STATE OF ALASKA
GROUNDFISH FISHERIES

ASSOCIATED INVESTIGATIONS IN 2020

Prepared for the Sixty-first Annual Meeting of the Technical Subcommittee
of the Canada-United States Groundfish Committee

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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, except for Pacific halibut, 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 140º 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) FMPs. 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. ADF&G personnel are listed in Appendix I by division and region. The Southeast Region extends from the Exclusive Economic Zone (EEZ) equidistant line boundary in Dixon Entrance north and westward to 144º 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 in Sitka, Juneau, and Petersburg. Sitka staff is comprised of the project leader, one fishery biologist, and one full-time fishery technician. Staff in Juneau includes one full-time fishery biologist and one seasonal fishery technician, 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 typically 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 inseason management of the groundfish resources. Inseason 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 2020. The ADF&G research vessel *R/V Medeia* is home ported in Juneau and is used to conduct the annual sablefish marking survey.

2. Central Region

The **Central Region** commercial fisheries groundfish management and research staff are primarily located in Homer. The management staff in Homer consists of an area management biologist, an assistant area management biologist (serves as regional port sampling and age reading project leader), a research analyst (processes fish tickets and manages databases), a fisheries biologist (serves as lead port sampler and age reader), and two seasonal fisheries technicians (samplers stationed in Seward and Homer with travel to Whittier); additional seasonal technicians are utilized in Homer and Cordova as funding allows for sampling, observing, and age reading. The area management biologist serves as a member of the Council's GOA Groundfish Plan Team. The research staff in Homer consists of a Groundfish research project lead, a fishery biologist, and a research analyst. Commercial Fisheries groundfish staff are supported by regional staff in Anchorage.

Commercial fisheries groundfish staff are responsible for the research and management of groundfish species harvested in Central Region, which includes state waters of Cook Inlet and Prince William Sound (PWS) areas, as well as federal waters for lingcod, and black, deacon, and dark rockfishes. Within Central Region, groundfish species of primary interest include sablefish, Pacific cod, walleye pollock, lingcod, rockfishes, skates, sharks, and flatfishes. Management staff collect harvest data through commercial groundfish sampling, fishermen interviews, logbooks, and onboard observing. 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 are collected and entered into local databases to provide additional information, including catch composition, catch per unit effort (CPUE), depth, and location data. Research staff produce relative abundance estimates from bottom trawl surveys conducted in Kachemak Bay and in the inside waters of PWS. Bottom trawl surveys in PWS are conducted by ADF&G research vessel R/V *Solstice*, which is based in the port of Cordova.

3. Westward Region

The **Westward Region** Groundfish management and research staff are 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 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, dark 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 like 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 inseason 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 (NMFS, 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 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 2020, ADF&G AKFIN personnel processed 12,952 groundfish fish tickets, collected 23,642 groundfish biological samples and measured 20,029 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 2020

ADF&G Region	Total fish tickets
1 - Southeast	3,303
2 - Central	1,823
4 - Westward; Kodiak, Chignik, AK Pen.	6,555
4 - Westward; BSAI	1,271
Total	12,952

Groundfish Biological Data Collection - Calendar Year 2020

ADF&G Region	AWL samples collected	Age estimates produced by regional personnel	Age estimates produced by the ADU lab
1 - Southeast	5,862	n/a	6,792
2 - Central	7,384	4,160	5,163
4 - Westward	10,396	3,914	n/a
Total	23,642	8,074	11,955

b. Interagency Electronic Reporting System - eLandings (Contact Carole Triem)

ADF&G maintains a commercial harvest database, based on landing report receipts – fish tickets. These data are comprehensive for 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 CFEC, 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 (Figure 1). The web-based reporting component of this system is eLandings (Figure 2). The application for the at-sea catcher processor fleet is seaLandings. Vessels using the seaLandings application upload landing and production reports to the centralized database. 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 IERS has been successfully operated in Alaska's commercial fisheries since August 2005. To date, approximately 1.5 million landing reports have been submitted to the eLandings repository database. More than 99% of all groundfish landings are submitted electronically.

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 2020 salmon season, 96% percent of all salmon landings were submitted electronically.

Implementation of statewide electronic reporting of shellfish and herring fisheries is a goal; however, this ambitious undertaking has been delayed. Development resources have been focused on completing the Processor HTML5 application, to improve the reporting experience for processor users. Turnover at all three agencies have contributed to the delays. Due to the complexity of the eLandings system, training new staff requires up to two years before he/she can act without review.

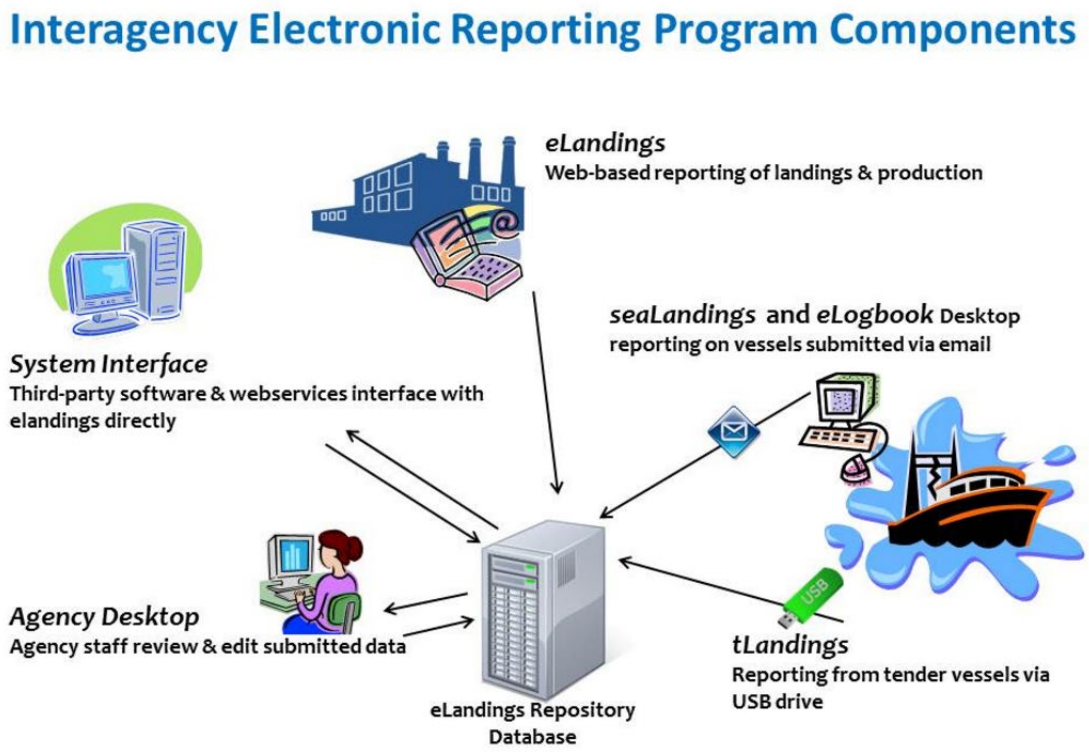

Figure 1.–Data are reported by the seafood industry using eLandings web, seaLandings and tLandings. Agency staff review, edit and verify landing and production reports within the eLandings agency desktop tool. Industry can pull harvest data for their company from the database using the eLandings system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

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 2020, the IERS recorded 163,627 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 is provided by ADFG and NMFS staff, who monitor the eLandings Help Desk email address. IFQ reporting support is provided by the NOAA Fisheries Data Technicians.

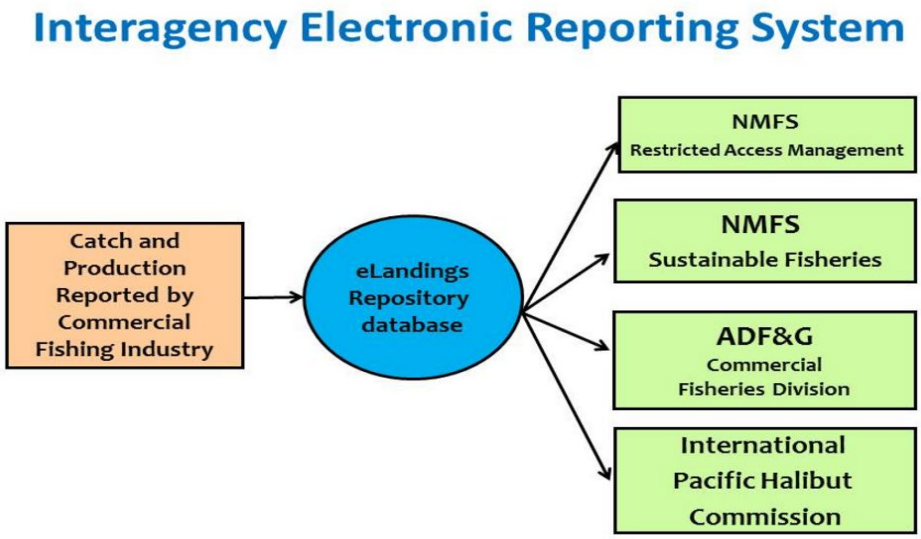

Figure 2.–Interagency staff have established methods to pull data from the repository database into their databases of record. The ADF&G fish ticket records are pulled into the commercial fisheries fish ticket database once data verification has occurred.

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

The ADF&G Gene Conservation Laboratory (GCL) is a statewide program located in Anchorage. The mission of the GCL is to protect genetic resources and provide genetic information and advice to department staff, policy makers, and the public to support management of resources.

In the past, the GCL collected genetic information on black, yelloweye, light and dark dusky rockfish, and pollock (a list of *Sebastes* and pollock tissue samples stored at GCL can be found in

Appendix III). The GCL used traditional genetic markers, such as allozymes, mitochondria DNA, and microsatellites, to identify larval and juvenile rockfish (Seeb and Kendall 1991), to study population structure of black rockfish in the Gulf of Alaska (Seeb 2004), and to investigate spatial and temporal genetic diversity in walleye pollock from Gulf of Alaska, eastern Bering Sea, and eastern Kamchatka (Olsen et al. 2002).

In 2019, the GCL developed an operational plan with Division of Sport Fish to sample and analyze yelloweye and black rockfish from inside and outside waters of Prince William Sound, North Gulf of Alaska, and Southeast Alaska (Howard et al. 2019a-c). The GCL used Restriction site Associated DNA Sequencing (RAD-Seq) to develop a new set of Single Nucleotide Polymorphism (SNP) genetic markers and has genotyped the black and yelloweye rockfish for the genetic population structure. The data are currently being analyzed.

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 2020, the ADU received 7,566 otolith sets from central and southeast Alaska commercial and survey sampling (representing eight groundfish species). The ADU produced 13,560 ages and distributed 11,955 ages to region managers, including data from samples received in previous years but processed in 2020. 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 2020, quality control procedures resulted in an additional 9,574 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 3,795 age estimates. Given production, quality control, and training procedures, the ADU recorded 26,929 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 (15,915 otoliths in 2020, representing 13 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 size-at-age values were developed from Ludwig 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 2020, ADU personnel participated in age structure exchanges to address agency and TSC concerns, prepared CARE documents for the TSC meeting, and participated in virtual meetings. The ADU contributed to a sablefish exchange with the Alaska

Fisheries Science Center in Seattle, WA (AFSC), Northwest Fisheries Science Center in Newport, OR NWFSC, and Fisheries and Oceans Canada (DFO); a rougheye exchange with AFSC; a lingcod otolith exchange with ADF&G Homer-Sport; and a yelloweye rockfish exchange with ADF&G Homer.

The ADU is funded by the State of Alaska, AKFIN, and special project support. In fiscal year 2020, approximately 54% of funding was provided by the State of Alaska, 30% by AKFIN, and 15% from research grants. During 2020, the ADU employed 9 people (approximately 41-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, except for the sport halibut fishery which is managed by the IPHC and NMFS. 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, lingcod, and sablefish; the primary bottomfish species targeted by the sport fishery. Statewide data collection programs include an annual mail survey (Statewide Harvest Survey, SWHS) that estimates overall catch and 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 and release of selected species including halibut, rockfish (pelagic, yelloweye, or other nonpelagic), lingcod, sablefish, and salmon shark in the charter boat fishery.

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.

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 is funded through sport fishing license sales, 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 144º W. longitude. Regional staff in Juneau coordinate a data collection program for halibut and groundfish in conjunction with a regionwide salmon harvest studies project. The regional research coordinator, project leader, and the project research analyst are based in Juneau. The project biometrician is stationed in Anchorage. Since 2014, the area management biologists in Yakutat, Juneau, Sitka, Petersburg/Wrangell, Ketchikan, and Craig have been responsible for the onsite daily supervision of the field technicians. A total of 25-30

technicians work at the major ports in the Southeast region, where they interview anglers and charter operators and collect data from sport harvests of halibut and groundfish while also collecting data on sport harvests of salmon. In 2020, an Action Plan was developed which guided the collection of data during onsite surveys to minimize impacts of COVID to staff and sport anglers. Low sport fishing license sales in 2020 due to travel restrictions in combination with COVID-related extraction plans resulted in elimination of staffing the port of Elfin Cove in the Southeast region harvest assessment project.

Biological data collected included lengths of halibut, rockfish, lingcod, and sablefish, sex of lingcod, sex and age of black rockfish at Sitka, and genetic information of black rockfish; technicians also collect other basic data including the sport fishery sector (charter or unguided) and the statistical areas fished. Otoliths were collected from black rockfish landed at Sitka for estimation of age composition in 2016–2020. Genetic information was collected from black rockfish in 2020. Data summaries were provided to the Alaska BOF, other ADF&G staff (especially through the Statewide Rockfish Initiative), 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/Skagway, Sitka, Juneau, Petersburg/Wrangell, 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 BOF.

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 consists 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 is based in the Homer office, consisting of a project leader, project assistant, and six technicians. Seasonal technicians collected data from the sport harvest at six major ports in the region. Low sport fishing license sales in 2020 due to travel restrictions resulted in funding cuts to the Southcentral region harvest assessment project. One technician position was not filled, but the data collected by this technician were collected by other project personnel.

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 length, age, and sex of halibut, rockfishes, lingcod, and sharks; sablefish, Pacific cod, and other infrequently harvested sport bottomfish species may also be sampled opportunistically. All non-halibut age reading was done in Homer, and the staff members are active participants in CARE. Halibut otoliths were forwarded to the IPHC for age reading.

Southcentral Region staff are responsible for management of groundfish fisheries, except halibut, in state and federal waters. In addition, staff provide sport halibut harvest statistics to the IPHC and the Council, assist in development and analysis of the statewide charter logbook program and SWHS, provide information to the BOF, advisory committees, and local fishing groups, draft and review proposals for sport groundfish regulations, and disseminate information to the public.

II. Surveys

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

III. Marine Reserves

Nothing to report for 2020.

IV. Groundfish Research, Assessment, and Management

A. Hagfish

1. Research

In 2016, the **Southeast Region** began an opportunistic survey for hagfish *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 on 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 742 hagfish have been sampled with the largest length recordings for *E. deani* at 770 mm for females and 620 mm for males (Figure 3; Contact Rhea Ehresmann).

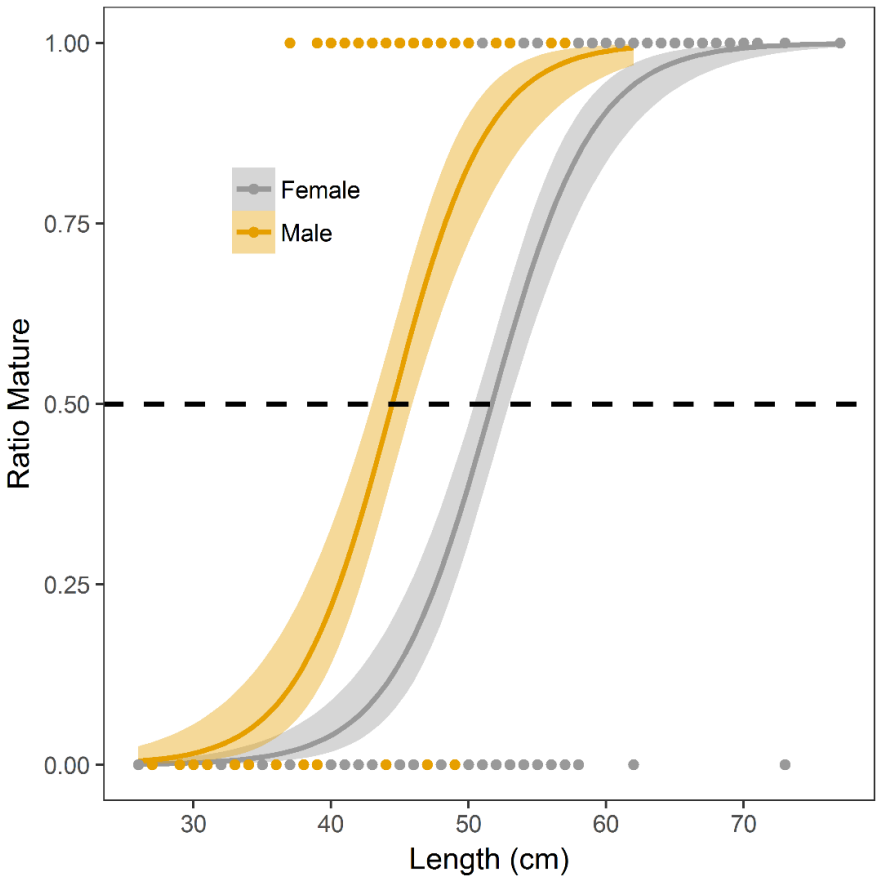

Figure 3.–.Preliminary size at 50% maturity with 95% confidence intervals for male (44.4 cm, n=182) and female (51.6 cm, n=269) *E. deani* in southern Southeast Alaska.

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 2018, six hagfish management areas were created within the Southeast Region. In 2020, one commissioner's permit was issued for directed fishing of hagfish in the **Southeast Region**. There has been an increase in interest in this fishery with several fishermen requesting information in 2020 with the anticipation of obtaining permits in 2021.

4. Fisheries

The directed fishery for hagfish in the Southeast region has a total guideline harvest level (GHL) of 77.1 mt for 2020, which was a 22.7 mt increase from the 2019 GHL. In 2020 a total of 55.5 mt of hagfish were harvested in the directed fishery. The primary species caught is *E. deani* and a market has been developing for Alaskan hagfish where they are sold for food. 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

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 1,979 boat-trips and 8,757 angler-days of effort targeting or harvesting groundfish species in 2020. Interviewed anglers caught seven salmon sharks and kept six, caught one sleeper sharks and did not retain any, and caught 359 spiny dogfish and kept five. Biological data were obtained from two salmon sharks (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 the **Central Region**, bycatch had historically been set at 20% of the round weight of the target species on board a vessel, the maximum allowable retention amount in regulation; however, from 2014 through 2020, allowable bycatch levels of all shark species in aggregate (includes spiny dogfish) were set at 15% by emergency order (EO).

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 overharvest, 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 2020.

4. Fisheries

No applications for commissioner's permits were received in 2020, and no permits have been issued in **Central Region** since 2006. During 2020, there was no commercial harvest of spiny dogfish as bycatch in Cook Inlet Area with 4.3 mt harvested in PWS.

Estimates of the 2020 sport harvest of sharks are not yet available, but harvest in 2019 was estimated at 115 sharks of all species in Southeast Alaska and 157 sharks in Southcentral Alaska. The precision of these estimates was relatively low; the Southeast estimate had a CV of 39% and the Southcentral estimate had a CV of 31%. The statewide charter logbook program also required reporting of the number of salmon sharks kept in the charter fishery. In 2019, 6 salmon sharks were harvested by charter anglers in Southeast, 15 were harvested in Southcentral, and 1 in Western Alaska. Charter anglers are believed to account for most of the sport salmon shark harvest.

C. Skates

1. Research

A population abundance index from the PWS bottom trawl survey is generated annually for three skate species (Figure 4). The survey occurs in Eastern PWS; the time series begins in 1999 for big and longnose skates and 2001 for Bering skate. The 2020 PWS survey was conducted in a new survey area and was not part of the historical index survey. Aleutian skates are also captured in the survey, but their occurrence is too low to estimate abundance. Bering skate CPUE has increased from 2007 to 2019 and is presently above the long-term survey average. Big skate CPUE has generally increased since 2001 and has been above the long-term average since 2014. Longnose skate CPUE fell to a survey low in 2017 but was near a survey high in 2019 (Contact Wyatt Rhea-Fournier).

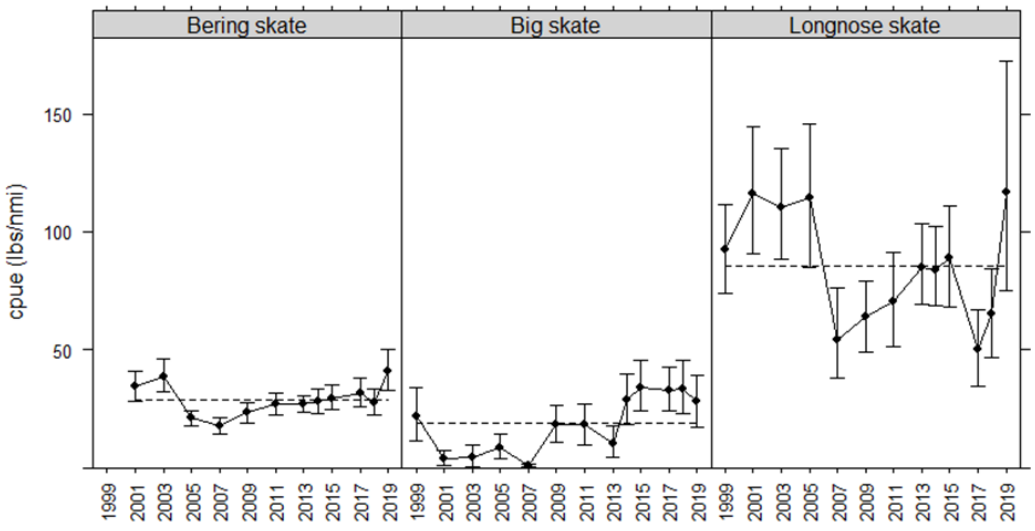

Figure 4.–PWS trawl survey CPUE estimates for skates with 90% confidence intervals. Dotted line represents the long-term survey average.

2. Assessment

There are no stock assessments for skates in state waters but the PWS trawl survey biomass time series as well as biomass time series from other Central Region trawl surveys in Kachemak and Kamishak Bays in Cook Inlet have recently been included in the federal stock assessment of the skate stock complex in the GOA (Ormseth 2019).

3. Management

A commissioner's permit is required before a directed commercial 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 the **Central Region**, skates are harvested commercially as bycatch up to 5% of target species; this allowable bycatch level is set by EO to align with the NMFS maximum retainable allowance (MRA) for skates in the GOA.

A directed fishery in 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 included a logbook requirement.

In the Cook Inlet Area, there was no harvest of skates in 2020. In PWS, skate harvest was 7.9 mt in 2020, an increase from 5.7 mt in 2019. Due to bycatch limits set as a percentage of the targeted species, harvest levels of the target species may affect the amount of bycatch harvested. In 2020, federal Pacific cod fisheries were closed, and state-waters Pacific cod fisheries set at lower harvest levels, which decreased the amount of bycatch caught, particularly with longline gear.

Over the last ten years, in **Southeast Region**, skate landings in internal waters of Northern Southeast Inside (NSEI) and Southern Southeast Inside (SSEI) fluctuated with a low harvest in 2011 of 1.5 mt and a high in 2014 of 18.7 mt. In 2020, a total of 3.6 mt of skates were landed. Skate harvest fluctuates with current market value.

D. Pacific cod

1. Research

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

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 the coefficient of variation (CV) ranging from 0.16 to 0.54 and averaging 0.28. The survey occurs in Eastern PWS and the Pacific cod time series begins in 1991. Estimated CPUE dropped substantially in 2017 and remained low in 2019 (Figure 5).

In the Central Region, skipper interviews and biological sampling of commercial Pacific cod deliveries from Cook Inlet and PWS areas during 2020 occurred in Homer, Seward, Whittier, and

Cordova. 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).

The **Division of Sport Fish—Southcentral Region** creel sampling program also collects data on Pacific cod catch by stat area (on a vessel-trip basis) through dockside interviews, and lengths of sport-caught Pacific cod, though this is a secondary objective and there are no sample size targets. Interviewed anglers caught 1,504 Pacific cod in 2020, of which 1,132 were retained. Biological data were collected from 132 Pacific cod in Southcentral Region. No information is collected in the Southeast Region creel survey program on the Pacific cod sport fishery.

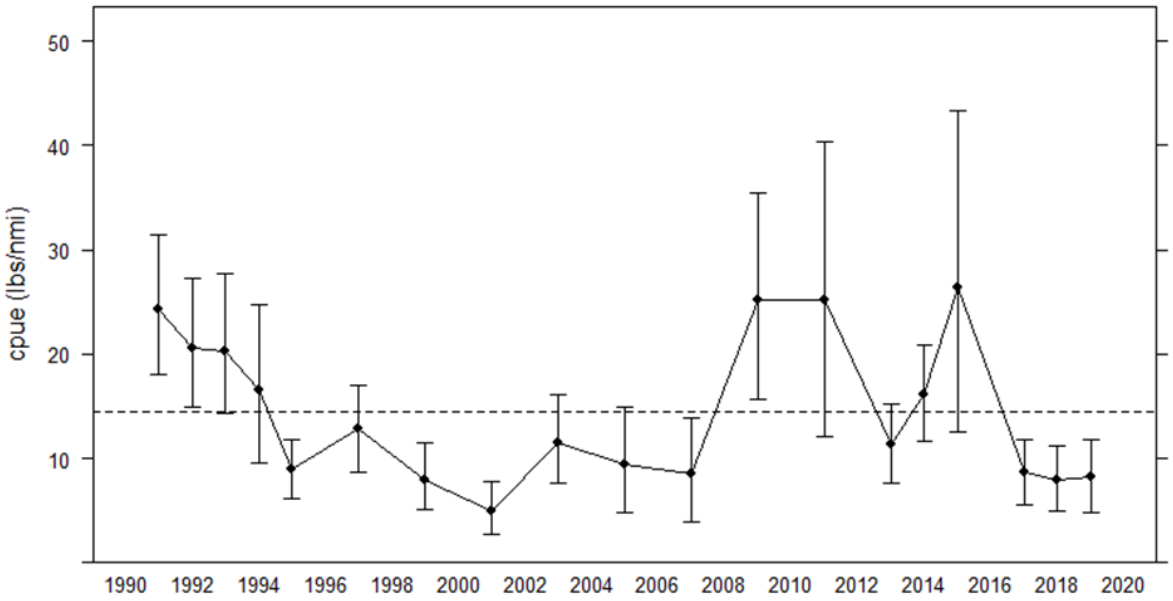

Figure 5.–PWS trawl survey CPUE estimates for Pacific cod with 90% confidence intervals. Dotted line represents the long-term survey average.

2. Assessment

No stock assessment programs were active for Pacific cod during 2020.

3. Management

The 2020 federal/parallel fisheries in the Gulf of Alaska (GOA) were closed and state-waters season opening dates were coordinated with the federal closure to allow for orderly and manageable fisheries. In some areas, the state-waters guideline harvest levels (GHLs) were based on a 35% reduction from the maximum prescribed harvest limits in regulation. This GHL reduction provided the opportunity for limited fisheries in state waters while recognizing the need for conservative fishery management at current Pacific cod stock levels.

The internal waters of the **Southeast Region** are comprised of two areas, NSEI and SSEI Subdistricts. 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 inseason 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; however, the federal fisheries, and subsequently the state parallel fisheries in Southeast state outer coast waters were closed in 2020.

In the GOA, Pacific cod Management Plans are 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 high level of interest from the longline gear group. Guideline harvest levels are further allocated by gear type.

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. Most CGOA state-waters fisheries open after the respective gear sector closure in the federal Pacific cod A season, generally late winter through early spring. A 58-foot overall length (OAL) vessel size limit is in place for the Chignik and South Alaska Peninsula Areas. The Cook Inlet and Kodiak Areas have a harvest cap for vessels larger than 58-ft OAL that limits harvest to a maximum of 25% of the overall GHL. If the GHL is not fully harvested, the fishery management plans allow removal of area exclusivity, vessel size restrictions, and gear limits later in the season to increase harvest to promote achievement of GHL.

In the **Bering Sea/Aleutian Islands area**, a Pacific cod Management Plan for an exclusive Aleutian Islands Subdistrict, 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 35% of the Aleutian Islands ABC for Pacific cod and may not exceed 15 million lbs.

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. During the 2020 season, new regulations adopted at the January Board of Fisheries meeting became effective on February 28. These new regulations closed the state-waters fishery for trawl vessels over 60 feet OAL and pot vessels over 100 feet OAL on February 17 at 11:59pm Alaska time. All state waters west of 170° W long reopened for trawl vessels 100 feet or less OAL and pot vessels 125 feet or less OAL on March 15 at 12:00 noon Alaska time.

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 9 percent of the Bering Sea ABC for Pacific cod in 2020. 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. Additionally, there is a Pacific cod season open to vessels 58 feet or less OAL using jig gear. The fishery GHL is set at 100,000 pounds which is subtracted from the overall Bering Sea ABC for Pacific cod. The season opens May 1.

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 SWHS.

4. Fisheries

Most of the Pacific cod harvested in the **Southeast Region** are taken by longline gear in the NSEI Subdistrict during the winter months. 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, the Pacific cod harvest has been largely sold for human consumption. A total of 193 mt of Pacific cod were harvested in Southeast state-managed (internal waters) fisheries during 2020 with 177 mt harvested from the directed fishery (Figure 6).

For **Central Region** Pacific cod fisheries, the dominant gear type has been pot gear in Cook Inlet Area and longline gear in PWS fisheries. In the **Cook Inlet**, **Kodiak**, **Chignik**, and **South Alaska Peninsula** state-waters Pacific cod fisheries, pot gear vessels are allocated 70% of the GHL and jig gear vessels are allocated 30% of the GHL; however, pot gear vessels often harvest a larger percentage if GHLs are not on track to be met and gear and exclusivity restrictions are lifted. In the **Dutch Harbor Subdistrict** state-waters Pacific cod fishery, pot and jig gear are legal gear types however each gear has a separate allocation. In the **Aleutian Islands Subdistrict** state-waters fishery, trawl, jig, longline, and pot are all legal gear types. Pot, trawl, and longline vessels participated in 2020; however, harvest by gear type is confidential due to the number of processors and vessels.

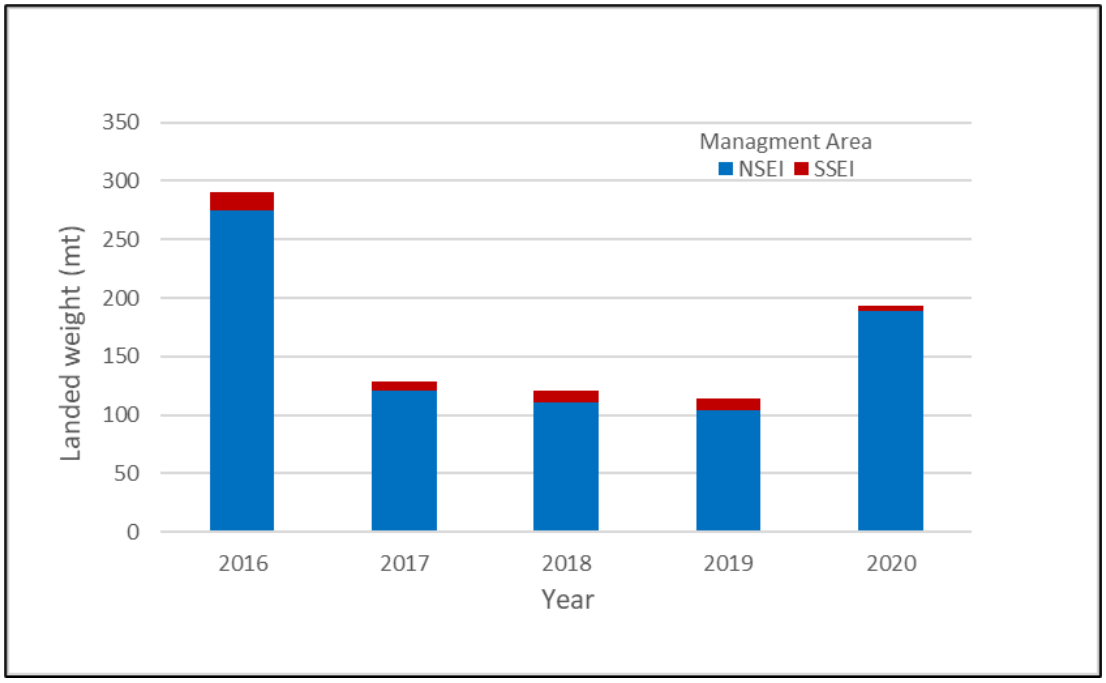

Figure 6.–Annual harvest of Pacific cod in the Northern Southeast Inside (NSEI) and Southern Southeast Inside (SSEI) management areas in Southeast Alaska from 2016–2020 for the directed and bycatch fisheries.

In the **Central Region**, the Cook Inlet Area state-waters fishery GHL is based on 3.75% of the federal CGOA Pacific cod ABC and the PWS GHL is based on 25% of the EGOA ABC. The 2020 GHLs for the state-waters Pacific cod seasons in the Cook Inlet and PWS areas of the Central Region were 206 mt and 198 mt, respectively. The Cook Inlet Area GHL was a decrease of 29% from 2019 and in PWS the decrease was even greater, at a 53% reduction. This follows a decrease of approximately 80% from 2017 to 2018 following a sharp decline in abundance observed in the NMFS survey and a subsequent decline from 2018 to 2019 in both areas.

Pacific cod harvest in 2020 from the state-waters seasons was 192 mt from Cook Inlet Area and 196 mt from PWS. In Cook Inlet Area, the GHL is allocated 85% to pot gear and 15% to jig gear; pot vessels achieved their allocation; however, jig vessels only harvested 27% of their allocation. For PWS, the GHL is allocated 85% to longline gear and 15% to jig and pot gear combined; longline achieved their allocation; pot and jig vessels harvested 10% of their allocation in 2020.

In the **Westward Region**, the Kodiak Area state-waters Pacific cod GHL is based on 12.5% of the annual CGOA Pacific cod ABC, the Chignik Area GHL is based on 8.75% of the annual CGOA ABC, and the South Alaska Peninsula Area GHL is 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 2020 Pacific cod GHLs were 687 mt in the Kodiak Area, 481 mt in the Chignik Area and 963 mt in the South Alaska Peninsula Area. Total state-waters Pacific cod catch in the Kodiak, Chignik, and South Alaska Peninsula was 689 mt, 445 mt, and 930 mt, respectively. Pot gear vessels took approximately 77% of the total 2020 catch in these state-waters Pacific cod fisheries. In the Aleutian Islands Subdistrict state-waters Pacific cod 2020 GHL 6,804 mt. Legal gear is limited to nonpelagic trawl, pots, longline and jig gear during state-waters the Pacific cod fishery. The 2020 total state-waters Pacific cod catch for the Aleutian Islands Subdistrict was 6,762 mt. The **Dutch Harbor Subdistrict** state-waters Pacific cod 2020 GHL for pot gear is based on 9% of the annual Bering Sea Pacific cod ABC. In 2020, the total state-waters catch for the Dutch Harbor Subdistrict pot gear fishery was 14,029 mt. The Dutch Harbor Subdistrict state-waters Pacific cod GHL for jig gear is 45 mt, which is subtracted from the annual Bering Sea Pacific cod ABC. The 2020 harvest for this fishery is confidential due to limited participation.

Estimates of the 2020 sport harvest of Pacific cod are not yet available from the SWHS, but the 2019 estimates were 13,762 fish in the **Southeast Region** and 11,802 fish in the **Southcentral Region**. The estimated annual harvests for the recent five-year period (2015-2019) averaged 12,222 fish in Southeast Alaska and 20,190 fish in Southcentral Alaska. Statewide Pacific cod harvest peaked at over 60,000 fish in 2014 and in 2018 was at the lowest level since 2003.

E. Walleye Pollock

1. Research

In the **Central Region** skipper interviews and biological sampling of PWS commercial trawl pollock deliveries during 2020 occurred in 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 and aged by Homer staff (Contact Elisa Russ).

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 ranging from 0.15 to 0.67 and averaging 0.26. The survey occurs in Eastern PWS and the pollock series begins in 1994. Estimated CPUE was down in 2014 to a survey low, and 2019 was well below the long-term average (Figure 7).

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).

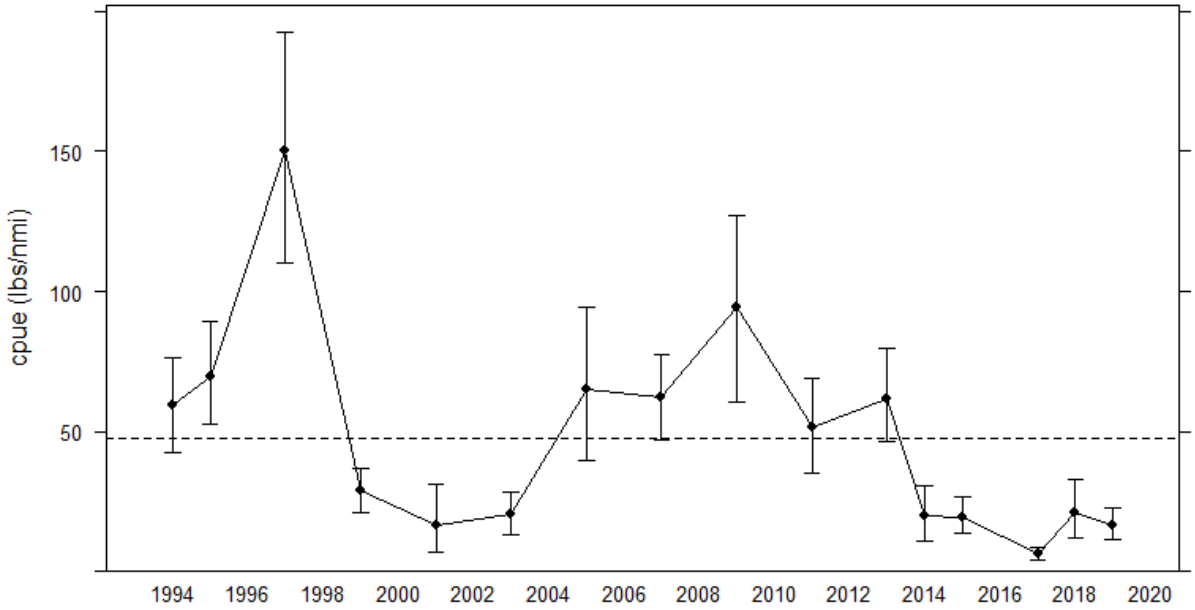

Figure 7.–PWS trawl survey CPUE estimates for Walleye pollock with 90% confidence intervals. Dotted line represents the long-term survey average.

2. Assessment

No stock assessment work was conducted by the department on pollock in 2020.

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 an ADF&G 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 addition, the Rockfish Management Plan allows 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).

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.

4. Fisheries

The 2020 PWS pollock pelagic trawl fishery opened January 20 and closed February 29. There were 27 landings made by 14 vessels with a total harvest of 2,731 mt, or 100% of the 2,712 mt GHL, which included harvest from the test fishery; interest in the fishery was high because of low Pacific cod abundance and corresponding harvest levels. Rockfish bycatch during the fishery totaled 7.9 mt, below the 11.5 mt allowed as bycatch to the pollock harvested. Other bycatch limits were achieved and exceeded. The harvest bycatch cap for salmon was 0.92, with a harvest of 1.02 mt. In addition, the squid harvest cap was 69.1 mt and the fleet harvested 69.8 mt. In the Cook Inlet Area, no seine pollock commissioner's permits were issued in 2020. Pollock was harvested in **Central Region** as bycatch to other groundfish fisheries at low levels; in 2020, 0.02 mt was harvested in Cook Inlet Area and 0.28 mt in PWS (Contact Jan Rumble).

F. Pacific Whiting (hake)

1. Research

There was no research conducted on Pacific whiting (hake) in 2020.

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 2020. Currently in **Central Region** and **Southeast Region** Pacific whiting (hake) are grouped with the "other groundfish" assemblage 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 2020.

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 2020. Currently in the **Central Region** and **Southeast Region** grenadiers are considered part of the "other groundfish" assemblage 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 rockfish (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; however, 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 most groundfish fisheries. The logbook program is designed to obtain detailed information regarding specific harvest location. In 2020, length, weight and age structures were collected from 244 yelloweye rockfish caught in the halibut commercial longline fisheries. There were no yelloweye rockfish sampled from the directed fishery due to the directed fishery closure in 2020.

Skipper interviews and port sampling of commercial rockfish deliveries in **Central Region** during 2020 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 DSR and slope species. The directed jig fishery in the Cook Inlet Area that targets PSR opens July 1 and historically has been the focus of rockfish sampling during the last half of the year. Sample data collected includes date and location of harvest, species, length, weight, sex, gonad condition, and otoliths. Homer staff determine ages of PSR and DSR otoliths; otoliths from slope and thornyhead rockfish species are sent to the ADF&G Age Determination Unit in Juneau. In 2018, a new project was initiated to study genetic variation between outside waters of North Gulf, outside waters of PWS, and inside waters of PWS for both yelloweye and black rockfish; tissue samples were collected in 2018 and 2019 with genetic analysis to follow. Additionally, ovaries were collected from both species of rockfish in 2019 and 2020 for maturity and fecundity studies. An age structure exchange was also conducted on yelloweye rockfish between commercial and sport age reading staff in Homer. The genetics and gonad collections, and age structure exchange, were conducted as collaborative interdivisional research as part of the ADF&G Statewide Rockfish Initiative (SRI) initiated in 2017 (Contact Elisa Russ).

Funding for **Central Region** DSR and lingcod ROV surveys ended in 2016 and surveys have not been conducted since then. Rockfishes are captured in Central Region bottom trawl surveys for Tanner crab. All rockfish are sampled for length, weight, sex, and age structures. Rougheye/blackspotted rockfish composed >90% of the rockfish catch by weight in all years. A population abundance index from the PWS bottom trawl survey is estimated for rougheye/blackspotted rockfish each year of that survey with CV estimates ranging from 0.16 to 0.40 and averaging 0.25. The survey occurs in Eastern PWS and the time series begins in 1991. Estimated CPUE has been below the long-term survey average since 2014 and was the lowest in the time series in 2019 (Figure 8; Contact Mike Byerly or Wyatt Rhea-Fournier).

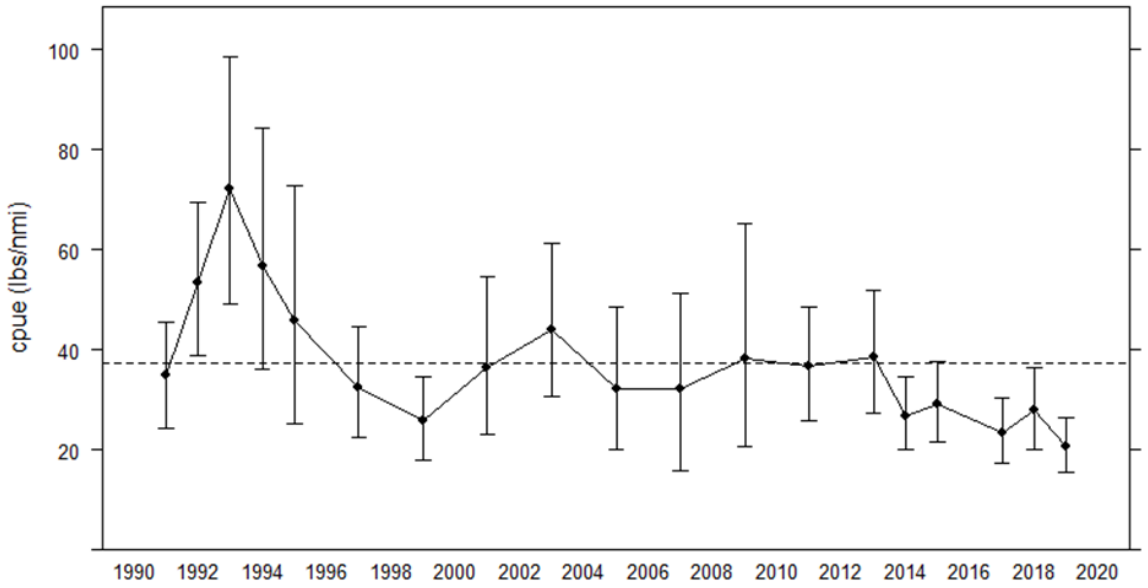

Figure 8.–PWS trawl survey CPUE estimates for rougheye/blackspotted rockfish with 90% confidence intervals. Dotted line represents the long-term survey average.

The **Westward Region** continued port sampling of several commercial rockfish species in 2020. 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 have completed aging black rockfish otoliths through the 2020 season. The Westward Region also continued to conduct hydroacoustic surveys of black and dark rockfish in the Northeast, Afognak, Eastside, and Southeast districts of the Kodiak Management Area in 2020 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 2021. As one of ADF&G's SRI research priorities, a black rockfish maturity study was initiated in 2019 and collections continued through 2020 with the goal of updating the maturity parameters for black rockfish in the Kodiak Area (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 ports. Rockfish objectives included estimation of: 1) species composition, 2) length composition and average weight, as derived from a length-weight regression relationship, 3) age and sex composition of black rockfish at Sitka, 4) genetic composition of black and yelloweye rockfish (no yelloweye rockfish genetic samples were collected in 2020 due to a closure in all SEAK waters that extended to all DSR species) from inside and outside ports, and 5) biomass of total sport removals (harvest and release mortality). Primary species harvested in Southeast Alaska included yelloweye, black, copper, silvergray, and quillback rockfish. A total sample size of 3,001 rockfish was obtained from the sport harvests at Ketchikan, Craig, Wrangell, Petersburg, Juneau, Sitka, Gustavus, Elfin Cove, and Yakutat in 2020 (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 rockfish harvest and groundfish effort by port. The 2020 total sample size from the sport harvests at Seward, Valdez, Whittier, Kodiak, Central Cook Inlet, and Homer

was 3,550 rockfish (Contact Martin Schuster). The Division of Sport Fish conducted research in PWS on the ability of six species of rockfish to resubmerge unassisted when released at the surface. This study is ongoing. Results will be published as an ADF&G Fishery Data Series report towards the end of 2022 (Contact Brittany Blain-Roth or Jay Baumer). In addition, a University of Alaska, Fairbanks Graduate Student/ADF&G Biologist collected life history information on yelloweye rockfish to improve estimates of maturity, fecundity and skip-spawning between Prince William Sound and Northern Gulf of Alaska (Arthur 2020; Contact Brittany Blain-Roth or Donald Arthur). Similar data are currently being collected from black rockfish in the same area.

The **Age Determination Unit** continued the North Pacific Research Board funded project 1803: Reconstructing reproductive histories of yelloweye rockfish through opercular hormone profiles. ADF&G personnel sampled opercula and otoliths from female yelloweye rockfish along with black rockfish and other representative species. Ages were estimated using otoliths and corresponding bands were identified on opercula. Sampled opercula material was sent to Baylor University to analyze progesterone, cortisol, and ecdysteroid concentrations (Figure 9). Lifetime reproductive and stress hormone profiles were constructed for 13 female yelloweye rockfish and individual profiles were used to estimate age of sexual maturity and annual spawning frequency. Preliminary results suggest the onset of sexual maturity for female yelloweye rockfish is between 8 and 20 years and mean spawning frequency could be as low as 40%. Also, there was little evidence supporting reproductive senescence in female yelloweye rockfish. Yelloweye and black rockfish operculum samples paired with blood and ovary samples are being processed to validate results (Contact Dion Oxman).

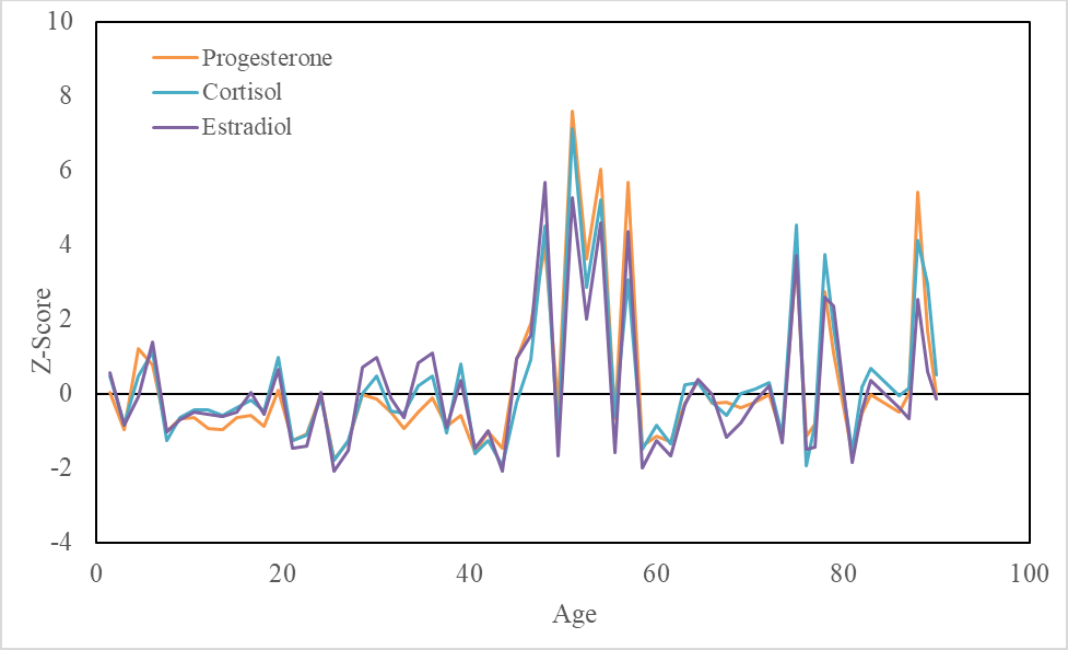

Figure 9.–Normalized progesterone, cortisol, and estradiol concentrations recovered from annual growth increments within the operculum of a 90-year-old female yelloweye rockfish via immunoassay extraction. Hormone concentrations were normalized based on concentrations prior to the first peak, assuming this were estimates of non-reproductive levels.

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 no deeper than 180 m, and the average weight of yelloweye rockfish. 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 SEO is set by multiplying the lower bound of the 90% confidence interval of total biomass for yelloweye rockfish by the natural mortality rate (M = 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 (2.0 to 4.0%). However, starting in 2015, the non-yelloweye DSR biomass estimate has been calculated from catch data from 2010–2014 recreational, commercial, and subsistence fisheries and 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 surveys for non-DSR species (e.g., black rockfish) have not been conducted since 2002.

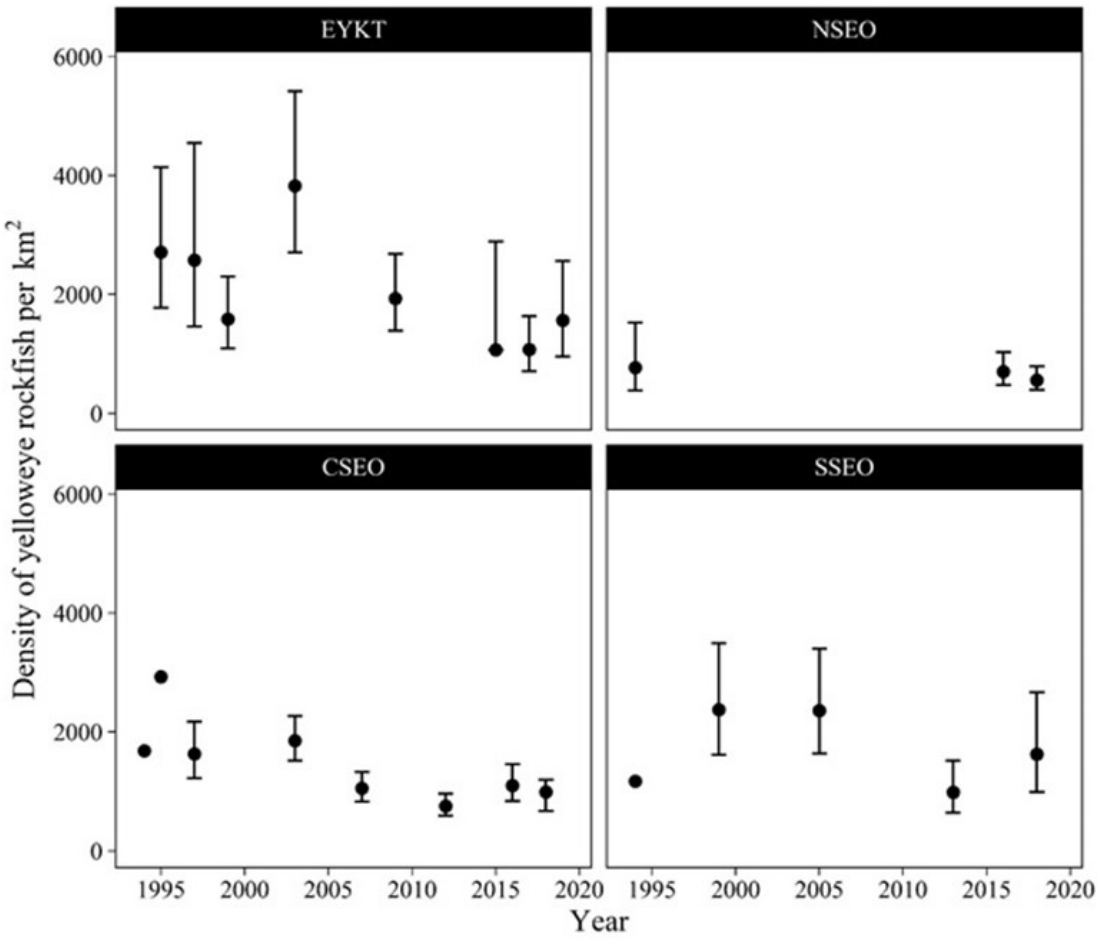

Figure 10.–Density estimates of yelloweye rockfish with 90% confidence intervals in the Eastern Gulf of Alaska management areas.

Prior to 2012, line transect surveys were conducted using a manned submersible. Since 2012, visual surveys have been conducted using a remotely operated vehicle (ROV). The last submersible surveys were conducted in 2020 in the Southern Southeast Outside (SSEO) section, 2019 in the Eastern Yakutat (EYKT) section, and 2018 in the SSEO, Central Southeast Outside (CSEO) and Northern Southeast Outside (NSEO) sections. Density estimates were derived from

each of these surveys except for the SSEO management area where the data analyzation is in progress (Figure 10). Density estimates by area for the most recent submersible surveys ranged from 553–1,562 yelloweye rockfish per km^2 with CV estimates of 14–25%. The most recent density estimates for EYKT in 2019 was 1,562 yelloweye rockfish per km^2 (CV = 25%), SSEO in 2018 was 1,624 yelloweye rockfish per km^2 (CV = 25%), CSEO in 2018 was 897 yelloweye rockfish per km^2 (CV = 14%), and NSEO in 2018 was 544 yelloweye rockfish per km^2 (CV = 18%). In addition, fish lengths for yelloweye rockfish, lingcod, black rockfish, and halibut are measured from ROV video data using stereo camera imaging software (SeaGIS, Ltd; Contact Rhea Ehresmann).

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; however, assessment surveys have not been conducted in recent years (Contact Mike Byerly or Wyatt Rhea-Fournier).

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, and Southeast districts of the Kodiak Management Area (Contact Carrie Worton).

3. Management

Management of DSR in the **Southeast Region** is based upon a combination of total allowable catch (TAC), guideline harvest range (GHR), seasons, gear restrictions, and trip and bycatch limits. Directed commercial harvest of DSR is restricted to hook-and-line gear. Directed fishing quotas are set for Southeast Outside 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 included logbook requirements and 5-day trip limits of 6,000 pounds sold per vessel in all areas except EYKT where the trip limit was 12,000 pounds. New regulations adopted in 2018 further restricted trip limit rules by prohibiting additional fish to taken or allowed on board a vessel until the trip limit period expired. The EYKT trip limit amount was also reduced to 8,000 pounds.

The directed DSR fishery season in SEO occurs in the winter, prior to the start of the commercial halibut IFQ season. The SEO TAC for DSR is set after decrementing estimated subsistence harvest, the remainder is allocated 84% to the commercial sector and 16% to the sport sector. The 2020 ABC for DSR was 238 mt, which resulted in a TAC of 231 mt with allocations of 194 mt to commercial fisheries and 37 mt to sport fisheries. Estimated subsistence harvest for 2020 was 7 mt. A significant portion of the total commercial harvest is taken as bycatch during the halibut fishery. Each year DSR bycatch is estimated and decremented from the commercial TAC prior to the determining whether an area has enough quota remaining to prosecute a directed fishery.

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 the Eastern Gulf of Alaska Area. 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 Rhea Ehresmann).

In the **Central Region**, commercial rockfish fisheries in 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 PSR species. At the spring 2000 BOF meeting, the BOF closed directed rockfish fishing in PWS 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 PSR. 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 PSR fishery. In addition, logbooks are required during the Cook Inlet Area 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 PWS 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 district fishery at a time. Registration requirements also exist for the Chignik and South Alaska Peninsula Areas. In the Kodiak Area, fishers may retain up to 20% of black rockfish by weight caught incidentally during other fisheries, and in the Chignik and South Alaska Peninsula Area black rockfish may be retained up to 5% by weight. In the Aleutian Islands District of the Bering-Sea Aleutian Islands Area, fishers may retain up to 20% of black rockfish and 20% for dark rockfish caught in the Bering Sea–Aleutian Islands area incidentally during other fisheries. 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).

In 2020, the Kodiak Area black rockfish GHL was 55 mt, allocated across five districts. GHLs were attained in four sections of the Kodiak Area for a total harvest of 52 mt. The Chignik and South Alaska Peninsula area GHLs were 45 mt and 34 mt, respectively. In the South Alaska Peninsula Area, the 2020 black rockfish harvest was confidential due to low participation and harvest, and no black rockfish harvest occurred in the Chignik Area. The Aleutian Islands GHL for black rockfish was 41 mt allocated across three sections. No vessels made directed black rockfish landings in the Aleutian Islands Area; all harvest was incidental retention. In 2020, less than 1 mt of black and 9.2 mt of dark rockfish were harvested incidental to other groundfish species.

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*.

Beginning in 2020, a functioning deepwater release mechanism was required on all vessels sport fishing in Alaskan saltwater, and all rockfish not harvested were required to be released at depth of capture or at a depth of 100 feet.

For the 2020 season, the **Southeast Region's** sport bag and possession limit for pelagic rockfish was five fish per day, 10 in possession. The sport fishery in Southeast outside waters is allocated a portion of the TAC (16%) for demersal shelf rockfish. By emergency order, all Southeast Alaskan waters were closed to nonpelagic rockfish retention from January 1, 2020, through January 31, 2021. A second emergency order was subsequently issued allowing for retention of slope rockfish in Southeast waters from April 3, 2020, through January 31, 2021. There was a bag and possession limit of one slope rockfish in all waters of Southeast Alaska during that time; waters remained closed to retention of DSR species. For the entire Southeast Alaska region, charter operators and crew members were not allowed to retain nonpelagic rockfish (except species from the slope assemblage) while clients were on board the vessel.

As in Southeast Alaska, sport rockfish regulations in the **Southcentral Region** largely rely on bag limits for regulating effort and are more restrictive for nonpelagic species to account for their lower natural mortality rates. The open season for rockfish was year-round in all areas. In 2020, the bag limit in Cook Inlet was five rockfish daily, only one of which could be a nonpelagic species; the possession limit was two bag limits. The bag limit in PWS was four rockfish per day, with a possession limit of eight rockfish; only one per day and one in possession could be a nonpelagic species. The bag limit in the North Gulf Coast area was four rockfish per day, only one of which could be a nonpelagic species; the possession limit was two bag limits. The bag limit for Chiniak and Marmot Bay areas off Kodiak was three rockfish, no more than two of which could be nonpelagic and one of which could be a yelloweye. The bag limit in the remainder of Kodiak was five rockfish, no more than two of which could be nonpelagic species, and no more than one of the nonpelagic species could be a yelloweye. The bag limit in the Alaska Peninsula and Aleutian Islands was 10 rockfish per day. For all areas off Kodiak, the Alaska Peninsula, and the Aleutian Islands, the possession limit was two bag limits.

In 2017 the department began the SRI, an interdivisional process to develop comprehensive harvest strategies for groundfish, beginning with black and yelloweye rockfish using information from all fisheries. 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, 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 only black rockfish occurred in the **Southeast Region** in 2020. The directed fisheries for DSR in SEO and inside waters were closed in 2020 due to stock health concerns. DSR was taken as bycatch with 98.5 mt harvested in SEO and 19.6 mt in internal waters. Harvest in the directed black rockfish fishery in Southeast Outside District (SEO) was 6.2 mt and black rockfish bycatch harvest in all groundfish, halibut, and salmon troll fisheries in SEO was 3.5 mt. Slope, PSR, and thornyhead rockfish were also taken as bycatch in internal waters with 51.2 mt harvested in 2020.

For **Central Region** commercial rockfish fisheries, 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 2020, the total rockfish harvest was 17.9 mt, a decrease from 30.0 mt in 2019. In Cook Inlet Area, the PSR harvest and other rockfish were similar, 9.2 mt and 8.7 mt. A majority of the PSR harvest came from the directed jig fishery, at 99%. The other rockfish were harvested as bycatch in longline groundfish fisheries (4.8 mt), and jig fisheries (3.9 mt). In PWS, rockfish are only harvested as bycatch, as there is no directed fishery. The harvest of 37.3 mt in 2020 was an increase of ~14% from 2019, although still well below the GHL. The majority of rockfish bycatch in PWS was caught by longline gear (75%) followed by trawl gear (25%) with the minimal remaining harvested by jig gear.

Sport harvest (guided and unguided) is estimated primarily through the SWHS (all species combined). Charter vessel logbooks provide reported harvest for the guided sector in three categories - pelagic, yelloweye, other nonpelagic. Additionally, species-specific data are available only from creel surveys.

Harvest reporting areas for these programs are different than commercial reporting areas, making direct comparisons difficult. Methods were recently developed to estimate sport harvest in numbers of fish for black and yelloweye rockfish in the same geographic reporting areas as used in commercial fisheries. Results are expected to be published by the end of 2021. Additional methods are being developed to estimate sport removals by weight and for other rockfish species.

Sport rockfish harvest is typically estimated in numbers of fish. Estimates of the 2020 harvest are not yet available from the SWHS, but the 2019 estimates for all species combined were 156,368 fish in Southeast and 174,105 fish in Southcentral Alaska. The average annual harvest estimates for the recent five-year period (2015–2019) were 166,156 rockfish in Southeast Alaska and 153,311 fish in Southcentral Alaska. Rockfish harvest in the sport fishery has increased substantially in recent years, likely in response to more restrictive limits for other sport caught fish.

I. Thornyhead rockfish

1. Research

There was no research conducted on thornyhead rockfish in 2020.

2. Assessment

There are no stock assessments for thornyhead rockfish.

3. Management

There is no directed fishery for thornyhead rockfish, and they may only be harvested as bycatch in halibut and other groundfish fisheries.

4. Fisheries

In **Central Region** thornyhead rockfish are retained as bycatch up to 10% in aggregate with other rockfish 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 thornyhead rockfish and other rockfish in aggregate may be retained. Proceeds from bycatch overages are forfeited to ADF&G.

In **Southeast Region**, thornyhead were retained as bycatch, based on the round weight of the target species, of up to 15% in aggregate with other rockfish. For pot gear only, 5% thornyhead bycatch was permitted in the sablefish and Pacific cod fisheries. Any bycatch overages that occurred in state waters were forfeited to ADF&G.

J. Sablefish

1. Research

In 2020, sablefish longline surveys were conducted for both the NSEI and SSEI areas in the **Southeast Region**. 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 2020 three permit holders participated in the surveys and could sell their Personal Quota Share (PQS), thus, reducing the impact on the quota for fish harvested and sold by the state. The department plans to allow permit holders to harvest their PQS aboard future NSEI longline surveys.

In addition to longline surveys, an annual mark-recapture survey has been conducted using longlined pots since 2000. This survey has used the state research vessel *Medeia* since 2012. During the 21-day NSEI survey that took place in May 2020, 29 longlined pot sets were made, and 7,916 sablefish were marked and released. Sablefish were targeted by statistical area in proportion to the commercial catch using logbook data from the three previous years. The mark-recapture results serve as a component of the NSEI stock assessment. The tagging survey is not scheduled for 2021 due to budgetary constraints (Contact Rhea Ehresmann).

In **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 fish, 318 fish, 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.

Sablefish 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 the catch composed of predominantly 1 and 4-yr old fish. Precision in the estimates is generally poor with CV values ranging from 0.17 to 0.86 and averaging 0.42. The survey occurs in Eastern PWS and the sablefish series begins in 1994. Estimated CPUE declined sharply in 2007 and has remained very low though has been increasing in the last two surveys as a larger cohort moves through the population (Figure 11; Contact Wyatt Rhea-Fournier).

In **Central Region**, skipper interviews and biological sampling in 2020 occurred in Whittier and Seward. Data collected included date and location of harvest, length, weight, sex, gonad condition, and otoliths. Otoliths were 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).

The Division of Sport Fish—Southeast Region collects catch, harvest, and biological data from sablefish as part of a marine harvest survey program. Ports sampled in 2020 included Juneau, Sitka, Craig, Petersburg/Wrangell, Gustavus, Yakutat, and Ketchikan. Length data were collected from 217 sablefish in 2020, primarily from the ports of Sitka, Ketchikan, and Juneau (Contact Mike Jaenicke). Port sampling of sablefish is opportunistic in **Southcentral Region** and is not a primary

objective of the program; port samplers in Southcentral Alaska measured only one sablefish from the sport harvest in 2020, reflecting the relatively low harvests. Interviewed anglers in Southcentral Region retained 38 of 69 sablefish caught in 2020).

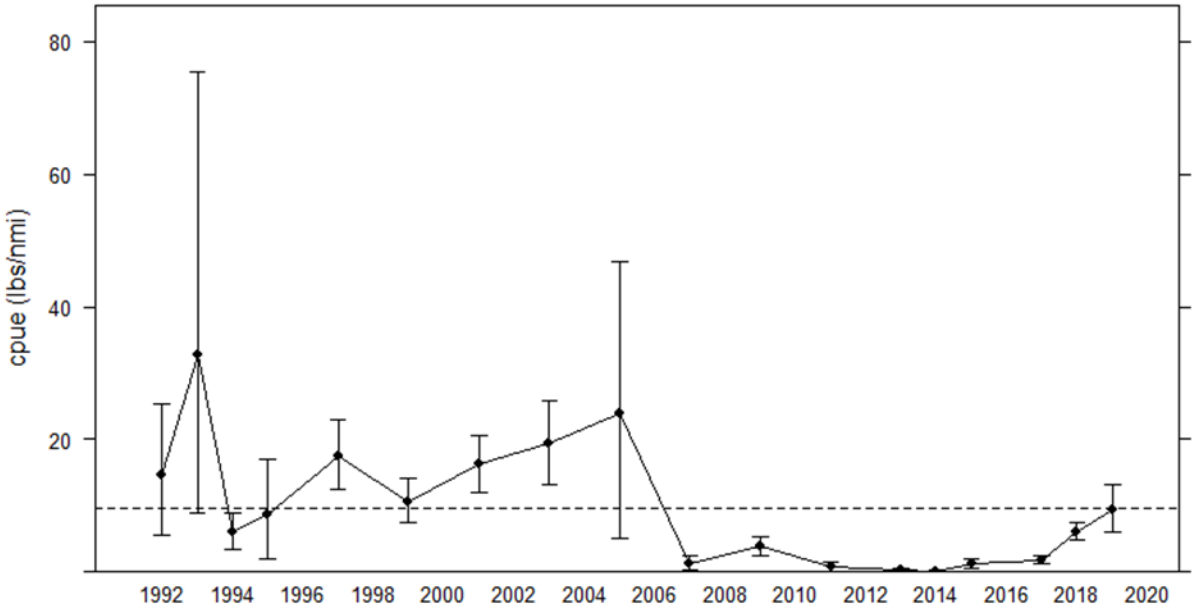

Figure 11.–PWS trawl survey CPUE estimates for sablefish with 90% confidence intervals. Dotted line represents the long-term survey average.

The **Age Determination Unit** worked with the AFSC, Auke Bay Laboratories to investigate the use of age-0 lapillar and sagittal otoliths to infer daily growth in juvenile sablefish in the Gulf of Alaska. Otoliths from rhinoceros auklet bill-load samples from 1978 to present, survey samples, and samples from laboratory reared juvenile sablefish were removed and prepared. The external and internal structure of otoliths collected from bill-load samples were significantly damaged due to storage and were not useful for modeling size nor daily growth. Focus was shifted to samples included in growth trials conducted at Auke Bay Laboratories. Otolith size and daily increment width was measured using image analysis. The relationships between lapillar and sagittal otolith increment width, comparison of total increment count on both structures, otolith size to fish size, temperature and feeding ration were modeled. Evaluations of survey and laboratory reared juvenile sablefish found close agreement in daily age between otoliths, strong linear relationships between otolith size and fish size, and peak otolith increment width in both structures between 14°C and 18°C and at maximum feed rations. These findings support current and previous studies, and investigators plan to publish methods and findings (Contact Kevin McNeel).

2. Assessment

In the **Southeast Region**, the department uses 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. 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 the NSEI Subdistrict, the 2020 recommended ABC was 551.9 mt, a 15% increase from the 2019 ABC. This ABC was generated using a new statistical catch-at-age (SCAA) model that replaced past methodology that partitioned

a mark-recapture abundance estimate using fishery age compositions. This new model reduces reliance on the annual mark-recapture project by integrating multiple indices of abundance and biological data (catch, mark-recapture abundance estimates, survey and fishery CPUE, and survey length and age composition data). The 2020 recommended ABC is less than the SCAA model's maximum permissible ABC of 580.8 mt, as management decision was implemented to constrain recommended ABCs to a maximum 15% annual change. Consequently, the 2020 recommended ABC was held to 551.9 mt (15% increase from 2019) rather than 580.8 mt (a 21% increase). This management procedure has been shown to increase fishery stability, maximize catch, and achieve biological goals in long-term simulations.

In the SSEI Subdistrict, the 2020 annual harvest objective (AHO) was set at 259.7 mt, a 3% reduction from 2019. For SSEI, 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. There were several negative indicators that contributed to the reduction in AHO, including decreased survey and fishery CPUE, truncation of the population age structure, and suppressed spawning stock biomass (Contact Rhea Ehresmann).

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. 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 sablefish household fishing permits. Bag (50 fish per permit), vessel (200 fish per vessel) and hook (350 per permit) limits were adopted for personal use sablefish fishing at the 2015 BOF meeting. In 2017, the CFEC approved a public petition for SSEI longline permit holders to fish pot gear due to whale depredation and rockfish bycatch issues, thus making the permit a longline/pot permit. The NSEI fishery is restricted to longline gear only. In 2018, the BOF amended SSEI sablefish longline and pot seasons to a concurrent season occurring from June 1 to November 15, adopted new regulations to require commercial sablefish pots to have two 4-inch circular escape rings and allowed for the possession of live sablefish for delivery as a live product. In 2018, the BOF also approved the use of pots in the personal use sablefish fishery with a limit of two pots per person, 8 pots per vessel.

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.

In **Central Region**, the Cook Inlet Area sablefish GHL is set using a 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 1.8 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 NMFS and ADF&G indicate that sablefish populations throughout the GOA including PWS 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 2020. PWS fishery management developed through access limitation and in 2003 into a shared quota system wherein permit holders are allocated shares of the GHL. 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; new season dates of April 15–August 31 were also adopted. The new season opening date, one month later than in previous years, was adopted to reduce the opportunity for whale 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 register and fill out logbooks provided by ADF&G. In 2013, the BOF changed the season opening and closing dates reverting them back to coincide with the federal IFQ season.

The **Southeast Region sport fishery** for sablefish was regulated for the first time in 2009. Sport limits in 2020 were four fish of any size per day, four in possession, with an annual limit of eight fish applied to nonresidents. The sablefish sport fishery in the remainder of Alaska has no limits.

4. Fisheries

In the **Southeast Region**, the 2020 NSEI quota was set at 502 mt of sablefish. The fishery is managed by equal quota share with each permit holder allowed 6.7 mt. The 2020 NSEI sablefish fishery opened August 15 and closed November 15 by regulation. The 75 permit holders landed a total of 500 mt. The SSEI quota was set at 260 mt with an equal quota share of 11.8 mt for each of the 19 permit holders for longline/pot gear and three permit holders for pot gear. The 2020 SSEI sablefish fishery season allowed longline/pot gear permits to fish from June 1–November 15. The 22 permit holders landed a total of 179 mt of sablefish (Contact Rhea Ehresmann).

In the **Central Region,** the 2020 Cook Inlet Area sablefish fishery opened at noon July 15 with a GHL of 34.9 mt and closed by regulation on December 31; no effort or harvest occurred in 2020. Harvest and effort have been steadily decreasing in the Cook Inlet Area fishery and 2020 marked

the first time that there was zero harvest. The 2020 PWS sablefish fishery opened April 15 with a GHL of 75.7 mt. Because of COVID-19 complications, some of the fleet requested an extension of the season to December 31 (from the regulatory closure of August 31), which was granted. PWS sablefish harvest totaled 43.2 mt, a slight increase from 2019; harvest has been steadily increasing since the 7.7 mt historical low in 2015, although still not achieving the GHL. There has been an increase in the use of pot gear in the fishery in recent years in response to excessive orca depredation on sablefish in PWS, but longline gear still dominated in 2020 harvesting 72% and 28% harvested with pot gear (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 2020 Aleutian Island fishery opened concurrent with the IFQ season, on March 14 with pot, longline, jig and hand troll gear allowed. The GHL was set at 195.0 mt for the state-waters fishery. The harvest from the 2020 Aleutian Islands sablefish fishery was 180.4 mt. The season remained open until the November 15 closure date (Contact Asia Beder).

The most recent sablefish sport harvest estimates from the SWHS are for 2019. The estimated harvest was 18,376 fish in Southeast Alaska and 7,426 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 15,612 sablefish in Southeast Alaska and 2,133 sablefish in Southcentral Alaska in 2019 (Contact Bob Chadwick, Jason Dye).

K. Lingcod

1. Research

In the **Southeast Region**, dockside sampling of lingcod caught in the commercial fishery continued in 2020 in Sitka with 1,051 fish sampled for biological data. Otoliths were sent to the ADU in Juneau for age determination (Contact Rhea Ehresmann).

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; however, evidence of sex (vent/papilla) was required by EO to remain intact on lingcod by having fishermen cut one inch forward of the vent when gutting fish (Contact Elisa Russ). Funding for Central Region lingcod ROV surveys ended in 2016 and no surveys have been conducted in recent years (Contact Mike Byerly).

The Division of Sport Fish—Southeast Region continued to collect catch, harvest, and biological data from lingcod as part of a marine harvest survey program with lingcod harvests tabulated back to 1987 in some ports. Data collected in the program include statistics on effort, catch, and harvest of lingcod taken by Southeast Alaska sport anglers. Ports sampled in 2020 included Juneau, Sitka, Craig, Petersburg/Wrangell, Gustavus, Yakutat, and Ketchikan. Length and sex data were collected from 986 lingcod in 2020, primarily from the ports of Sitka, Ketchikan, Craig, Gustavus, 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 556 lingcod from the sport harvest at Seward, Valdez, Whittier, Kodiak, and Homer in 2020. These ports account for most of the sport lingcod harvest in Southcentral Alaska (Contact Martin Schuster).

2. Assessment

There is no stock assessment for lingcod in the **Southeast Region**.

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 2020 (Contact Mike Byerly or Wyatt Rhea-Fournier).

3. Management

Management of commercial lingcod fisheries in the **Southeast Region** 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. The 27-inch 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 BOF established a super-exclusive directed fishery registration for lingcod permit holders fishing in the IBS area.

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 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 the **Southeast Region**, 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 2020 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 limits or annual limits. Additional restrictions were put into place for nonresidents to keep harvest from exceeding allocations specified by the Alaska BOF:

> (1) In the Northern Southeast area, nonresidents were allowed one fish daily and in possession, the fish must be 30–35 inches in length or at least 55 inches or greater in length, and the annual limit was two fish, of which one must be 30–35 inches in length and one must be at least 55 inches in length;

(2) In the Southern Southeast area, nonresidents were allowed one fish daily and 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 fish, of which one must be 30–45 inches in length and one must be at least 55 inches in length.

(3) In the Yakutat area, nonresidents were allowed one fish daily and in possession, the fish must be 30–50 inches in length or at least 55 inches or greater in length, and the annual limit was two fish, of which one must be 30–50 inches in length and one must be 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 and protect 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 and possession limits in 2020 were two fish in Cook Inlet and Kachemak Bay, and one fish in North Gulf Coast and Prince William Sound areas. All areas except Kodiak had a minimum size limit of 35 inches to protect spawning females (Contact Jason Dye or Matt Miller). The bag limit in Kodiak, the Alaska Peninsula, and the Aleutian Islands was two lingcod with a possession limit of four fish. There were no size limits in these areas.

4. Fisheries

Lingcod are the target of a "dinglebar" troll fishery in the **Southeast Region**. Dinglebar troll gear is power troll gear modified to fish for groundfish. Additionally, lingcod are landed as significant bycatch in the DSR longline, halibut longline, and salmon troll fisheries. The directed fishery landed 137 mt of lingcod in 2020. An additional 39 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. The 2020 lingcod GHL was 23.8 mt in Cook Inlet Area, and the fishery closed November 13 when the GHL was achieved; increases in lingcod effort and harvest in recent years began in 2017 with similar harvest levels in 2017, 2018, and 2019. In PWS, lingcod harvest in 2020 was 11.7 mt in PWS, down slightly from 2019. Approximately 92% of the lingcod harvest from Cook Inlet Area was from the directed lingcod jig fishery and the remainder was harvested as bycatch primarily with longline gear. In PWS, the lingcod harvest was split evenly between longline gear (49.5%) and jig gear (49.5%) with a minimal amount harvested with pot gear; 7.3 mt or 62% of total harvest was from the directed fishery (Contact Jan Rumble).

In the **Westward Region**, no directed lingcod effort occurred during 2020. All lingcod were harvested incidental to other federal and state managed groundfish fisheries. The 2020 harvest totaled 17 mt in the Kodiak Area, 1.5 mt in the Chignik area, and <1 mt in the South Alaska Peninsula and Aleutian Islands – Bering Sea Areas combined.

Sport lingcod harvest estimates from the SWHS for 2019 (the most recent year available) were 14,055 lingcod in Southeast Alaska and 14,288 lingcod in Southcentral Alaska. The average estimated annual harvest for the recent five-year period (2015-2019) was 13,077 fish in Southeast Alaska and 13,455 fish in Southcentral Alaska.

L. Atka Mackerel

1. Research

There was no research on Atka mackerel during 2020.

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 2020. Currently in the **Central Region** and **Southeast Region** Atka mackerel are considered part of the "other groundfish" assemblage and are allowed up to 20% as bycatch in aggregate in directed fisheries for groundfish.

M. Flatfish

1. Research

There was no research on flatfish during 2020.

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 the **Southeast Region** 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.

In **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

No effort has occurred in the **Southeast Region** fishery in recent years. Since 2000, only one vessel has applied for a commissioner's permit to participate in this fishery; this vessel made a single flatfish landing in 2014. 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 2020, one commissioner's permit to catch flatfish was issued in the Cook Inlet Area and none in PWS. The purpose of the Cook Inlet Area permit was to test the viability of pot gear; however, there was limited success.

N. Pacific Halibut and IPHC Activities

The sport halibut fishery is monitored by the **Division of Sport Fish**. Data on sport fishery effort and harvest are collected through port sampling in Southeast and Southcentral Alaska, the SWHS, and charter vessel logbooks. 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 (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 Sarah Webster).

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 the **Southeast Region**. 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 the **Southeast Region,** several projects are funded through test fish funds, notably the sablefish longline assessments and mark-recapture work, the herring fishery, and some salmon assessments.

VII. Publications

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Richardson, N. 2020. Fishery management plan for the Chignik Area state-waters Pacific cod season, 2020. Alaska Department of Fish and Game, Fishery Management Report No. 20-09, Anchorage.

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Richardson, N., and N. Nichols. 2020. Fishery management plan for the Kodiak Area state-waters Pacific cod season, 2020. Alaska Department of Fish and Game, Fishery Management Report No. 20-08, Anchorage.

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A. Websites

ADF&G home page: http://www.adfg.alaska.gov

Commercial fisheries: http://www.adfg.alaska.gov/index.cfm?adfg=fishingCommercial.main

Sport fisheries: http://www.adfg.alaska.gov/index.cfm?adfg=fishingSport.main

Advisory announcements: http://www.adfg.alaska.gov/index.cfm?adfg=newsreleases.main

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

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

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

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

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

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

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

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

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

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APPENDICES

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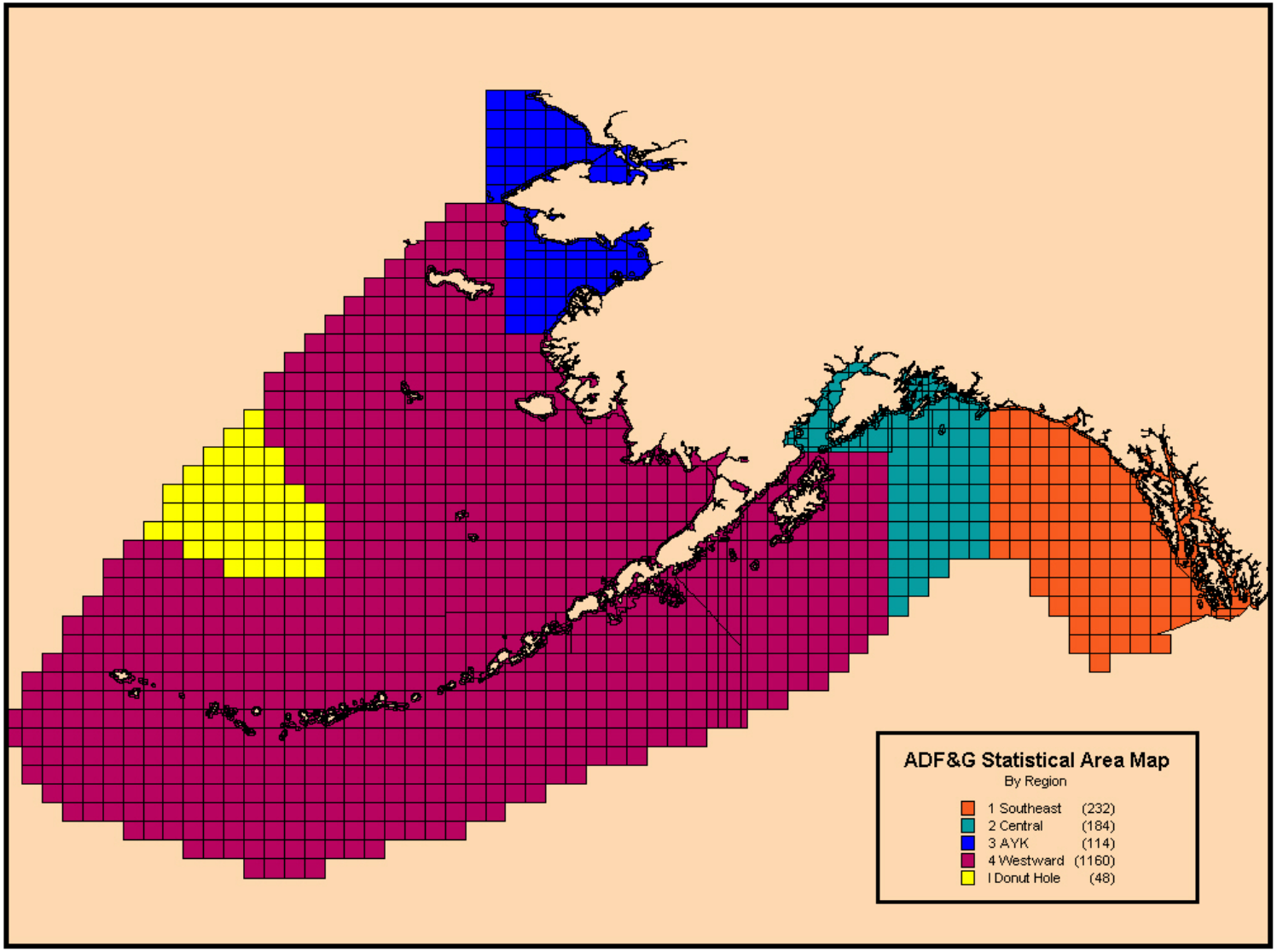
Appendix II. Map depicting State of Alaska commercial fishery management regions.



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
	Port Gravina	2008	61	fin
	Prince William Sound - inside	2018	71	fin
	Prince William Sound Marine	2018	121	fin
	Eastern North Gulf Coast	2019	51	fin
	Kodiak	2019	10	fin
	North Gulf Coast	2019	123	fin
	Prince William Sound	2019	110	fin
	Prince William Sound	2019	175	fin
	Sitka, Craig	2019	467	fin
	Sitka, Craig, Petersburg	2019	396	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
	Eastern North Gulf Coast	2019	34	fin
	Gustavas to Ketchikan	2019	719	fin
	Kachemak Bay	2019	50	fin

North Gulf Coast	2019	125	fin
Prince William Sound	2019	319	fin
Sitka, Craig	2019	31	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