California Department of Fish and Wildlife
Agency Report
to the
Technical Subcommittee
of the
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CALIFORNIA
DEPARTMENT OF
FISH &
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I. Agency Overview

Within the California Department of Fish and Wildlife (CDFW), the Marine Region is responsible for protecting and managing California's marine resources under the authority of laws and regulations created by the State Legislature, the California Fish and Game Commission (CFGC) and the Pacific Fishery Management Council (PFMC). The Marine Region is unique in the CDFW because of its dual responsibility for both policy and operational issues within the State's marine jurisdiction (0 – 3 miles). It was created to improve marine resources management by incorporating fisheries and habitat programs, environmental review and water quality monitoring into a single organizational unit. In addition, it was specifically designed to be more effective, inclusive, comprehensive and collaborative in marine management activities.

The Marine Region has adopted a management approach that takes a broad perspective relative to resource issues and problems. This ecosystem approach considers the values of entire biological communities and habitats, as well as the needs of the public, while ensuring a healthy marine environment. The Marine Region employs approximately 140 permanent and 100 seasonal staff that provide technical expertise and policy recommendations to the CDFW, CFGC, PFMC, and other agencies or entities involved with the management, protection, and utilization of finfish, shellfish, invertebrates, and plants in California's ocean waters. There are only six permanent Marine Region staff that are tasked with managing groundfish and providing policy recommendations to the CDFW, CFGC, and PFMC.

Contributed by Traci Larinto (Traci.Larinto@wildlife.ca.gov)

II. Surveys

In December 2013, the CDFW Marine Region's Statewide Marine Protected Area (MPA) Management Project initiated a contract with Marine Applied Research and Exploration to perform visual surveys statewide using remotely operated vehicle (ROV). The contract draws upon a $1.9 million grant awarded to the CDFW by the Coastal Impact Assistance Program (CIAP). The CIAP grant funds deep water surveys of MPA's and fishery resources statewide through 2016 (Figure 1). This project has allowed the CDFW to continue its deep water MPA surveys, which have been ongoing since 1999. It also has provided the opportunity to fill in gaps of coverage in surveys funded through the baseline MPA monitoring programs in the south, central, north central, and north regions. In addition to MPA focused monitoring these surveys have been designed to collect valuable information on abundance, density, size frequency and habitat associations of groundfish species in rocky habitats inside and outside of marine reserves and conservation areas.

Survey Milestones to Date

In 2014, two deployments were completed across the southern MPA region covering 52 sites and completing 142 km (88.2 mi) of transects. An additional deployment in 2014 in the northern MPA region completed 28 sites and 75 km (46 mi) of transects. In 2015, one deployment at 24 sites collected 76 km (47.2 mi) of transects within the north central MPA region. Along with hundreds of hours of video recorded during these transects approximately 33,000 high resolution digital still images were collected across all the surveys thus far. In 2016, two deployments are planned for

40 sites and 140 km (87 mi) of transects within the central MPA region. These final surveys of the CDFW grant will complete the statewide coverage of the project.

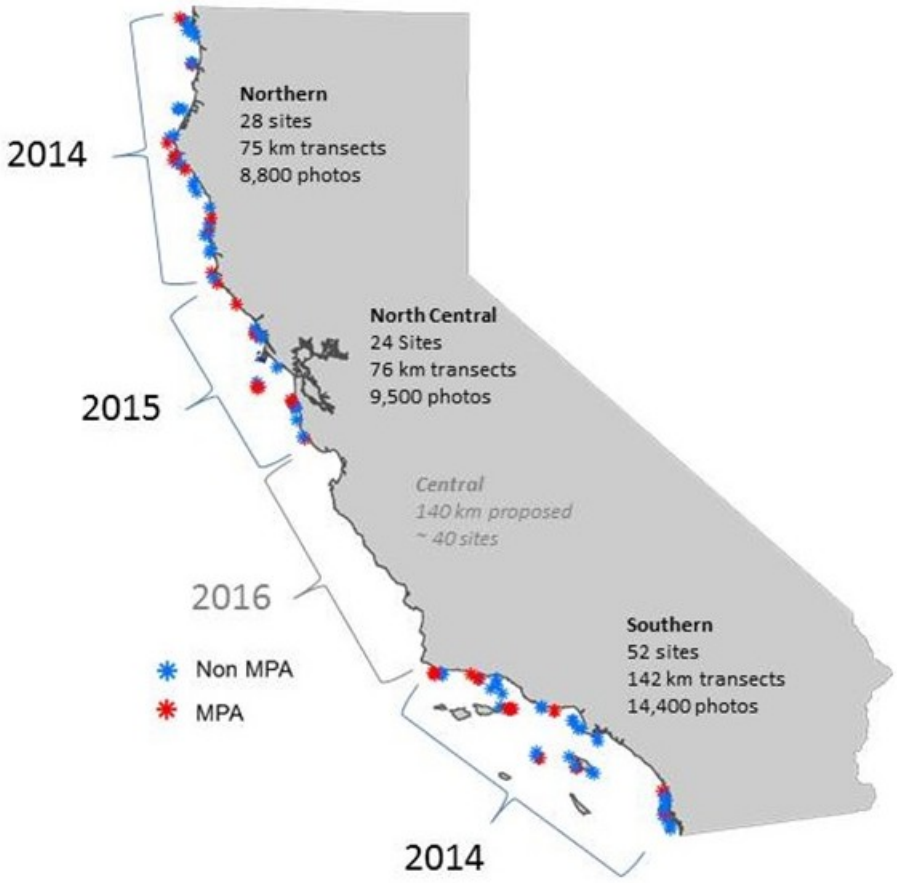

Figure 1. CDFW ROV Survey locations completed in 2014 and 2015.

Preliminary Statewide Findings

Analysis of data collected from quantitative video transects for the statewide dataset will describe baseline ecological conditions inside and outside of MPAs while examining abundance, density and size frequency of managed fish and invertebrate species. Preliminary observations appear to show high juvenile and adult lingcod (*Ophiodon elongatus*) abundance throughout entire state. Also, differential patterns of abundance were observed in northern vs. southern sites for some species. For example, in the north and north central regions, only larger adult vermillion rockfish (*Sebastes miniatus*) were observed in comparably moderate abundance vs. higher abundance and smaller size classes in the southern region. In the north central region previous surveys in 2011 showed very low abundance of brown rockfish (*S. auriculatis*) compared to the current surveys where they were one of the most prevalent species observed throughout all sites.

Next Steps

After completion of surveys in 2016, the resulting dataset from all surveys will be compiled into a searchable georeferenced database which will allow analysis for statewide and regional MPA monitoring and fishery specific needs. Detailed

processing of the video based transects records observations of all fish and macro invertebrates as well as habitat characterization. Size frequency of select species will also be determined from stereographic video. This extensive effort will provide much needed fishery independent data for multiple management uses and establishes an unprecedented set of index sites across the entire California coast.

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III. Reserves

Overview

California is home to the largest scientifically designed network of MPAs in the contiguous United States, consisting of 124 MPAs, protecting approximately 16 percent of state waters along the mainland coast and offshore islands (https://www.wildlife.ca.gov/Conservation/Marine/MPAs/Network). Pursuant to the 1999 Marine Life Protection Act (MLPA), California's existing system of MPAs was redesigned to increase its coherence and effectiveness at protecting the state's marine life and habitats, ecosystems, natural heritage, and function as a network. From 2005 to 2012, new and revised MPAs were implemented incrementally on a regional basis through four science-based and stakeholder driven MPA planning processes. The CDFW manages California's MPAs as a statewide network using a partnership-based approach, primarily through four focal areas: monitoring and research, enforcement and compliance, outreach and education, and policy and permitting.

California has developed a two-phase approach to MPA monitoring: 1) baseline monitoring and 2) long-term monitoring. Baseline monitoring data was collected through four collaborative regional MPA Baseline Programs funded by the State to establish a benchmark of ecological and socioeconomic conditions when each regional MPA network took effect, and informs a management review of the first five years of MPA implementation in each region. After the baseline monitoring period, long-term monitoring based on regional and statewide objectives, will follow and continue into the future. Long-term monitoring will seek to understand conditions and trends of marine populations, habitats, and ecosystems across regions towards a statewide network scale. Adaptive management, as defined by the MLPA, is an ongoing process which seeks to improve management by learning from program actions such as monitoring, evaluation, and other management actions that affect California's MPA network. Adaptive management coupled with a commitment to a partnership-based approach will continue to set the foundation for managing California's MPA network.

Adaptive Management Activities in 2015

The CDFW updated the 2008 Master Plan for MPAs (Master Plan). The updated Master Plan shifts the focus away from MPA design and planning towards managing California's MPA network to meet the goals of the MLPA. The CFGC is anticipated to adopt the updated plan early 2016. To improve MPA regulation compliance, the CFGC adopted a rulemaking package proposed by CDFW to provide consistency and clarity to MPA regulations. Amended regulations were implemented March 1, 2016 and include: refined boundaries, simplified MPA names, language amendments to improve clarity and consistency, addressing aquaculture concerns in

Drakes Estero State Marine Conservation Area and Morro Bay State Marine Recreational Management Area, changing Año Nuevo's designation to a state marine reserve, and updating troll gear references.

Baseline MPA Monitoring Programs

Regional MPA baseline monitoring programs were administered through a partnership among CDFW, Ocean Science Trust (OST), Ocean Protection Council (OPC), and California Sea Grant (CASG). Each regional baseline program consists of five phases: 1) secure funds and implement a process to conduct monitoring, 2) collect data, 3) analyze data, 4) report results, and 5) conduct monitoring and management reviews. Following data collection by the project researchers, the researchers work with the baseline partners to analyze the data and report the results. Baseline project summaries and technical reports are available on CASG's website, and the data is publicly available through an online portal at www.OceanSpaces.org. The status of regional baseline programs varies due to the staggered implementation of the regional MPA networks. To date, the central coast and north central coast regions baseline programs are the only completed programs. In 2013, a central coast "State of the Region" baseline MPA monitoring report was released, and in 2015 a similar north central coast "State of the Region" baseline MPA monitoring report was also released. These reports and other related material inform CDFW's five-year MPA management recommendations for the CFGC, and provide an update on regional MPA progress. Figure 2 shows the status of the regional baseline programs.

MLPA Coastal Region	*Fund projects*	*Collect data*	*Analyze data*	*Report results*	*5-year review*
Central Coast	2007	2007	2008	2010	2013
North Central	2010	2011	2013	2014	2016
South Coast	2011	2012	2014	2016	*2017*
North Coast	2014	2015	*2016*	*2017*	*2018*

= completed = underway = ~ year complete

Figure 2. Status of the regional baseline monitoring programs.

Geographic Information System (GIS) and MarineBIOS

CDFW's Marine Region GIS unit specializes in providing GIS marine and coastal data to support California marine science and management, such as spatial data related to California's coastline, bathymetry, fisheries, natural resources, and

seafloor characteristics. As a venue to discover, visualize, and access data relevant for adaptive management, CDFW's GIS unit has developed an interactive web map called MarineBIOS. This platform is continually evolving as new source data is uploaded and interface improvements are added to increase system functionality. Most recently, data from the 2015 aerial survey of coastal kelp canopies (along the mainland coast and the Channel Islands) was incorporated into the web map. For more information please visit the Marine Region GIS website.

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IV. Review of Agency Groundfish Research, Assessment and Management

A. Hagfish

There are two species of hagfish that reside off California, Pacific hagfish (*Eptatretus stoutii*) and black hagfish (*Eptatretus deani*). Of the two, the Pacific hagfish (hagfish) is the preferred species for California's export-only fishery. Using traps, fishermen land hagfish in live condition. The hagfish are usually stored dockside until packaged for live export to South Korea where they are sold live for human food. Considered scavengers, hagfish are found over deep, muddy habitat.

1. Research

The Department conducted two research studies relative to trap gear and hagfish take. The first was a 2013 research cruise in Monterey Bay which showed the influence of hole diameter on average size of trap-retained hagfish. These holes are for water circulation and to allow for the escape of small fish, the entrance funnel is larger. Prior to this research, many fishermen used 12.7 millimeter (1/2 inch) diameter holes for circulation and for escape of smaller fish. Increasing the hole diameter to 14.2 millimeters (9/16 inch) inches resulted in a 10 percent reduction of immature hagfish, thus improving average size and reducing impacts to the population. As a result, the Department recommended to the CFGC to increase in minimum hole size to 12.2 millimeters (9/16 inch).

The second research study was an evaluation of two experimental gear permits for the use of barrel traps in the Bodega Bay area conducted in 2014-15. When applying for the experimental gear permits, the fishermen noted that these were already in use in other jurisdictions and suggested that barrel traps were a way to decrease potential for negative gear interactions with other commercial benthic fisheries (e.g. Dungeness crab) and to improve catch quality by reducing dead loss or damage to captured fish through crowding. These barrel traps are approximately 40 gallons (150 liters), eight times the size of traditional bucket traps [5 gallon (19 liter)] that were allowed in the fishery at the time. A condition of the experimental gear permits required that the Department be allowed to observe fishing activity.

An earlier Department study of the smaller, bucket traps resulted in a two percent dead loss; although, one trap that was filled to capacity had a much higher loss rate. For the current study on the use of larger, barrel traps, there were no observed trips where barrel traps were filled to capacity and no dead

loss was observed. However, the greater trap volume and large number of holes allows for better water circulation, which may improve survivorship. Both fishermen reported no incidents of negative gear interaction with other fisheries or marine mammals and Department staff did not observe any interactions. Only one trap was lost throughout the entire evaluation period by experimental gear permittees. The limited logbook data (logs are not required) show that during the barrel trap evaluation period (September 2013-April 2015), the bucket trap fishery lost 141 buckets. The reasons cited for trap loss included cut ground line, lost trap string, or traps cut off by another vessel. The Department recommended to the CFGC to allow the use of barrel traps.

2. Assessment

   Little is known about the status or biomass of Pacific hagfish stocks. Since 2007, the Department's Northern and Central California Finfish Research and Management Project monitors and documents changes in the average size and spawning status of landed hagfish by sampling hagfish. Sampling activity began in Moss Landing, but ended a year later due to market changes. Currently staff collects samples from the ports of Morro Bay and Eureka. Due to the physical impossibility of accurately measuring hagfish in a live condition, staff employs a count-per-pound method to monitor changes in average size of retained hagfish. Randomly selected hagfish from sampled landings are retained for spawning status and length data. Landings have been relatively stable from 2010 to 2015, fluctuating between 360 and 745 metric tons (0.8 and 1.6 million pounds) annually. The value of the landings has ranged from $565,000 to $1.3 million per year during that same time period.

3. Management

   The commercial hagfish fishery is open access; only a commercial fishing license and a general trap permit are required. Hagfish may be taken in 19 liter (5 gallon) bucket traps, Korean traps, or, since January 1, 2016, barrel traps [approximately 150 liters (40 gallons) each]. The maximum number of traps allowed is 200 bucket traps, 500 Korean traps, or 25 barrel traps; fishermen must choose one trap type and may not combine hagfish trap types or have other, non-hagfish traps onboard when fishing with hagfish traps. When fishing barrel traps, traps may be attached to no more than three groundlines. There is no limit on the number of groundlines when using buckets or Korean traps. All traps must have a Department-approved destruct device and all holes, except for the entrance, in any hagfish trap shall have a minimum diameter of 14.2 millimeters (9/16 inch). When in possession of hagfish, no other finfish species may be possessed on board. Currently logbooks are not required for this fishery. There are no annual quotas or minimum size limits.

   Contributed by Travis Tanaka (Travis.Tanaka@wildlife.ca.gov)

B. Groundfish, all species combined

1. Research

Scientific Collecting Permits are issued by CDFW to take, collect, capture, mark, or salvage, for scientific, educational, and non-commercial propagation purposes. Permits are generally issued for three years, except that student permits are for one year. Each year the Marine Region reviews about 40 permits involving the take of groundfish. While a complete report of groundfish-related research activities isn't available for this report, the permits fall into four broad categories: 1) public display in aquariums and interpretive centers; 2) environmental monitoring; 3) life history studies that include age and growth, hormone assays and genetics for population structure; and, 4) studies related to changing environmental conditions such as ocean acidification and hypoxia.

In 2015, two studies were ongoing by Marine Region staff, and are described below.

a. Yelloweye Rockfish

The yelloweye rockfish (*Sebastes ruberrimus*) population off the West Coast was designated as an overfished stock in the early 2000s. Commercial and recreational regulations were implemented to minimize gear interactions in combination with a prohibition on retention (or limited retention in designated fishing sectors) and area closures. As a result, there has been limited opportunity to collect current biological information for studying age and growth parameters that are crucial components of stock assessment modeling. In 2010, CDFW implemented a data collection policy within the recreational sampling program (California Recreational Fishery Survey Program) to collect yelloweye that are that mistakenly landed by recreational anglers.

Between 2010 and 2015, the CDFW's Groundfish Ecosystem Management and Science Project staff has processed approximately 81 yelloweye from the recreational fishing sector. Length, weight, sexual maturity, and otoliths were collected from each specimen. A sub-set of specimens (approximately 25) were processed to collect tissue for genetic testing. The sample set ranges between 134-706 mm in total length, and are approximately 41 percent female, 38 percent male and 16 percent unknown sex. The geographic samples extend from Monterey to Crescent City with the majority coming from North of Point Arena (Fort Bragg, Shelter Cove, Eureka and Crescent City).

In anticipation of the next full stock assessment, CDFW expects to send the data from all processed samples to the appropriate agency for ageing and incorporation into the assessment's data streams.

Contributed by Caroline Mcknight (Caroline.Mcknight@wildlife.ca.gov)

b. Yellowtail Rockfish

Starting in 2013, the PFMC granted an Exempted Fishing Permit (EFP) to commercial fishermen to study a method of commercial jig fishing to determine whether it is possible to target yellowtail rockfish (*Sebastes flavidus*) inside the RCAs while avoiding overfished rockfish species. The goal of this study is to determine if alternate fishing strategies can provide additional fishing opportunities for the commercial fishery in the RCAs while avoiding overfished stocks. Data from trips taken between 2013 and 2015 indicate that the fishing method focuses catch on yellowtail and widow rockfish (*S. entomelas*) (88 percent of total catch). Catch of overfished species was minimal [bocaccio (*S. paucispinis*), canary (*S. pinniger*) and yelloweye rockfish were 8.9, 0.7 and 0.2 percent of total catch, respectively]. The remainder (2.4 percent) was a combination of shelf rockfish and other species. This EFP was renewed for 2015-2016.

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2. Assessment

The CDFW did not conduct any stock assessments in 2015 for groundfish species.

3. Management

Groundfish management is a complex issue and is conducted by the PFMC with input by CDFW as well as the states of Oregon and Washington, and guided by the federal Pacific coast Groundfish Fishery Management Plan. With the exception of some nearshore species, discussed below, harvest guidelines, fishery sector allocations, commercial trip limits and recreational management measures (e.g., bag limits, season limits) are established by the PFMC and implemented by National Marine Fisheries Service (NMFS). Additionally, the PFMC establishes rockfish conservation areas (RCA) which are spatial closures to protect overfished species.

The state's Nearshore Fishery Management Plan manages 16 species that are also listed in the federal Groundfish Fishery Management Plan [black (*Sebastes melanops*), black-and-yellow (*S. chrysomelas*), blue (*S. mystinus*), brown, calico (*S. dallii*), China (*S. nebulosus*), copper (*S. caurinus*), gopher (*S. carnatus*), grass (*S. rastrelliger*), kelp (*S. atrovirens*), olive (*S. serranoides*), quillback (*S. maliger*), and treefish (*S. serriceps*) rockfishes; cabezon (*Scorpaenichthys marmoratus*); kelp greenling (*Hexagrammos decagrammus*); California scorpionfish (*Scorpeana guttata*)], along with three other species [California sheephead (*Semicossyphus pulcher*), rock greenling (*H. lagocephalus*), and monkeyface prickleback (*Cebidichthys violaceus*)].

Inseason monitoring is used to track landings against statewide total allowable catches, statewide and/or regional allocations and trip limits. Inseason monitoring of California commercial nearshore species landings is now conducted by CDFW biologists in the areas north and south of 40°10' North Latitude near Cape Mendocino. This work is done in conjunction with inseason monitoring, management and regulatory tasks conducted by the

PFMC. Weekly tallies of landing receipts are used for inseason monitoring. At present, inseason monitoring focuses on black rockfish and sablefish (*Anoplopoma fimbria*).

For the recreational fisheries, inseason monitoring relies on data collected by CDFW's California Recreational Fisheries Survey (CRFS) staff using a combination of CRFS weekly reports that are replaced by CRFS monthly estimates, as they become available. Inseason monitoring for the recreational fisheries focuses on black rockfish and California scorpionfish as well as some overfished species, such as cowcod (*Sebastes levis*) and yelloweye rockfish. Inseason monitoring of recreational yelloweye rockfish catch is posted on CDFW's website so that the angling public can see how the season is progressing.

4. Commercial Fishery Monitoring

   Statistical and biological data from landings are continually collected and routinely analyzed by CDFW staff to provide current information on groundfish fisheries and the status of the stocks. California's primary commercial landings database is housed in CDFW's Commercial Fisheries Information System. Outside funding also enables California fishery data to be routinely incorporated into regional databases such as Pacific Coast Fisheries Information Network.

   Commercial sampling occurs at local fish markets where samplers determine species composition of the different market categories, measure and weigh fish and take otoliths for future ageing. Market categories listed on the landing receipt may be single species (e.g., bocaccio), or species groups (e.g., group shelf rockfish). Samplers need to determine the species composition so that landings of market categories can be split into individual species for management purposes. Biological data is collected for use in stock assessments and for data analyses to inform management decisions.

5. Recreational Fishery Monitoring

   The CRFS program was initiated in January 2004 to provide catch and effort estimates for marine recreational finfish fisheries. The CRFS generates monthly estimates of total recreational catch for four modes of fishing [beach/bank, man-made structures, commercial passenger fishing vessels, and private and rental boats] for six geographic districts along California's 1000 plus miles of coast. The data are used by state and federal regulators to craft regulations to protect fish stocks and provide recreational fishing opportunities. The sampling data and estimates are available on the Recreational Fisheries Information Network website.

   Contributed by Traci Larinto (Traci.Larinto@wildlife.ca.gov)

C. Pacific halibut & IPHC activities

1. Research and Assessment

   Research and assessment activities for Pacific halibut (*Hippoglossus stenolepis*) off the coast of California are conducted by the International Pacific Halibut Commission (IPHC).

2. Management

   The CDFW collaboratively manages the Pacific halibut resource off the coast of California with the IPHC, NMFS, PFMC, other west coast states, and the CFGC. Pacific halibut management activities occur on an annual timeline, with most changes to management occurring through the PFMC's Catch Sharing Plan and federal regulations published by NMFS. Changes to the Catch Sharing Plan for the following year are approved in November by the PFMC.

   Changes in management for the 2015 recreational Pacific halibut fishery off of California included a number of open and closed periods, and a new weekly inseason catch tracking and monitoring process to keep catches within the California quota. The fishery was scheduled to be open the first through the fifteenth of each month from May through August, and September 1 through October 31, or until the quota was met, whichever was earlier.

   To track Pacific halibut catch, CDFW generated a Preliminary Projected Catch amount by using sample information directly from CRFS weekly field reports to approximate catch during the lag time until monthly CRFS catch estimates are available six weeks later. The Preliminary Projected Catch would be replaced by the monthly CRFS catch estimate, once available. The CDFW provided this information online so that the angling public could see how the season was progressing (https://www.wildlife.ca.gov/Conservation/Marine/Pacific-Halibut/2015). Using this inseason tracking methodology, the quota was projected to have been met on August 12, 2015, and the fishery closed early on August 13, 2015. Final season catch estimates were 24,906 net pounds, 99 percent of the 25,220 net pound quota.

   Contributed by Melanie Parker (Melanie.Parker@wildlife.ca.gov)

V. Publications

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