish otoliths, and otoliths from slope and Thornyhead rockfish species were sent to the ADF&G Age Determination Unit in Juneau. Additional sampling occurred during Cook Inlet and PWS research trawl surveys (Contact Elisa Russ).

Tissue samples were collected from 10 rougheye and 10 shortraker rockfish for genetic analysis in 2015 along with otoliths. Tissue was analyzed in 2016 and the results suggested that 8 of the 10 rougheye belonged to the species *Sebastes melanostictus* (commonly referred to as blackspotted rockfish), the remaining two rougheye belonged to species *S. aleutianus* (rougheye rockfish), and the 10 identified as shortraker rockfish belonged to species *S. borealis* (shortraker rockfish). These samples were mainly collected to support a larger investigation on Central Region slope rockfish otolith species identification and otolith growth, but also support future investigation on rockfish species identification and composition (Contact Kevin McNeel or Elisa Russ).

Funding for **Central Region** DSR and lingcod ROV surveys ended in 2016 and no surveys were conducted in 2017. Staff participated in the ADF&G Interdivisional Rockfish Workshop in September 2017 (see rockfish management section for details).

Rockfishes are captured in Central Region bottom trawl surveys for Tanner crab. All rockfish are sampled for length, weight, sex, and age structures. A population abundance index from the PWS bottom trawl survey is estimated for rougheye/blackspotted rockfish each year of that survey with cv's ranging from 0.16 to 0.37 and averaging 0.24. The survey occurs in Eastern PWS and the

time series begins in 1991. Estimated CPUE in 2017 was the lowest in the time series. (Contact Ken Goldman or Mike Byerly).

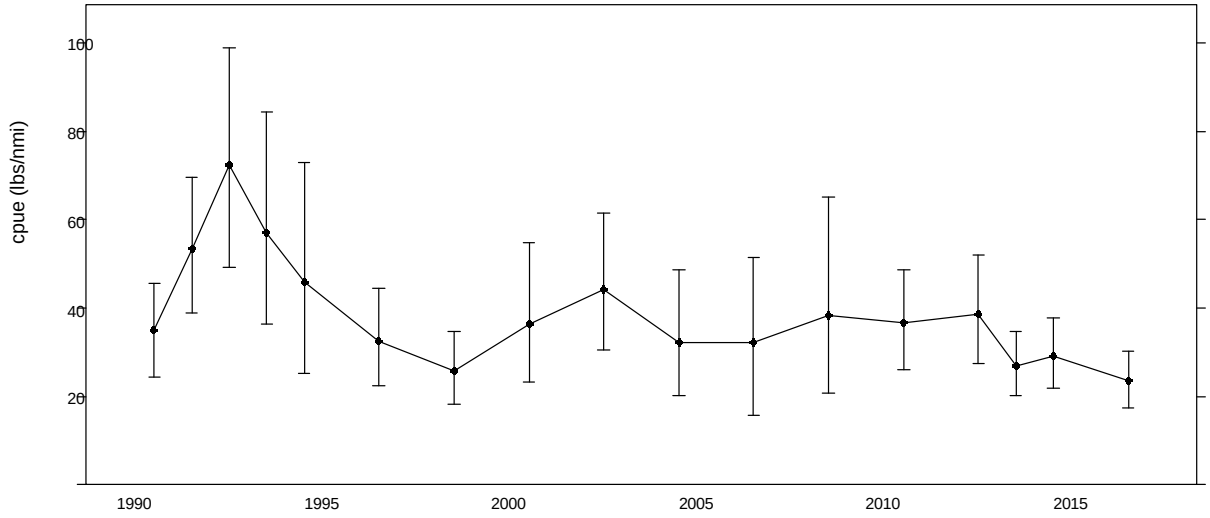


Figure 8. Trawl survey CPUE estimates of rougheye/blackspotted rockfish with 90% confidence intervals in Eastern PWS.

The **Westward Region** continued port sampling of several commercial rockfish species and Pacific cod in 2017. Rockfish sampling concentrated on black and dark rockfish with opportunistic sampling of other miscellaneous *Sebastes* species. Skippers were interviewed for information on effort, location, and bycatch. Length, weight, gonadal maturity, and otolith samples were collected (Contact Sonya El Mejjati). Staff from the Kodiak office has completed aging black rockfish otoliths through the 2016 season. Pacific cod otolith aging is ongoing.

The **Westward Region** also continued to conduct hydroacoustic surveys of black and dark rockfish in the Northeast, Afognak, Eastside, Southeast, Southwest, Westside, and Mainland districts of the Kodiak Management Area in 2017 to generate biomass estimates for both black and dark rockfish. Surveys of Northeast, Afognak, Eastside, and Southeast districts in the Kodiak Management Area will continue in 2018 (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) length composition and average weight, 3) age and sex composition of black rockfish at Sitka, and 4) biomass of total sport removals (harvest and release mortality). Primary species harvested in Southeast Alaska included yelloweye, black, copper, and quillback rockfish. A total sample size of 9,046 rockfish was obtained from the sport harvests at Ketchikan, Craig, Klawock, Wrangell, Petersburg, Juneau, Sitka, Gustavus, Elfin Cove, and Yakutat in 2017 (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 of primary species, and 3) the spatial distribution of harvest by port. The 2017 total sample size from the sport harvests at Seward, Valdez, Whittier, Kodiak, and Homer was 5,041 rockfish (Contact Martin Schuster).

The Division of Sport Fish conducted research in PWS on survival of rockfish following recompression from 2012-2017. During this time, 185 rockfish of six species (copper, quillback, yelloweye, silvergray, dark, and dusky) were caught using sport fishing gear over a range of depths and held for two days at capture depths of at least 35 m to evaluate survival. From this study it was estimated that post-recompression survival for all six species combined was >84%, which is consistent with results from studies that indicated high survival for yelloweye rockfish in PWS and other species in the Pacific Northwest. Results will be published as an ADF&G Fishery Data Series report in the coming months titled "Post-Recompression Survival of Rockfish in PWS (Contact Brittany Blain-Roth or Jay Baumer).

The **Age Determination Unit** researched Southeast Alaska yelloweye and PWS rougheye, blackspotted, and shortraker rockfish age structures. In 2017, ADF&G personnel sampled opercula and otoliths from female yelloweye rockfish collected during the NMFS Sablefish Longline Survey. Ages were estimated using otoliths and annual bands were identified on opercula. Opercula were then sent to Baylor University to be analyzed for progesterone and cortisol concentrations extracted from annual bands within a given structure. Preliminary results suggested that hormone estimates vary between annual bands and reproductive life histories may be reconstructed from the fluctuating annual concentrations (Figure 5). The Mark, Tag, and Age Laboratory is seeking funding to further investigate hormone extraction from incrementally grown hard structures as a method to reconstruct life histories of long-lived fishes (Contact Dion Oxman).

During 2017, the Age Determination Unit also continued investigating methods to identify rougheye, blackspotted, and shortraker rockfish using otolith shape analysis and to identify correlations between shortraker rockfish otolith growth and climatic events to corroborate ages and suggest climates that favor rockfish growth (Contact Kevin McNeel).

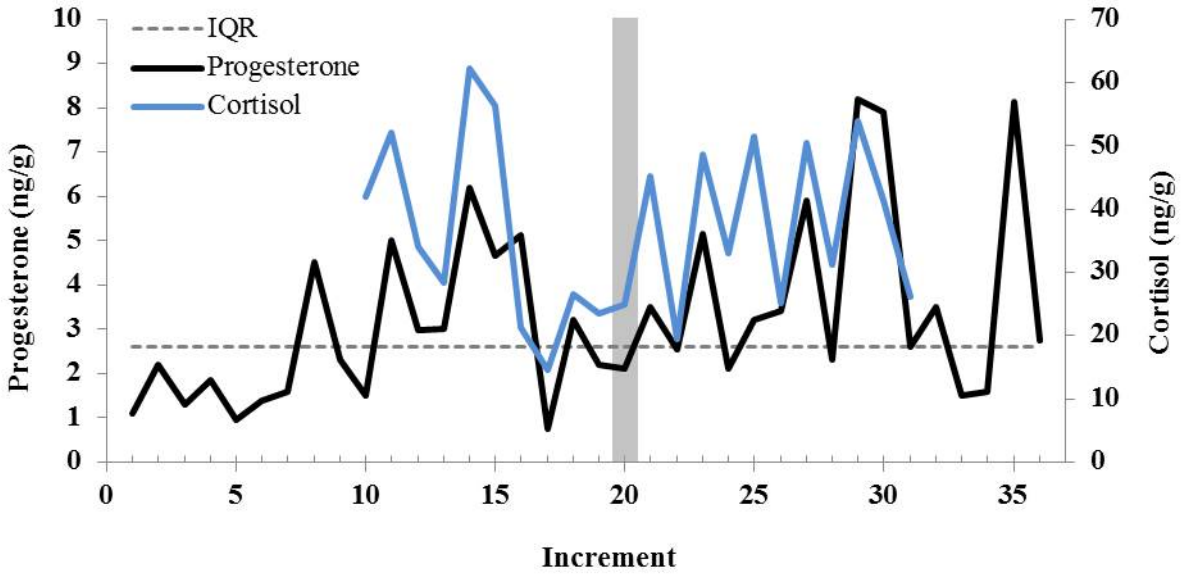


Figure 9. Progesterone (black) and cortisol (blue) concentrations recovered from annual growth increments within the operculum of a 36-year old female yelloweye rockfish via immunoassay extraction. Peak concentrations of progesterone that exceed the interquartile range (IQR; dashed line) were considered to be indicative of reproductive activity. The currently accepted age of maturity for yelloweye is highlighted in gray. Data are missing from the cortisol profile because they were used to validate immunoassay extractions.

2. Assessment

The **Southeast Region** performs multi-year stock assessments for DSR in the Southeast District. Biomass is estimated by management area as the product of yelloweye rockfish density determined from line transect surveys, the area of rocky habitat within the 100-fathom contour, and the yelloweye rockfish average weight. Yelloweye rockfish density for the stock assessment is based on the most recent estimate by management area. Yelloweye rockfish densities for each area are multiplied by the current year's average commercial fishery weight of yelloweye rockfish specific to that management area. Allowable biological catch for the SEO is set by multiplying the lower bound of the 90% confidence interval of total biomass for yelloweye rockfish by the natural mortality rate (0.02). In the past, the yelloweye biomass estimate was expanded to the entire DSR assemblage by multiplying the proportion of other DSR species in the commercial catch (2–4.0%). However, starting in 2015, the non-yelloweye DSR biomass estimate was calculated from the catch data from 2010–2014 recreational, commercial, and subsistence fisheries; the non-yelloweye ABC was added to the yelloweye ABC to obtain a total for the entire DSR assemblage. There is no stock assessment information available for DSR in NSEI and SSEI management areas, and no surveys for non-DSR species (e.g. black rockfish) have been conducted since 2002.

Prior to 2012, line transect surveys were conducted using a submersible; after that time, visual surveys have been conducted using an ROV. The last submersible surveys were conducted in 2009 in Eastern Yakutat (EYKT), 2005 in SSEO, 2007 in CSEO, and 2001 in NSEO; density estimates were derived from each of these surveys except for the NSEO management area where data were too limited to obtain a valid density estimate. Density estimates by area for the most recent submersible surveys ranged from 765 to 1,755 yelloweye rockfish per km^2 with CV estimates of 12–33%. ROV surveys were performed in collaboration with Central Region staff in 2016 in NSEO and CSEO, 2013 in SSEO, and 2015 in EYKT (Figure 6). Yelloweye rockfish density was, 701 yelloweye per km^2 (CV=20%) for NSEO in 2016, 1,101 yelloweye per km^2 (CV=14 %) for CSEO in 2016, 986 yelloweye per km^2 (CV=22%) in SSEO in 2013, and 1,072 yelloweye per km^2 (CV=21%) for EYKT in 2017. In addition, from ROV video data, we can measure fish lengths for yelloweye rockfish, lingcod, and halibut using stereo camera imaging software (SeaGIS, Ltd).

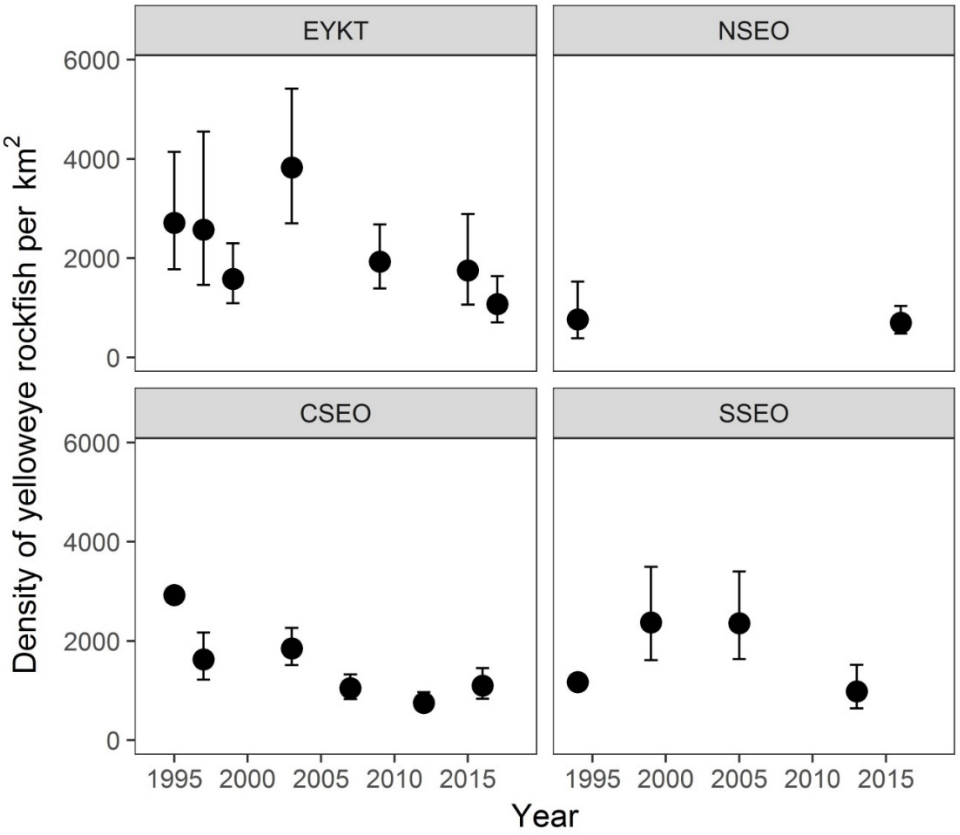


Figure 10. Density estimates of yelloweye rockfish with 90% confidence intervals in the Eastern Gulf of Alaska management areas. Management areas include: Eastern Yakutat (EYKT), Northern Southeast Outside (NSEO), Central Southeast Outside (CSEO), and Southern Southeast Outside (CSEO).

Central Region conducts ROV surveys along the northern Gulf of Alaska coast from the Kenai Peninsula to PWS to monitor the local abundance of DSR in selected index sites. No assessment surveys were conducted in 2017 (Contact Mike Byerly or Dr. Kenneth J. Goldman).

In the **Westward Region** rockfish surveys using hydroacoustic equipment were deployed to assess black and dark rockfish stocks in the Kodiak Management Area. Surveyed areas included the Northeast, Afognak, Eastside, Southeast, Southwest, Westside, and Mainland districts of the Kodiak Management Area (Contact Carrie Worton).

3. Management

Management of DSR in the **Southeast Region** is based upon a combination of GHRs, seasons, gear restrictions, and trip limits. Directed commercial harvest of DSR is restricted to hook-and-line gear. Directed fishing quotas are set for the four outside water management areas (NSEO, CSEO, SSEO, and EYKT) based on the stock assessment. Directed fishery quotas for the two internal water management areas (NSEI and SSEI) are set at 25 mt annually. Regulations adopted in 1994 include trip limits (within any five-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. The DSR directed fishery season in SEO occurs only in the winter from January 5 until the day before the start of the commercial halibut IFQ season, or until the annual harvest limit is reached whichever occurs first. Total allowable catch (TAC) is set for DSR is set after decrementing estimated subsistence harvest and the remainder is allocated 84% to the commercial sector and 16% to the sport sector. The 2017 ABC

for DSR was 227 mt, which resulted in a TAC of 220 mt with allocations of 185 mt to commercial fisheries and 35 mt to sport fisheries. The 2018 ABC is set at 250 mt, resulting in a TAC of 243 mt of which 204 mt is allocated to commercial fisheries and 39 mt is allocated to sport fisheries. Estimated subsistence harvest for 2017 and 2018 was 7 mt. A significant portion of the total commercial harvest is taken as bycatch during the halibut fishery; each year this is estimated and decremented from the commercial TAC prior to determining if a directed fishery is manageable.

Management of the commercial black rockfish fishery in the **Southeast Region** is based upon a combination of GHLs and gear restrictions. Directed fishery GHLs are set by management area and range from 11 mt in EYKT and IBS to 57 mt in SSEOC with a total GHL of 147 mt for all of SEO. A series of open and closed areas was also created for managers to better understand the effects of directed fishing on black rockfish stocks. Halibut and groundfish fishermen are required to retain and report all black rockfish caught (Contact Andrew Olson).

Rockfish in **Central Region's** Cook Inlet and PWS areas are managed under their respective regulatory Rockfish Management Plans. Plan elements include a fishery GHL of 68 mt for each area and 5-day trip limits of approximately 0.5 mt in the Cook Inlet District, 1.8 mt in the North Gulf District, and 1.4 mt in PWS. Rockfish regulations underwent significant change beginning in 1996 when the BOF formalized the GHL into a harvest cap for all rockfish species in Cook Inlet and PWS areas and adopted a 5% rockfish bycatch limit for jig gear during the state-waters Pacific cod season. In 1998, the BOF adopted a directed rockfish season opening of July 1 for the Cook Inlet Area and restricted legal gear to jigs to target pelagic shelf rockfish species. At the spring 2000 BOF meeting, the BOF 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 BOF 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 the sablefish fishery, 5% during the state-waters Pacific cod season and 10% during other directed fisheries. In 2010, the BOF adjusted rockfish bycatch levels for Cook Inlet to 10% during halibut and directed groundfish, other than rockfish, and 20% nonpelagic rockfish during the directed pelagic shelf rockfish fishery. In addition, logbooks are required to be filled out daily during the Cook Inlet directed jig fishery. In 2014, the BOF adopted regulations to adjust rockfish bycatch levels during the parallel Pacific cod season in PWS to 5%, for consistency with the state-waters season. In addition, a 0.05% rockfish bycatch limit was established for the PWS pollock pelagic trawl fishery. Proceeds from rockfish landed in excess of allowable bycatch and harvest levels are surrendered to the State of Alaska (Contact Jan Rumble).

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

In the Kodiak Area, vessels may not possess or land more than 2.3 mt of black rockfish in a 5-day period. Additionally, vessel operators are required to register for a single groundfish fishery at a time. Registration requirements also exist for the Chignik and South Alaska Peninsula areas. The Chignik Area was designated as superexclusive for the black rockfish fishery beginning in 2003.

In 2017, 49 mt of black rockfish were harvested from seven sections in the Kodiak Area. GHLs were attained in four sections of the Kodiak Area. In the South Alaska Peninsula Area, the 2017 black rockfish harvest was 20 mt. Harvest in the Chignik Area is confidential. In 2017, no vessels made directed black rockfish landings in the Aleutian Islands Area and all harvest was incidental

retention. Fishers may retain up to 5% of black rockfish by weight incidentally during other fisheries. In 2017, 1.4 mt of black rockfish and 3.1 mt of dark rockfish were harvested incidental to other groundfish species. 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 Nathaniel Nichols).

Statewide, most sport caught rockfish is taken incidental to sport fisheries for halibut or 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.

Sport fisheries are managed primarily under two assemblages: pelagic, defined the same as for commercial fisheries, and nonpelagic, which includes all other species of the genus *Sebastes*. For the 2017 season, the **Southeast Alaska** region's sport bag and possession limit for pelagic rockfish was five fish per day, 10 in possession. However, an emergency order reduced the limit for pelagic rockfish in outside waters near Sitka (north of the latitude of Cape Ommaney and south of 57° 30' N. lat.) to three fish per day, six in possession, effective March 27 through the end of the year.

The sport fishery in Southeast outside waters is allocated a portion of the TAC for demersal shelf rockfish. The non-pelagic rockfish regulations were set as follows:

All Southeast Alaska Waters: 1) all non-pelagic rockfish caught were required to be retained until the bag limit was reached; 2) resident bag and possession limit was one rockfish of any species; 3) nonresident bag limit was one fish, with an annual limit of one yelloweye rockfish.

Southeast Alaska Outside Waters: 1) Retention of nonpelagic rockfish was prohibited in all Southeast Outside waters from August 1 through August 21, 2017; 2) All anglers fishing from a vessel in Southeast Outside waters during this period were required to have a functional deep water release mechanism on board and release nonpelagic rockfish at the depth of capture or at least 100 feet using the deep water release mechanism.

For the entire Southeast Alaska region, charter operators and crewmembers were not allowed to retain non-pelagic rockfish while clients were on board the vessel. All anglers fishing from charter vessels were required to release non-pelagic rockfish to the depth of capture or at least 100 feet, whichever is shallower, using a deep water release device. Charter vessels were required to have at least one functional deep water release device on board and available for inspection (Contact Bob Chadwick).

Sport rockfish regulations in **Southcentral Alaska** have been designed to discourage targeting of rockfish yet allow and mandate retention of incidental harvest. As in Southeast Alaska, bag limits are more restrictive for non-pelagic species to account for their lower natural mortality rates. The open season for rockfish was year-round in all areas. The bag limit in Cook Inlet was five rockfish daily, only one of which could be a non-pelagic species (DSR or slope species). The bag limit in PWS during the period May 1-September 15 was four rockfish, no more than two of which could be a non-pelagic species. During the period September 16-April 30, the bag limit was eight rockfish, of which no more than two could be non-pelagic species. During both periods, the first two non-pelagic rockfish caught in PWS were required to be retained. The bag limit in the North Gulf Coast area was four rockfish daily, including no more than one non-pelagic rockfish. The bag limit in the Kodiak and Alaska Peninsula areas was five rockfish, no more than two of which could be non-pelagic species, and no more than one of the non-pelagic species could be a yelloweye.

In 2017 the department began an interdivisional process to develop comprehensive harvest strategies for groundfish, beginning with black and yelloweye rockfish using information from all

fisheries. A workshop was held in September 2017 with approximately 30 participants from the Commercial Fisheries and Sport Fish divisions. Staff summarized harvest trends and management procedures used in each fishery. Commercial and sport fisheries are currently managed separately, and several areas of the state lack annual harvest targets for the sport fishery. There was agreement on the need to develop harvest strategies that applied to all removals and an integrated approach to management, at least to set harvest guidelines and control rules. The department is committed to developing abundance-based goals where assessment is possible and simpler strategies where information is lacking. The initial focus on black and yelloweye rockfish is to address immediate management needs and serve as models for other groundfish species.

4. Fisheries

Directed fisheries for DSR and black rockfish occurred in **Southeast** in 2017. The directed fishery for DSR in SEO only opened in EYKT, while the Central Southeast Outside (CSEO), Southern Southeast Outside (SSEO), and Northern Southeast Outside (NSEO) sections did not open to directed fishing, because the portion of the TAC allocated to those areas was not large enough to support a manageable fishery. Directed fishing for DSR was also opened in internal waters. The 2017 harvest of DSR by directed fisheries in EYKT was 32.2 mt and in internal waters was 5.7 mt. In addition, DSR was taken as bycatch with 96.8 mt harvested in SEO and 24.3 mt in internal waters. Harvest in the directed black rockfish fishery in Southeast Outside District (SEO) was 5.2 mt and black rockfish harvest in all groundfish, halibut, and salmon troll fisheries in SEO was 10.6 mt. Slope, PSR, and thornyhead rockfish were also taken as bycatch in internal waters with 65.6 mt harvested in 2017.

In **Central Region**, both the Cook Inlet and PWS areas have a rockfish GHL of 68 mt, which includes both directed and bycatch harvest. In the Cook Inlet Area in 2017, the total rockfish harvest, including the directed PSR jig fishery and bycatch, was 53 mt. PSR harvest comprised 55% of the total harvest, with the majority of harvest coming from the directed PSR fishery. There had been a steady increase in harvest and effort in the Cook Inlet directed fishery in recent years, and although harvest decreased in 2017, it was still the third highest since 2005, with highest harvests in 2016 and 2015, respectively. In PWS, rockfish are only harvested as bycatch, as there is no directed fishery. For PWS in 2017, rockfish harvest was 27 mt, down significantly from 2016 when the GHL was exceeded. The majority of rockfish bycatch in PWS was caught by longline gear (92%) followed by trawl gear (7%) with the minimal remaining harvested by jig gear.

Overall **sport harvest** (guided and unguided) is estimated primarily through the SWHS. Charter vessel logbooks provide reported harvest for the guided sector only. Harvest reporting areas for these programs are different than commercial reporting areas, making direct comparisons difficult. Additionally, species-specific data are available only from creel surveys.

The SWHS estimates harvest of “rockfish” (all species combined), and the charter vessel logbooks require reporting of rockfish harvest in three categories - pelagic, yelloweye, and other non-pelagics. Sport rockfish harvest is typically estimated in numbers of fish. Estimates of the 2017 harvest are not yet available from the SWHS, but the 2016 estimates for all species combined were 173,847 fish in Southeast and 173,591 fish in Southcentral Alaska. The average annual harvest estimates for the recent five-year period (2012-2016) were 164,418 rockfish in Southeast Alaska and 135,519 fish in Southcentral Alaska.

I. Thornyheads

1. Research

There was no research conducted on thornyheads in 2017.

2. Assessment

There are no stock assessments for thornyheads.

3. Management

A commissioner's permit is required before a directed fishery may be prosecuted for thornyheads. This permit may restrict depth, dates, area, and gear, establish minimum size limits, and require logbooks and/or observers, or any other condition determined to be necessary for conservation and management purposes.

4. Fisheries

There was no directed fishery for thornyheads in 2017. In **Central Region** thornyheads are retained as bycatch up to 10% in aggregate with other groundfish during a halibut or directed groundfish fishery, with exceptions occurring in PWS for the bycatch allowance for the directed sablefish fishery (20%), Pacific cod (5%), and directed pollock trawl fishery (0.05%). For directed drift or set gillnet fisheries for salmon or herring up to 10% of thornyheads and other rockfish in aggregate may be retained. Proceeds from bycatch overages are forfeited to ADF&G.

In **Southeast Region** thornyheads are retained as bycatch of up to 15% in aggregate with other rockfish for a directed DSR fishery, 5% in aggregate with other rockfish for halibut fishing and a directed lingcod fishery, 15% for a directed black rockfish, sablefish, and Pacific cod, 0% for a directed pot fishery for sablefish and Pacific cod, and 5% for a directed fishery in outside waters of **Southeast Region**. Any bycatch overages that occur are forfeited to ADF&G.

J. Sablefish

1. Research

In 2017, 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; however, in 2017 seven commercial fishermen participated in the surveys and were allowed to sell their Personal Quota Share (PQS); thus, reducing the impact on the quota by for fish harvested and sold by the state. The department plans to allow permit holders to harvest their PQS aboard future NSEI longline surveys.

A mark-recapture survey has been conducted using longlined pots since 2000 with this survey performed using the state vessel the R/V *Medeia* since 2012. In May and June 2017, 7,096 fish were marked and released in NSEI over the course of the tagging survey. Over the 21-day survey, 29 longlined pot sets were made. Sablefish were targeted by area and depth in proportion to the commercial catch using logbook data from the three previous years. The mark-recapture results serve as the basis of our NSEI stock assessment. A tagging survey is scheduled for 2018 (Contact Andrew Olson).

Central Region, ADF&G conducted longline surveys for sablefish from 1996 through 2006 in PWS. Longline survey effort was extended into the North Gulf District in 1999, 2000 and 2002. All longline surveys were discontinued due to lack of funding, and with the goal of transitioning to a pot longline survey, particularly in PWS. Between 1999 and 2005, sablefish were opportunistically tagged in PWS on ADF&G trawl surveys. Sablefish tagging surveys were conducted in PWS in 2011, 2013, and 2015 using pot longline gear. There were 1,203, 318, and 26 fish tagged in 2011, 2013, and 2015, respectively. CPUE was very low in 2013 with an average of 0.11 fish per pot. To date, 329 fish have been recaptured from the 2011 survey and 56 were captured from the 2013 survey and 5 from the 2015 survey. Of all tagged releases, 57% have been recaptured within PWS and 29% outside in the GOA with the remainder of unknown location. There have been no PWS sablefish tagging surveys since 2015 (Contact Dr. Kenneth J. Goldman).

Skipper interviews and biological sampling occurred in Cordova, Whittier, and Seward for the PWS Area commercial fishery and in Seward and Homer for the Cook Inlet Area fishery. After PWS sampling goals were not achieved in 2015, due to extremely low effort and poor fishery performance, staff endeavored in 2016 and 2017 to ensure sampling goals for sablefish were achieved. Expanded interviews were also conducted with PWS fishermen to collect additional information on fishery dynamics. Data obtained included date and location of harvest, length, weight, sex, and gonad condition. Otoliths were removed and sent to the Age Determination Unit. Logbooks are required for both fisheries and provide catch and effort data by date and location (Contact Elisa Russ).

2. Assessment

In **Southeast**, the department is using mark-recapture methods with external tags and fin clips to estimate abundance and exploitation rates for sablefish in the NSEI Subdistrict. Sablefish are captured with pot gear in May or June, marked with a tag and a fin clip then released. Tags are recovered from the fishery and fish are counted at the processing plants and observed for fin-clips. The 2017 recommended ABC of 385 mt for the NSEI fishery was calculated by applying the 2016 fishery mortality at age (based on a harvest rate of 6.8% using the $F_{50\%}$ biological reference point (BRP)) to the 2017 forecast of total biomass at age and summing across all ages. The 2017 ABC was a 5.3% decrease from the 2016 ABC (366 mt), which was also based on the $F_{50\%}$ BRP (the harvest rate was 6.8% for 2016). Since 2009 BRPs have become more conservative, i.e. $F_{45\%}$ in 2009 and $F_{50\%}$ since 2010.

In addition to the mark-recapture work, an annual longline survey is conducted in NSEI to provide biological data as well as relative abundance information. In SSEI only an annual longline survey is conducted to provide biological data as well as relative abundance information. Unlike NSEI, the department does not currently estimate the absolute abundance of SSEI sablefish. There appears to be substantial movement of sablefish in and out of the SSEI area, which violates the assumption of a closed population; consequently, Peterson mark-recapture estimates of abundance or exploitation rates are not possible for this fishery. Instead, the SSEI sablefish population is managed based on relative abundance trends from survey and fishery CPUE data, as well as with survey and fishery biological data that are used to describe the age and size structure of the population and detect recruitment events (Contact Andrew Olson).

3. 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 PWS Inside District (**Central Region**) each have separate seasons and GHLs. In the Cook Inlet Area, there is a state-managed open access sablefish fishery with a separate GHL.

In the **Southeast Region** both the SSEI and NSEI sablefish fisheries have been managed under a license limitation program since 1984. In 1994 the BOF adopted regulations implementing an equal share quota system where the annual GHL was divided equally between permit holders and the season was extended to allow for a more orderly fishery. In 1997 the BOF adopted this equal share system as a permanent management measure for both the NSEI and SSEI sablefish fisheries. There were 78 permit holders eligible to fish in 2017 in NSEI and 23 permit holders eligible to fish in SSEI. The NSEI fishery is restricted to longline gear only while SSEI has separate seasons for longline and pot gear with 20 longline permits and 3 pot permits. In 2017, the CFEC approved a public petition for SSEI longline permits the ability to fish pot gear due to whale depredation and rockfish bycatch, thus making the permit a longline/pot permit.

The NSEI quota was set at 327 mt and the SSEI quota was set at 234 mt for 2017.

During the February 2009 BOF meeting, the BOF made no changes affecting the regulation of commercial sablefish fisheries, however bag and possession limits were established for the sablefish sport fishery. At the 2012 BOF meeting, a regulation was passed to require personal use and subsistence use sablefish household permits, and at the 2015 BOF meeting, limits were defined for personal use sablefish fisheries for the number of fish (50 fish per permit), 200 fish vessel limit when four or more permits are present on a vessel, and number of hooks (no more than 350 hooks in aggregate per permit).

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

Within the **Central Region** the Cook Inlet Area North Gulf District sablefish GHL is set using an historic baseline harvest level adjusted annually by the relative change to the ABC in the federal CGOA. In 2004, the BOF adopted a sablefish fishery-specific registration, logbook requirement, and 48-hour trip limit of 1.36 mt in the Cook Inlet Area. For PWS, a limited-entry program that included gear restrictions and established vessel size classes was adopted in 1996.

Between 1996 and 2014, the PWS fishery GHL was set at 110 mt, which is the midpoint of the harvest range set by a habitat-based estimate. Tagging studies conducted by the National Marine Fisheries Service (NMFS) and ADF&G indicate that sablefish populations throughout the GOA including the PWS area are likely mixed. Therefore, the GHL was adjusted by applying the relative change each year in the NMFS GOA sablefish ABC, which is derived from NMFS stock assessment surveys. The GHL was adjusted beginning in 2015 by applying the relative change in the GOA-wide ABC for sablefish back to 1994; this adjustment continued in 2017. PWS fishery management developed through access limitation and in 2003 into a shared quota system wherein permit holders are allocated shares of the guideline harvest guideline level. Shares are equal within each of four vessel size classes but differ between size classes. In 2009, the BOF adopted regulations which included a registration deadline, logbooks, and catch reporting requirements. In 2009, new season dates were also adopted by the BOF for PWS sablefish, 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 sole **Westward Region** sablefish fishery occurs in the Aleutian Islands. The GHL for the Aleutian Islands is set at 5% of the combined Bering Sea Aleutian Islands TAC. The state GHL

can be adjusted according to recent state-waters harvest history when necessary. From 1995 to 2000 the fishery opened concurrently with the EEZ IFQ sablefish fishery. In 2001 the BOF changed the opening date of the state-waters fishery to May 15 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. In 2013, the BOF changed the season opening and closing dates reverting them back to coincide with the federal IFQ season.

The Southeast Alaska **sport fishery** for sablefish was regulated for the first time in 2009. Sport limits in 2017 were four fish of any size per day, four in possession, with an annual limit of eight fish applied to nonresidents only in lower Lynn Canal and Chatham Strait. Creel surveys in Southeast Alaska in 2017 sampled 387 sablefish, reflecting the relatively small harvest relative to other species. The sablefish sport fishery in the remainder of Southcentral Alaska was unregulated, with no bag, possession, or size limits. Port samplers in Southcentral Alaska measured no sablefish from the sport harvest, again reflecting the relatively small harvests.

4. Fisheries

In the **Southeast Region** the 2017 NSEI sablefish fishery opened August 15 and closed November 15. The 78 permit holders landed a total of 324 mt of sablefish. The fishery is managed by equal quota share; each permit holder was allowed 4.2 mt. The 2017 SSEI sablefish fishery season was June 1–August 15 for longline gear and September 1–November 15 for pot gear. In SSEI, 20 permits were designated to be fished with longline gear and 3 permits for pot gear. Twenty-three permit holders landed a total of 191 mt of sablefish, each with an equal quota share of 10.2 mt (Contact Andrew Olson).

In the **Central Region,** the 2017 Cook Inlet Area sablefish fishery opened at noon July 15 with a GHL of 24.5 mt. Eight vessels participated in CI and harvested just under 70% of the GHL. The 2017 PWS sablefish fishery opened April 15 with a GHL of 53.1 mt and closed by regulation on August 31. PWS sablefish harvest totaled 33.2 mt, steadily increasing since the 7.7 mt historical low in 2015, although still the third lowest harvest on record and less than 30% of the historical average (Contact Jan Rumble).

Within the **Westward Region**, only the Aleutian Islands have sufficient habitat to support mature sablefish populations of enough 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%. The 2017 Aleutian Island fishery opened concurrent with the IFQ season, on March 11 with pot, longline, jig and hand troll gear allowed. Additional requirements for the fishery include registration and logbook requirements. The GHL was set at 173 mt for the state-waters fishery. The harvest from the 2017 Aleutian Islands sablefish fishery was 54 mt. The season remained open until the November 7 closure date (Contact Miranda Westphal).

The most recent sablefish sport harvest estimates from the SWHS are for 2016. The estimated harvest was 10,316 fish in Southeast Alaska and 5,035 fish in Southcentral Alaska. SWHS estimates are suspected to be biased due to misidentification and misreporting. Sablefish are not commonly taken by anglers in most areas of the state, and relatively high catches were reported from some areas where sablefish are rarely or never observed by creel survey crews. Charter logbooks indicated guided harvests of 6,430 sablefish in Southeast Alaska and 815 sablefish in Southcentral Alaska in 2016 (Contact Bob Chadwick, Dan Bosch).

K. Lingcod

1. Research

Since 1996, 9,189 lingcod have been tagged and 487 fish recovered in the **Southeast** Region. Length, sex and tagging location are recorded for all tagged fish. Dockside sampling of lingcod caught in the commercial fishery continued in 2017 in Sitka with 1,252 fish sampled for biological data. Samples were not collected in Yakutat due to weather. Otoliths were sent to the ADU in Juneau for age determination (Contact Andrew Olson).

In the **Central Region**, skipper interviews and port sampling were conducted in Cordova, Seward, and Homer. Data obtained included date and location of harvest, length, weight, sex and age structures. Otoliths were sent to the ADU in Juneau for age determination. Gonad condition was generally not determined as nearly all fish were delivered gutted (Contact Elisa Russ).

Funding for **Central Region** lingcod ROV surveys ended in 2016 and no surveys were conducted in 2017 (Contact Mike Byerly or Josh Mumm).

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 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 2017 included Juneau, Sitka, Craig/Klawock, Wrangell, Petersburg, Gustavus, Elfin Cove, Yakutat, and Ketchikan. Length and sex data were collected from 1,590 lingcod in 2017, primarily from the ports of Sitka, Ketchikan, Craig, Klawock, 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. The program sampled 382 lingcod from the sport harvest at Seward, Valdez, Whittier, Kodiak, and Homer in 2017. These ports accounted for most of the sport lingcod harvest in Southcentral Alaska (Contact Martin Schuster).

2. 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 CPUE from fishery logbooks, in terms of fish per hook-hour for 1988–1998, showed that CPUE had declined between 21 to 62% in areas where a directed fishery and increased sport catch had developed. Consequently, the quota for lingcod was reduced in all areas in 2000. After reductions in GHRs, CPUE increased in CSEO until around 2007; since then CPUE has generally decreased. CPUE in NSEO has been generally stable since reductions in GHRs. In SSEOC, CPUE was highly variable from 1994 to 2003; since then, limited participation in this fishery is too erratic to characterize CPUE. In EYKT, after the GHR was reduced, CPUE was fairly stable; however, in the last four years CPUE has been the lowest since 2000. Compared to other areas, CPUE in EYKT is high, likely because fishing is concentrated in smaller areas with typically higher abundances of lingcod. The CPUE in IBS was stable between 2004 and 2009, increased from 2010 to 2014, and has been declining since 2015. Higher CPUE in recent years may be due to increases in stocks or changes in fishery dynamics—vessel participation has decreased with experienced fishermen remaining in this area.

Central Region conducts ROV surveys along the northern Gulf of Alaska coast from the Kenai Peninsula to PWS for to estimate local abundance and biomass of lingcod concurrently with DSR. No surveys were conducted in 2017 (Contact Mike Byerly or Dr. Kenneth J. Goldman).

3. Management

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

The **Central Region** has directed commercial fisheries for lingcod in Cook Inlet and PWS areas. Regulations for the commercial lingcod fishery include open season dates of July 1 to December 31 and a minimum size requirement of 35 inches (89 cm) overall or 28 inches (71 cm) from the front of the dorsal fin to the tip of the tail. The directed lingcod fishery in the Cook Inlet Area is limited to jig gear only. Guideline harvest levels (GHLs) are 24 mt for Cook Inlet Area and 3.3 mt in the Inside District of PWS and 11.5 mt for the PWS Outside District. Resurrection Bay, near Seward, is closed to commercial harvest of lingcod. In 2009, a new BOF regulation permitted retention of lingcod at a 20% bycatch level in PWS waters following closure of the directed season. Cook Inlet Area also allows 20% bycatch levels for lingcod; however, no bycatch may be retained after the GHL is achieved.

In **Southeast Alaska**, sport harvests of lingcod are incorporated into a regionwide lingcod management plan. This plan 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 limit 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.

The sport fishery lingcod season for 2017 was May 16-November 30. Charter vessel operators and crew members were prohibited from retaining lingcod while guiding clients. For resident anglers, the limits regionwide were one fish per day and two in possession, with no size limit. Additional restrictions were put into place for nonresidents to keep harvest from exceeding allocations specified by the Alaska Board of Fisheries:

(1) In the Yakutat vicinity, nonresidents were allowed one fish daily or in possession, the fish must be 30-45 inches in length or at least 55 inches in length, and the annual limit was two fish, only one of which could be 55 inches or greater in length;

(2) In the Northern Southeast area, nonresidents were allowed one fish daily or in possession, the fish must be 30-35 inches in total length or at least 55 inches in length, and the annual limit was two fish, of which one must be 30-35" in length and one must be at least 55 inches in length;

(3) In the Southern Southeast area, nonresidents were allowed one fish daily and two in possession, the fish must be 30-45 inches in length or at least 55 inches or greater in length,

and the annual limit was two lingcod, of which one must be 30-45 inches in length and one must me at least 55 inches in length.

Notwithstanding the limits for each area, the nonresident annual limit in the combined waters of Southeast Alaska was four fish of which only one may be 55 inches or greater in length. In addition, the Pinnacles area near Sitka has been closed to sport fishing year-round for all groundfish since 1997 (Contact Bob Chadwick).

A suite of regulations was established in 1993 for sport lingcod fisheries in **Southcentral Alaska** considering the lack of quantitative stock assessment information. Resurrection Bay remained closed to lingcod fishing year-round to rebuild the population, although there is no formal rebuilding plan. The season was closed region-wide from January 1 through June 30 to protect spawning and nest guarding lingcod. Daily bag limits in 2017 were two fish in all areas except the North Gulf, where the daily bag limit was one fish. All areas except Kodiak had a minimum size limit of 35 inches to protect spawning females (Contact Dan Bosch or Matt Miller).

4. Fisheries

Lingcod are the target of a "dinglebar" troll fishery in **Southeast Alaska**. Dinglebar troll gear is power troll gear modified to fish for groundfish. Additionally, lingcod are landed as significant bycatch in the DSR and halibut longline and salmon troll fisheries. The directed fishery landed 108 mt of lingcod in 2017. An additional 70 mt was landed as bycatch in halibut and other groundfish fisheries and 9 mt in the salmon troll fishery.

Central Region commercial lingcod harvests have primarily occurred in the North Gulf District of the Cook Inlet Area and PWS. Lingcod harvests in 2017 totaled 22.1 mt in Cook Inlet Area, over twice the 2016 harvest due to a significant increase in effort in the directed fishery. In PWS, lingcod harvest in 2017 was 6.2 mt in PWS, similar to harvest in 2016. Approximately 92% of the lingcod harvest from Cook Inlet Area resulted from participation in the directed lingcod jig fishery. Cook Inlet harvest increased more than seven-fold from 2015 to 2017; vessels fishing in the directed fishery typically participated concurrently in the directed rockfish, which also had an increase in harvest and effort in recent years. In PWS, approximately 91% of lingcod harvest was from directed longline effort. In both areas, the remaining harvest resulted from bycatch to other directed (primarily halibut) longline fisheries and in PWS. Cook Inlet and PWS area fisheries remained open through December 31 (Contact Jan Rumble).

In the **Westward Region**, no directed lingcod effort occurred during 2017. All lingcod were harvested incidental to other federal and state managed groundfish fisheries. The 2017 harvest totaled 11 mt in the Kodiak Area and <1 mt in the Chignik and South Alaska Peninsula areas combined.

Sport lingcod harvest estimates from the SWHS for 2016 (the most recent year available) were 12,107 lingcod in Southeast Alaska and 13,506 lingcod in Southcentral Alaska. The average estimated annual harvest for the recent five-year period (2012-2016) was 13,050 fish in Southeast Alaska and 17,530 fish in Southcentral Alaska.

L. Atka Mackerel

1. Research

There was no research on Atka mackerel during 2017.

2. Assessment

There are no state stock assessments for Atka mackerel.

3. Management

A commissioner's permit is required in **Central Region** and **Southeast Region** before a directed fishery may be prosecuted for Atka mackerel. This permit may restrict depth, dates, area, and gear, establish minimum size limits, and require logbooks and/or observers, or any other condition determined to be necessary for conservation and management purposes.

4. Fisheries

There was no directed fishery for Atka mackerel in 2017. Currently in the **Central Region** and **Southeast Region** Atka mackerel are considered other groundfish and are allowed up to 20% as bycatch in aggregate during directed fisheries for groundfish.

M. Flatfish

1. Research

There was no research on flatfish during 2017.

2. Assessment

There are no stock assessments for flatfish.

3. Management

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

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

There are no bag, possession, or size limits for flatfish (excluding Pacific halibut) in the sport 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 sport fisheries in Southcentral or Southeast Alaska. Flatfish are occasionally taken incidentally to other species and in small shore fisheries, but the sport harvest is believed to be negligible.

4. Fisheries

Very little effort has occurred in the **Southeast** fishery in recent years. Since the 1998/99 season only one vessel has applied for a commissioner's permit to participate in this fishery; this vessel made a single flatfish landing in 2013. Due to limited participation, harvest information is confidential for this landing. The Southeast flatfish trawl areas are also the sites of a shrimp beam trawl fishery. In the past, most of the Southeast harvest was starry flounder. In state waters of the **Westward Region**, the State of Alaska adopts most NOAA Fisheries regulations and the flatfish fishery is managed under a parallel management structure. In **Central Region** during 2017, one commissioner's permit to catch flatfish was issued in the Cook Inlet Area and none in PWS. The

purpose of the Cook Inlet permit was to test the viability of pot gear; however, no harvest was allowed under the permit, and only a single trip was made with limited success.

N. Pacific Halibut and IPHC Activities

The sport halibut fishery is a focus of a statewide monitoring and management effort by the Division of Sport Fish. Data on the sport fishery and harvest are collected through port sampling in Southeast and Southcentral Alaska. Estimates of harvest and related information are provided annually to the IPHC for use in the annual stock assessment, and to the North Pacific Fishery Management Council. The council's Scientific and Statistical Committee has periodically reviewed the state's estimation and projection methods. ADF&G provides an analysis each year that is used by the Council to recommend regulatory changes for the charter fishery to keep its harvest within allocations specified in the Catch Sharing Plan for Guided Sport and Commercial Fisheries in Alaska. The Council's recommendations are incorporated by the IPHC as annual management measures for the charter fishery. Estimates of sport harvest and associated analyses are posted on the North Pacific Fishery Management Council's web page at http://www.npfmc.org (Contact Scott Meyer).

O. Other groundfish species

In 1997 the BOF approved 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" if they wish to participate in a directed fishery for species that do not already have regulations in place. Permits do not have to be issued if there are management and conservation concerns. 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.

V. Ecosystem Studies – N/A

VI. Other Related Studies

Staff in the **Central Region** currently house all data in an MS Access database format. Queries are complete for calculating CPUE, abundance, and biomass estimates from most surveys. All data are additionally captured in GIS for spatial analysis.

ADF&G manages state groundfish fisheries under regulations set triennially by the BOF.

ADF&G 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 NOAA Fisheries in regulating fisheries in offshore waters.

A. User Pay/Test Fish Programs

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

VII. Publications

Blain-Roth, B., J. Baumer, and S. Meyer. 2017. Sport fisheries in the Prince William Sound Management Area, 2014-2016. Alaska Department of Fish and Game, Fishery Management Report No. 17-44, Anchorage.

Chadwick, R. E., T. Tydingco, and P. Fowler. 2017. Overview of the sport fisheries for groundfish and shellfish in Southeast Alaska through 2017. Alaska Department of Fish and Game, Special Publication No. 17-16, Anchorage.

Green, K. and J. Stahl. 2017. Demersal shelf rockfish remotely operated vehicle stock assessment survey. Alaska Department of Fish and Game, Regional Operational Plan ROP.CFIJ.2017.02, Anchorage.

Meyer, S. and R. Powers. 2017. Analysis of management options for the Area 2C and 3A charter halibut fisheries for 2018. Unpublished report prepared for the North Pacific Fishery Management Council, December 2017. Available online at: http://npfmc.legistar.com/gateway.aspx?M=F&ID=fef2951a-8a6c-46b0-af91-2d95e32cadd8.pdf

Olson, A. and K. Carroll. 2017. Southern Southeast Inside (Clarence Strait) Sablefish Longline Survey. Alaska Department of Fish and Game, Regional Operational Plan ROP.CF.IJ.2017.03, Anchorage.

Olson, A., J. Stahl, M. Vaughn, K. Carroll, and A. Baldwin. 2017. Annual management report for the Southeast Alaska and Yakutat groundfish fisheries, 2017. Alaska Department of Fish and Game, Fishery Management Report No. 17-54, Anchorage.

Olson, A., J. Stahl, B. Williams, M. Jaenicke, and S. Meyer 2017. Chapter 14: Assessment of the demersal shelf rockfish stock complex in the Southeast Outside District of the Gulf of Alaska. Pages 1153-1168 in Appendix B, Stock Assessment and Fishery Evaluation Report. North Pacific Fishery Management Council, Anchorage, Dec. 2017.

Rumble, J., E. Russ, C. Russ, and M. Byerly. 2017. Prince William Sound Registration Area E groundfish fisheries management report, 2014–2017. Alaska Department of Fish and Game, Fishery Management Report No. 17-40, Anchorage.

A. Statistical Area Charts

Digital groundfish and shellfish statistical area charts are available and can be viewed or downloaded at:
http://www.adfg.alaska.gov/index.cfm?adfg=CommercialByFisheryGroundfish.groundfishmaps
(Contact Lee Hulbert).

B. Websites

ADF&G Home Page: http://www.adfg.alaska.gov

Commercial Fishing home page:
http://www.adfg.alaska.gov/index.cfm?adfg=fishingCommercial.main

Sport Fisheries home page: http://www.adfg.alaska.gov/index.cfm?adfg=fishingSport.main

News Releases: http://www.adfg.alaska.gov/index.cfm?adfg=newsreleases.main

Rockfish Conservation page:
http://www.adfg.alaska.gov/index.cfm?adfg=fishingSportFishingInfo.rockfishconservation

Age Determination Unit Home Page: http://mtalab.adfg.alaska.gov/ADU/

Region I, Southeast Region, Groundfish Home Page:
http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareasoutheast.groundfish

Gene Conservation Laboratory Home Page:
http://www.adfg.alaska.gov/index.cfm?adfg=fishinggeneconservationlab.main

Region II, Central Region, Groundfish Pages:
http://www.adfg.alaska.gov/index.cfm?adfg=fishingcommercialbyarea.southcentral

Westward Region, Groundfish Pages:
http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyfisherygroundfish.groundfishareas

ADF&G Groundfish Overview Page:
http://www.adfg.alaska.gov/index.cfm?adfg=CommercialByFisheryGroundfish.main

Commercial Fisheries Entry Commission: http://www.cfec.state.ak.us/

State of Alaska home page: http://www.alaska.gov

Demersal shelf rockfish stock assessment document:
https://www.afsc.noaa.gov/REFM/Docs/2017/GOAdsr.pdf

Groundfish charts:
http://www.adfg.alaska.gov/index.cfm?adfg=CommercialByFisheryGroundfish.groundfishmaps

APPENDICES

Appendix I. Alaska Department of Fish and Game Full-time Groundfish Staff (updated 4/18)

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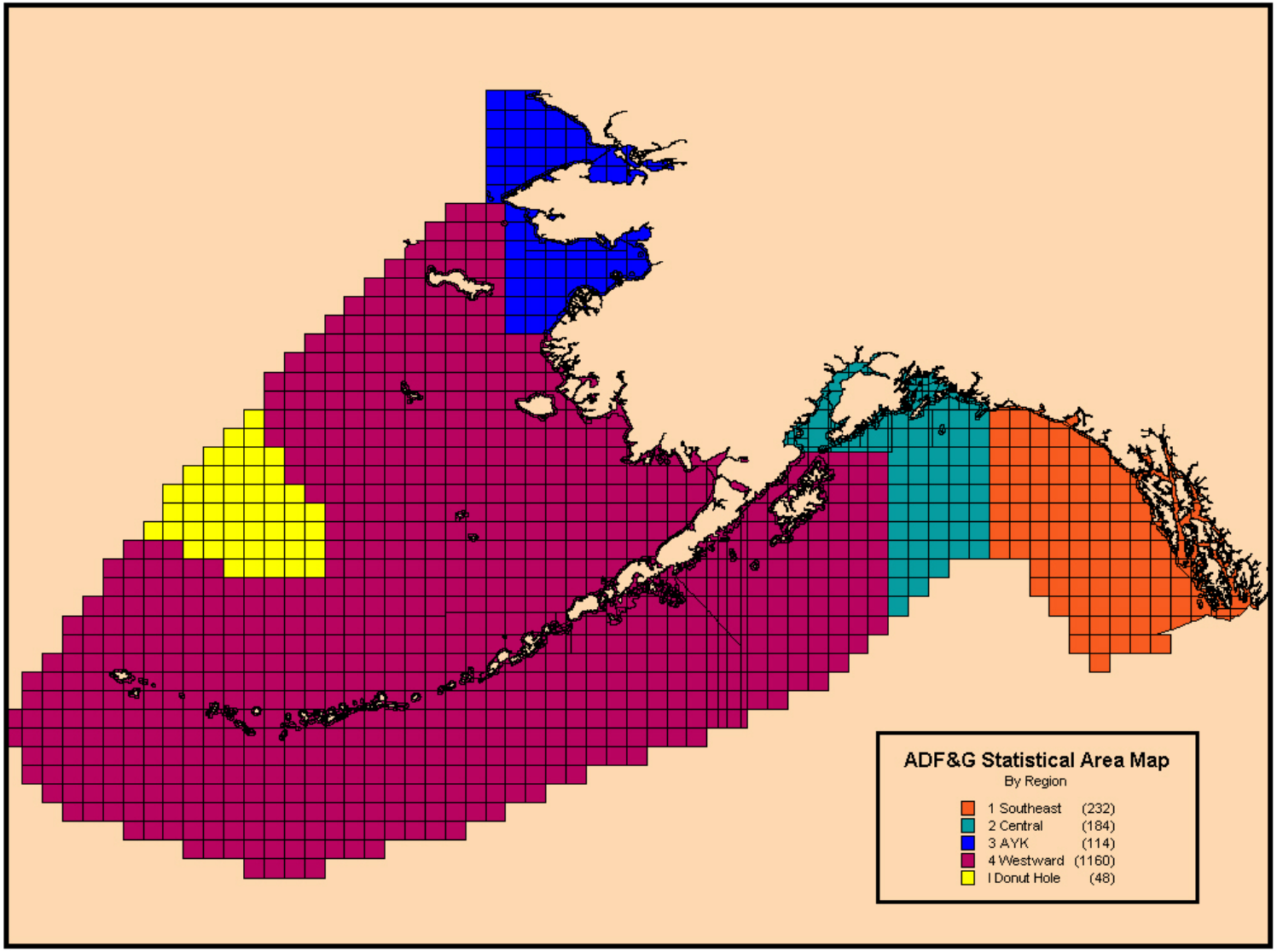
Appendix II. Map Depicting State of Alaska Commercial Fishery Management Regions.



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
	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
	Kachemak Bay	1999	58	fin
	Kodiak Island	1999	115	fin
	Resurrection Bay	1999	100	fin
	Fairweather Grounds	1999	100	fin
	SE Stat Areas 355601, 365701 (CSEO)	1999	100	fin
	Whittier	2000	97	fin
	Whittier	2000	50	fin
Black rockfish, *S. melanops*				
	Kodiak Island	1996	2	muscle, liver, heart, eye
	Ugak Bay, Kodiak Island	1997	100	muscle, liver, heart, eye
	Resurrection Bay - South tip Hive Island	1997	82	muscle, liver, heart, eye, fin
	Carpa Island	1998	40	fin
	Eastside Kodiak Is.: Ugak and Chiniak Bays	1998	100	fin
	Southwest side Kodiak Island	1998	86	fin
	Westside Kodiak Island	1998	114	fin
	North of Fox Island	1998	24	fin
	Washington - Pacific Northwest	1998	20	fin
	Sitka	1998	50	fin
	Castle Rock near Sand Point	1999	60	fin
	Akutan	1999	100	fin
	Oregon - Pacific Northwest	1999	50	muscle, liver, heart
	SE Stat Areas 355631, 365701 (CSEO)	1999	83	fin
	Sitka Sound Tagging study	1999	200	fin
	Dutch Harbor	2000	6	fin
	Chignik	2000	100	fin
	Valdez	2000	13	fin
	Whittier	2000	16	fin
	Valdez	2001	50	fin

Whittier	2001	93	fin
Yakutat Bay	2003	130	fin
Dusky rockfish, *S. ciliatus*			
Kodiak Island	1997	50	muscle, liver, heart, eye
Resurrection Bay	1998	3	fin
Eastside Kodiak Is.: Ugak, Chiniak, Ocean Bays	1998	100	muscle, liver, heart, eye
Sitka Black RF Tagging study	1999	15	muscle, liver, heart, eye
Sitka	2000	23	liver, fin
Sitka	2000	23	fin
Harris Bay - Outer Kenai Peninsula	2002	37	muscle
North Gulf Coast - Outer Kenai Peninsula	2003	45	fin
Walleye pollock, *Gadus chalcogrammus*			
Exact location unknown; see comments	1997	402	fin
Bogoslof Island	1997	120	muscle, liver, heart
Middleton Island	1997	100	fin
NE Montague/E Stockdale	1997	100	fin
Orca Bay, PWS	1997	100	fin
Port Bainbridge	1997	100	fin
Shelikof Strait	1997	104	muscle, liver, heart, eye, fin
Bogoslof Island	1998	100	muscle
Eastern Bering Sea	1998	40	muscle, liver, heart
Middleton Island	1998	100	muscle, liver, heart
Port Bainbridge	1998	100	muscle, liver, heart
Resurrection Bay	1998	120	fin
Shelikof Strait	1998	100	muscle, liver, heart
PWS Montague	1999	300	heart
Eastern PWS	1999	94	heart
Kronotsky Bay, E. Coast Kamtchatka	1999	96	muscle, liver, heart, eye, fin
Avacha Bay	1999	100	unknown
Bogoslof Island	2000	100	muscle, liver, heart
Middleton Island	2000	100	muscle, liver, heart
Prince William Sound	2000	100	muscle, liver, heart
Shelikof Strait	2000	100	muscle, liver, heart