

MARINE REGION

2016 YEAR IN REVIEW



Cavanaugh Gulch, near Elk
in northern California
photo by K. Joe

A Message From Craig Shuman, Marine Region Manager

Most of us have experienced *déjà vu* – that strong feeling of familiarity with an experience or event, as though we have already experienced it in the past. For Marine Region staff, many of the events in 2016 had that same strong feeling of familiarity.

Elevated levels of domoic acid continued to impact California's wildlife and fisheries, keeping commercial crabbers tied to the dock for part of the season and recreational razor clammers off the beaches of northern California for much of the year. The commercial sardine fishery remained closed for its second year and the combined effects of drought and poor ocean conditions impacted recreational and commercial salmon catches.

The "perfect storm" of large-scale ecological impacts continued to inflict ecosystem-wide changes throughout much of California's northern waters. With an exploding population of purple sea urchins devouring every frond of kelp they could find, abalone and other creatures that depend on kelp for food began to starve. This prompted the Fish and Game Commission to enact emergency regulations to curtail the recreational take of red abalone for the 2017 season and had dramatic impacts on the commercial red urchin fishery.

The warm waters that were causing problems in the north kept the run of great fishing going off Southern California, replete with odd events such as red crabs washing up

on the beach by the hundreds of thousands and reports of sea turtles more at home off the Galapagos. State record-sized tuna continued to be logged into the books by anglers and spear fishermen, besting old records by as much as 80 pounds or more.

Marine Region Mission:

To protect, maintain, enhance,
and restore California's
marine ecosystems for their
ecological values and their
use and enjoyment by the
public through good science
and effective communication.

As the offshore environment continued to experience rapid change, Marine Region staff were there monitoring, meeting with the public, and developing strategies to help better understand how the changes would affect the marine environment and our fisheries. Statewide, our biologists and analysts were busy studying, monitoring, and assessing fish and shellfish populations, including abalone, halibut (California and Pacific), Dungeness crab, bluefin tuna, market squid, rockfish,

salmon, sardine, sea cucumbers, shrimp, surfperch, and urchins, among many others. Staff also studied, monitored and assessed environmental changes off the California coast; for example, joining an effort to develop better tools for measuring the buffering action of eelgrass against ocean acidification in Humboldt Bay.

In 2016, Marine Region staff continued to develop new reporting tools for recreational and commercial catch data that will help to inform fishery management decisions. Staff continued work on the electronic log system, developing, implementing and testing

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2016 Region-Wide Accomplishments, By The Numbers...

Completed **1** new fishery management plan for California spiny lobster

Flew over **3,200** miles during aerial sardine and anchovy surveys

Reviewed over **600** environmental documents, and attended over **60** pre-project review meetings

Registered **4** new state record tuna diving and angling records

Sampled **26,200** salmon in the sport and commercial ocean salmon fisheries and collected **6,000** tags to determine the age and origin of hatchery fish

Processed over **19,800** commercial passenger fishing vessel e-log submissions on the new electronic log system

Contacted over **98,000** saltwater anglers. Observed and identified over **186,000** fish and invertebrates, and measured over **99,000** fish and invertebrates

Entered over **55,000** commercial landing receipts

Surveyed almost **60** miles of rocky seafloor habitat with a remotely operated vehicle

Reviewed and approved **140** aquaculture registration permits

Message from Craig Shuman, cont.

new improvements. Through a partnership with the Sportfishing Association of California, close to 20,000 Commercial Passenger Fishing Vessel (CPFV) e-logs were submitted through the system, representing almost 60 percent of all CPFV logs submitted in 2016. Developing improved tools for assessing fisheries is an important part of the Marine Life Management Act Master Plan amendment process, which also continued to make progress this year.

The underpinning of a fantastic administrative team made all this, and more, possible. Without their expertise, commitment and dedication, we would not have been able to achieve our region-wide objectives.

It is often said that change is inevitable. While we are hopeful that positive change will come sooner rather than later, Marine Region staff will remain vigilant, continuing to protect and maintain California's marine ecosystems and fisheries during these challenging times.

State-Managed Marine Species Programs

These programs are responsible for fisheries managed by the State alone.

Abalone – Dramatic changes in ocean conditions over the last few years resulted in very poor habitat conditions and population parameters in the northern red abalone fishery in 2016. At the end of the year, the Marine Region requested emergency changes to the regulations for 2017 through an emergency action, to address the situation.

Progress on drafting the Red Abalone Fishery Management Plan continued along with numerous public listening sessions.

Staff completed a number of papers that were published in the scientific literature. One area of work involved tracking reproduction of red abalone in the northern California recreational fishery. The team developed and implemented the capacity to capture larval and newly settled red abalone (see *Rogers-Bennett, L., Dondanville, R.F., Catton, C.A., Juhasz, C.I., Horii, T., Hamaguchi, M., 2016. Detecting larval, newly settled and juvenile red abalone (Haliotis rufescens) recruitment in northern California. J. Shell. Res. 35:601-610.*

The team worked with a non-governmental organization to estimate the economic value of the recreational red abalone fishery in northern California. The work confirmed just how economically important this large fishery is to the region, with estimates of the value of the fishery to the fishermen of up to \$44 million dollars per year (see *Reid, J., Rogers-Bennett, L., Pace, M., Eyer, R., Vasquez, F., Bruner, A., Catton, C.A., Kashiwada, J.V. and I.K. Taniguchi, 2016. The economic value of the recreational red abalone fishery in northern California. California Fish and Game 102:121-133.*

White abalone is an endangered species. Staff are developing a broad partnership called the White Abalone Restoration Consortium that has as its goal the restoration of white abalone populations through a captive breeding and stocking program. Staff are working closely with university, federal, and aquarium scientists to grow and then eventually stock abalone in the wild to restore the population (see *Rogers-Bennett, L., Aquilino, K.M., Catton, C.A., Kawana, S.K., Walker, B.J., Ashlock, L.W., Marshman, B.C., Moore, J.D., Taniguchi, I.K., Gilardi, K.V.,*

Cherr, G.N., 2016. Implementing a restoration program for the endangered white abalone (Haliotis sorenseni) in California. J. Shell. Res. 35:611-618.

As part of this work, staff have been modeling restoration options to help determine how many years until the wild population becomes extinct (trajectory of the wild population), as well as what might be the most useful strategies for restoration including numbers, sizes and locations for restoration actions (see *Catton, C.A., Stierhoff, K., Rogers-Bennett, L., 2016. Modeling restoration of endangered California white abalone (Haliotis sorenseni) populations. J. Shell. Res. 35:593-600.* Visit the CDFW website at wildlife.ca.gov/Conservation/Marine/Invertebrates/Abalone for more information about abalone.

Aquaculture (Marine) – Staff processed, reviewed, and approved 50 Live Importation Permits, reviewed and approved 140 Aquaculture Registrations, prepared three Wild Broodstock Collecting Permits, four Letters of Authorization, and reviewed and approved 10 Restricted Species Permits. Staff participated in several meetings with Fish and Game Commission staff and Department staff to discuss the process of lease assignments and transfers, best management practices, and rulemaking options for state water bottom aquaculture leases. Staff conducted various state water bottom lease inspections in Tomales Bay which informed preparation of subsequent recommendations to the Fish and Game



Red abalone surrounded by purple sea urchins in an urchin barren
CDFW photo by A. Maguire



been implicated in the decline of native clam and crab species in areas of central California. Monitoring suggests the abundance of green crab in the bay has remained relatively low; however, this species continues to be a cause for concern.

Staff continued long term monitoring of eelgrass in Humboldt Bay as part of the SeagrassNet Global Seagrass Monitoring Network and coordinated with Water Quality Project staff on eelgrass surveys in various other estuaries along the north and north central California coast as part of a baseline investigation study.

In collaboration with California Sea Grant, Humboldt State University, and Hog Island Oyster Company, staff helped develop an Ocean Protection Council-funded project evaluating eelgrass buffering effects on ocean acidification and the implications for oyster culture in Humboldt Bay.

Staff assisted in coordinating collection and shipping of Dungeness crab and razor clam samples from Humboldt and Del Norte counties for domoic acid testing by the Department of Public Health. Visit the CDFW website at www.wildlife.ca.gov/Conservation/Marine/ABMP for more information about California ocean bay management.

Barred Sand Bass and Kelp Bass - To help evaluate the 2013 regulation changes for the basses, staff completed 45 sampling trips aboard commercial passenger fishing vessels to collect information on numbers, sizes, and mortality of released fish; data were collected on over 2,000 kelp bass and 250 barred sand bass.

Work on age and growth studies of bass species continued in 2016. Over 1,200 kelp bass otoliths (ear bones used to age fish) have been cut and mounted; a total of 875 kelp bass otoliths were read this year and assigned ages. Analyses were completed based on results from last year's ageing of 733 barred sand bass otoliths to determine growth rates for males and females and to determine the best-fitting growth model. Additional hormone assays, histological slides, and egg counts have been done to determine kelp bass reproductive parameters. These data will be analyzed next year to estimate potential annual fecundity for female kelp bass.

Commission on requests to renew those aquaculture leases. Staff participated in agency consultation meetings and worked closely with the Environmental Review and Water Quality Project to review and prepare comments on the Coast Seafoods Company Humboldt Bay Shellfish Aquaculture Permit Renewal and Expansion Project. Visit the CDFW website at wildlife.ca.gov/Conservation/Marine/ABMP/Aquaculture for more information about California marine aquaculture.

Awards – An article by CDFW environmental scientists K. Crane and K. Lesyna, titled *Where the California Current Leads* (March/April 2015 issue of *Outdoor California*), garnered a national award from the Association for Conservation Information Inc. An inscribed third-place plaque was presented to CDFW at the organization's annual conference.

Bay Management - Staff continued the second year of a multi-year ecological study in Drakes Estero, Point Reyes National Seashore. The study is focused on gauging impacts to the benthic ecosystem associated with the decades-long oyster aquaculture operation before and after removal of the wooden rack structures by the National Parks Service.

Staff initiated field work on a State Wildlife Grant Program-funded project to evaluate the spawning and larval distribution of longfin smelt in Humboldt Bay and its tributaries. The project is aimed at acquiring fundamental ecological information essential for managing the Humboldt Bay population of longfin smelt and will directly support recovery planning for this threatened species. This is a collaborative effort between the California Department of Fish and Wildlife (CDFW) and the NMFS Southwest Fisheries Science center.

Staff continued long-term monitoring of invasive European green crab in Humboldt Bay. Green crabs have

Staff continue to work with modelers from the California Data-Limited Toolkit Project to develop and demonstrate a computer model for improving the assessment and management of California state fisheries. It is anticipated that the project will provide a method for analyzing management strategies that could be developed for individual fisheries when the planned revision to the state's Master Plan for Fisheries is implemented. Barred sand bass is a test species for testing this modeling approach. Along similar lines, staff have explored the application of an age production model that uses lengths (ages) of barred sand bass and kelp bass from several different datasets to determine their spawning biomass, fishing mortality and other information over time. A new study began in 2016 to quantitatively determine an ecosystem-based measure of fishery health by analyzing the trophic structure of kelp bass inside and outside MPA sites. The study will also determine if small amounts of fin-clipped tissue provide the same results as sampling larger amounts of muscle tissue. During 2016, a total of 85 kelp bass were sampled at Catalina Island and nearshore areas. Other Channel Island MPAs and control sites will be sampled in 2017. Visit the CDFW website at wildlife.ca.gov/Conservation/Marine/SCFRMP for more information about bass research and management.

California Halibut – Staff continued sampling the commercial and recreational California halibut fisheries in central California for length, weight, sex, spawning condition, and age information, and surpassed the 3,200 mark in number of halibut aged since 2007, using thin-sectioned otoliths. Work neared completion on the second statewide halibut stock assessment, using data collected since 2011 when the first assessment was completed with assistance from a contractor. CDFW's K. Lesyna co-authored an article in Volume 103 (2) of *California Fish and Game*, titled *Assessment of length- and age-at-maturity for California Halibut* (*Paralichthys californicus*), including a histologically-based maturity staging system. Work began on ageing of otoliths from young-of-the year halibut using otolith microstructure.

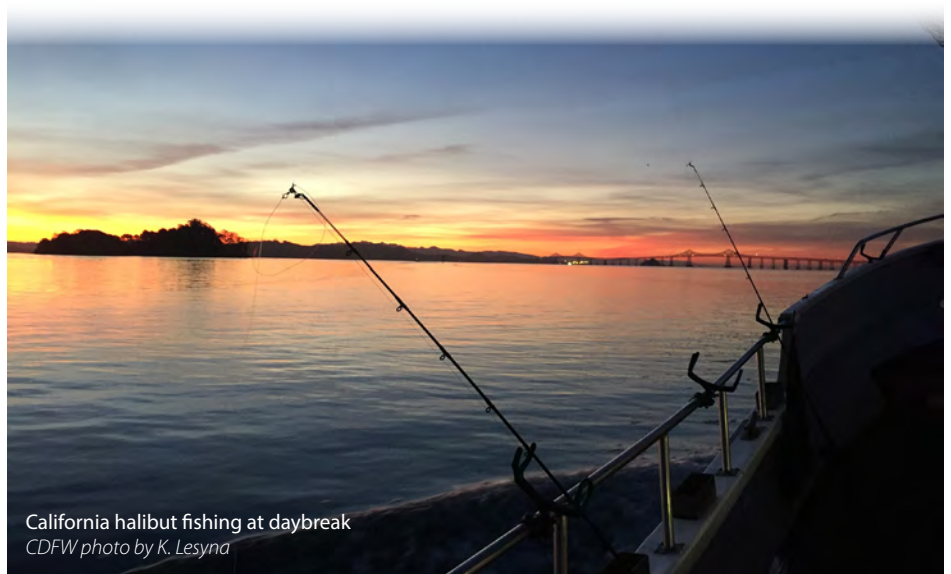
In Southern California, only a few trips were made to launch ramps, fishing derbies, and commercial markets to sample California halibut. A total of 12 commercial and five sport-caught halibut were sampled; the largest halibut weighing over 29 pounds. Visit the CDFW website at wildlife.ca.gov/

Conservation/Marine/NCCFRMP/Halibut-Studies/Halibut-Assessment for more information about California halibut.

Diving Safety Program – Seven new diver candidates were certified at CDFW's week-long program at Catalina Island, and all other active divers completed recertification training. Funding from the Ocean Protection Council was approved to replace the Marine Region's ageing 25-foot R/V *Melanops*, which is berthed in Monterey and maintained by the Diving Safety Officer. CDFW expects to acquire the new vessel in 2018.

The R/V *Garibaldi* assisted in a variety of CDFW research studies, as well as collaborative studies with other researchers, from San Diego to Point Conception, including the Channel Islands. The vessel was at sea for 150 days on 39 cruises, traveled 4,790 nautical miles, and used 6,338 gallons of fuel. Visit the CDFW website at wildlife.ca.gov/Conservation/Marine/Diving-Safety for more information about the Diving Safety Program.

Dungeness Crab – High concentrations of domoic acid delayed the start of the 2015-2016 Dungeness crab season until late March 2016, four months after the scheduled start date. The last remaining closed area opened to fishing by late May. Staff worked together with commercial fishers and the California Department of Public Health to continue sampling Dungeness crab in areas adjacent to 8 major ports until two rounds of testing resulted in domoic acid concentrations below the alert level (>30ppm). CDFW kept the public informed of these openings for both the recreational and commercial fisheries via press releases, blog posts, the CDFW crab website, and weekly messages on the domoic acid season closure phone line. As the closure for the commercial fishery continued into the new year, staff examined fishery losses to date and by February 2016, Governor Brown had requested a federal declaration



California halibut fishing at daybreak
CDFW photo by K. Lesyna



Dungeness crab in the wild.
photo by K. Joe

for a fishery disaster for the Dungeness and rock crab fishers from U.S. Secretary of Commerce Pritzker.

A Dungeness Crab Task Force (task force) meeting took place in late fall in time for the group to submit their final report of recommendations to the California Legislature by January 2017. One of their charges was to evaluate the trap limit program since its inception. Staff working collaboratively with the California Sea Grant member on the task force analyzed seasonal data from the three seasons prior to trap limits and three years into the program, and presented the data summaries at the meeting. This was the last Task Force meeting to be funded by the Ocean Protection Council.

Increased fishing effort due to the delayed 2015-2016 season coincided with the spring months when the abundance of whales along the California coast is high. Reports of whale entanglements with Dungeness crab fishing gear continued to rise, with the fishery accounting for most of the identifiable gear entanglements in 2016. The Dungeness crab gear working group continued to function via funding provided by The Nature Conservancy. Two meetings were held to continue the collaborative approach between agencies, fishermen and environmental non-governmental organizations to address ways of reducing the incidence of whale entanglements in the fishery. Detailed reports by NOAA of the fishery gear configurations recovered from recent entanglements led to a newly updated Best Practices Guide that focused on the use of the maximum distance of lines between trailer buoys and was made available to the public prior to the opening of the 2016-2017 Dungeness crab season. Future meetings are scheduled for 2017 to continue to develop long-term solutions that involve testing different gear modification modes and several methods for the electronic reporting of trap distribution.

The 2016-2017 season began on time in some areas of the state while portions of fishing districts 7 and 10 were delayed due to elevated levels of domoic acid. By the end of 2016, only one portion of the fishery remained closed between northern Mendocino County and southern Humboldt County. A different approach, led by the Fish and Game Commission in consultation with the Department of Public Health and the Office of Environmental Health Hazard Assessment, opened the recreational fishery on time with a health advisory in place for the public not to consume guts

or viscera for crab caught in those areas where tests exceeded the domoic acid alert level.

Daily sampling of Dungeness crab larvae continued during the spring months for the tenth year at two locations in northern and central California. The data collected from the sampling is helping CDFW scientists to understand the recruitment dynamics of the crab fishery. Total yearly abundance of larvae in 2016 at the northern site in Humboldt Bay was an order of magnitude higher than the central site in Bodega Bay. This was also the fourth year of sampling at a more southern site - Moss Landing - that is done in collaboration with California State University Monterey Bay undergraduates. Total abundance there was very similar to that at Bodega Bay. Visit the CDFW website at wildlife.ca.gov/Crabs for more information about Dungeness crab.

Green Sturgeon – A collaborative study continued with CDFW, NMFS, West Coast Groundfish trawl observers, and commercial California Halibut trawl fishermen working together to satellite-tag and monitor the survivability of green sturgeon (a threatened species) caught incidentally in the central California halibut trawl fishery. Since 2015, fishermen and observers have deployed 76 tags, and 40 usable datasets have been obtained. Some of the tags detached from the fish in the San Francisco Bay area, indicating that these green sturgeon, which were tagged in the Gulf of the Farallones, had moved into the estuary. Tag data analysis will be completed in 2017. Visit the CDFW website at www.wildlife.ca.gov/Conservation/Fishes/Sturgeon for more information about green sturgeon.

Hagfish – Staff completed a Fish and Game Commission regulatory change to modify the requirements for the

use of barrel traps in the commercial Pacific hagfish fishery; volumetric standards were replaced by linear dimensional standards. The fishery is sampled in Port San Luis, Morro Bay, Moss Landing, and Eureka. Since 2007, commercial landings for hagfish have remained relatively stable, ranging from one to two million pounds annually. While hagfish are mostly exported live to Korea, one dealer is experimenting with exporting frozen hagfish. Effort and demand in the California fishery is driven by external market conditions and the supply of hagfish from Oregon and Washington. Visit the CDFW website at wildlife.ca.gov/Conservation/Marine/NCCFRMP#29429329-hagfish for more information about hagfish.

Giant Red Sea Cucumber and Ridgeback Prawn – Staff assisted in assessing the spatial distribution of invertebrate trawl activity to inform Essential Fisheries Habitat designations. Staff also coordinated with NOAA's observer program to initiate a new program for observation of these fisheries.

Pacific Ocean (Pink) Shrimp – Staff renewed efforts to maintain updated fisheries-dependent data for the pink shrimp fishery and began using that data to assess fishery relationships with environmental factors. The Fish and Game Commission has been petitioned to undertake a permit capacity review in order to issue new permits for the northern fishery. Declines in the groundfish quota for California fishermen is driving new interest in the pink shrimp fishery. Analyses in 2016 and 2017 will be used to inform a capacity review and development of new management strategies.

Warty Sea Cucumber Dive Fishery – Staff completed the third consecutive year of dive and laboratory research to collect essential fishery information for warty sea cucumber populations at the northern Channel Islands. Seasonal dive surveys were performed at six different locations (inside and outside of marine protected areas) to measure changes in seasonal densities and to characterize size distributions. To date, a total of 1,883 sea cucumbers have been collected and dissected to determine spawning condition, sex ratio, fecundity, and length/weight relationships. Findings from CDFW research along with other independent monitoring have highlighted concerns about the sustainability of the resource. CDFW is working with the commercial fishing industry and other scientists to explore management options related to a seasonal closure that can be used to improve the sustainability of the fishery by protecting spawning activity. CDFW aims to have this regulation enacted for the 2018 fishing season.

Sea Urchin Fishery – Staff have been working with the commercial sector to overhaul the capacity goal for permits and the drawing system for new entrants. It is expected that the new regulations will be in place in 2018.

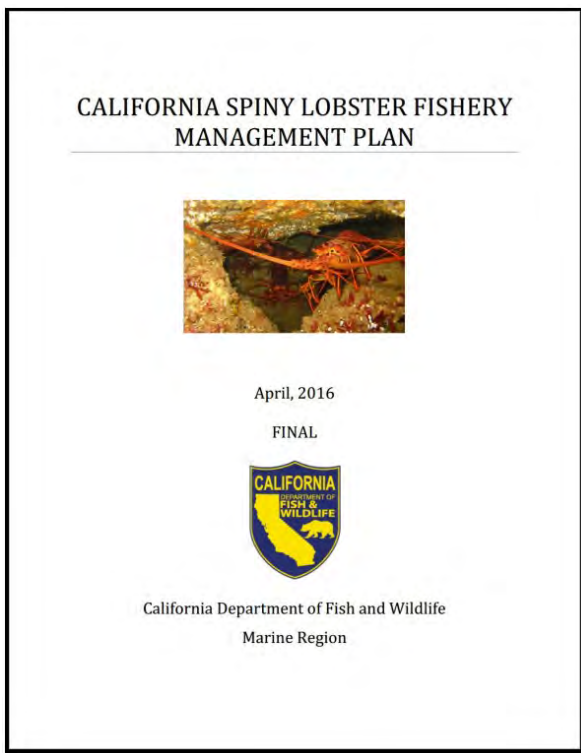
The severe ocean conditions that have affected abalone populations have had similar impacts on urchin, resulting in the lowest harvest in nearly two decades. Northern California divers have been hit especially hard with the “perfect storm” of events that have combined to reduce kelp, the primary urchin food source. Visit the Marine Region website at www.wildlife.ca.gov/Conservation/Marine/Invertebrates/Sea-Urchin for more information about the commercial sea urchin fishery program.

Lobster Fisheries – The 2015-2016 lobster fishing season saw nearly 795,000 pounds landed by the commercial fishery, which is very close to the 10-year average catch of 791,000 pounds. The fishing season also saw a lobster report card return rate of 47 percent, which is the lowest return rate since a non-return fee for unreturned lobster report cards went into effect at the beginning of the 2013-2014 season. The estimated catch for the recreational fishery was approximately 265,000 pounds, or 25 percent of the total (commercial + recreational) catch.

2016 saw the adoption of the Spiny Lobster Fishery Management Plan (FMP) that puts into place a cohesive management strategy to guide the future sustainable management of California's recreational and commercial lobster fisheries, as required by the Marine Life Management Act (the FMP is available online at wildlife.ca.gov/Conservation/Marine/Lobster-FMP). The adoption of the FMP is the culmination of four years of a collaborative development process that began in the spring of 2012 between CDFW, the Ocean Protection Council, Lobster Advisory Committee, peer review panels, technical consultants, and interested members of the public. As part of the FMP process, the Commission



Warty sea cucumber , foreground, amid a field of purple sea urchins. Garibaldi in the background. CDFW photo



adopted regulations to implement the FMP and a suite of new and revised regulations for the commercial and recreational lobster fisheries. A key change for the commercial fishery will be the implementation of a lobster trap limit and trap tag program beginning with the 2017-2018 season.

As part of implementing the FMP, staff began work on two new projects in 2016, a commercial lobster sampling project and lobster report card online survey.

During the 2016-2017 lobster season, staff started a pilot project to collect size frequency and weight data on lobsters landed in the commercial fishery. Buyers and some commercial fishermen were contacted in an effort to acquire samples of carapace length from across southern California, both at the dock and at buyer facilities. These data will be used to confirm average size trends calculated from log book and landing receipt data used by the recently adopted FMP harvest control rules. Continued monitoring will produce a time series of length frequency distributions, expanding the suite of population assessment models available for use. Staff encountered some challenges in this first year and will seek to develop more collaborative relationships and efficient methods for acquiring samples.

Reporting of recreational catch and fishing effort is an important component of CDFW's management of the spiny lobster resource. To improve estimates of recreational effort and catch, staff began development of an online survey for 2017. Lobster report cards allow

CDFW to determine the total number of sport fishermen targeting lobster and the number of lobsters caught during a season. However, accurate estimates of annual catch cannot be made when report card return rates are low. The online survey aims to improve estimates by acquiring data from report card holders who did not return their cards. A similar approach was used in the past by CDFW to improve catch and effort estimates in the recreational red abalone fishery. Visit the Marine Region website at www.wildlife.ca.gov/Conservation/Marine/Lobster-FMP for more information about the California Spiny Lobster Fishery Management Plan.

Kelp and Other Marine Algae - In February 2016, staff responsible for kelp and other marine algae management joined the Marine Region's Aquaculture and Bay Management Project team. Staff conducted an extensive research effort on the various edible algae species to prepare for Phase II of the commercial kelp and other marine algae regulations review. Staff presented regulatory options for Phase II of the rulemaking to the Marine Resources Committee and the Fish and Game Commission. The 2015 aerial kelp survey imagery was finalized and posted, the 2016 aerial kelp survey was completed with data analysis still being finalized, and the 2017 aerial kelp survey request for proposals was drafted. Staff also designed a new kelp and other marine algae webpage. Visit the CDFW website at www.wildlife.ca.gov/Conservation/Marine/Kelp for more information about kelp and other marine algae.

Marine Life Management Act (MLMA) Amendment Process – Staff provided subject matter expertise, participated in beta testing, worked closely with contractors, and reviewed and commented on several materials produced through the Informational Gathering Projects as part of the MLMA Master Plan Amendment process. Program staff worked closely with contractors on the following information gathering projects: Prioritization Framework, MLMA Assessment Framework, Data-Limited Toolkit, Risk Assessment and Vulnerability (ERA/PSA), Data Review, Climate Ready Fisheries, and the Socioeconomics projects. Forty-five state-managed fisheries were assessed by a contractor and reviewed by CDFW experts using a productivity/susceptibility analysis.

Staff also assisted in meetings and consultations with California tribes and tribal governments regarding the amendments to the MLMA and the Master Plan for Marine Fisheries. Visit the CDFW website at wildlife.ca.gov/Conservation/Marine/MLMA/Master-Plan for more information about the process.

Ocean Resources Enhancement and Hatchery Program (OREHP) - California Sea Grant (CASG)

continued coordinating CDFW's multi-year evaluation of the White Seabass Experimental Enhancement Program. Throughout much of the year, CASG compiled and summarized OREHP reports and published literature, and other ongoing white seabass research to address the needs of the Scientific Advisory Committee (SAC). CASG also reviewed, commented, and helped compile a draft OREHP Evaluation Report based on input and sections received from the SAC. In December, the first draft of the OREHP Evaluation Report was submitted to CDFW for review. Additionally, a Coastal Development Permit Notice of Waiver of Effectiveness for nine of the OREHP grow-out pens was approved by the California Coastal Commission. Visit the CDFW website at wildlife.ca.gov/Conservation/Marine/ABMP/OREHP for further information.

Oil Spill Response - Staff assisted in the collection of surfperch samples by beach seining at three sites in the Santa Barbara area. These samples are to be used as part of ongoing analyses to examine the effects of last year's Refugio oil spill. Visit the Cal Spill Watch website at calspillwatch.dfg.ca.gov/Spill-Archive/Santa-Barbara-County-Spill for more information about the Refugio Oil Spill.

Pacific Herring - Staff completed sampling and population estimates for Pacific herring in San Francisco Bay. The season ended with 13 spawn events and a final season spawning biomass estimate of 14,898 tons of herring. This is a reduction from the previous season's estimate of 16,700 tons and well below the 50,300 ton, 37-year historical average. Staff hosted a peer review of the stock assessment and operating models for the San Francisco Bay Pacific herring fishery in October. Staff also worked closely with the Herring Fishery Management Plan Steering Committee to hire a project management team for this fishery and spent the year providing data and background for fishery management plan development. Visit the Pacific Herring Management News blogsite at cdfwherring.wordpress.com and the CDFW website at wildlife.ca.gov/Fishing/Commercial/Herring for more information about Pacific herring.

Saltwater Angling and Diving Records - Four new saltwater angling and diving records were accepted in 2016 (old values in parenthesis):

- Calico surfperch angling record: 1 lb. 14 oz. (1 lb. 8 oz.)
- Bluefin tuna angling record: 245 lb. 7 oz. (243 lb. 11 oz.)
- Bluefin tuna diving record: 269 lb. 11 oz. (185 lb. 1 oz.)
- Yellowfin tuna diving record: 66 lb. 7 oz. (17 lb. 13 oz.)

Visit the CDFW website at wildlife.ca.gov/Fishing/Ocean/Records for more information about saltwater record fish and invertebrates.

Surf Fishes – Staff continue to analyze the spatial and temporal abundances of surf fishes in southern California from a study undertaken from 2007 through 2009, where over 400 beach seine hauls were completed. This is the largest sampling effort to date studying the surf zone fish community in southern California. Visit the CDFW website at wildlife.ca.gov/Conservation/Marine/SCFRMP/Surf-Fish for more information about surf fish studies.

Surfperch – In support of ongoing management, CDFW continued long-term databases on life history and age/length distributions of surfperch species in central and northern California. Program scientists continued to age whole otoliths, primarily from barred, redbtail, and walleye surfperch. Staff began aging embryonic surfperch using otolith microstructure. Work continued on completing the manuscript for a planned Fish Bulletin describing life history and fishery aspects for barred and redbtail surfperch in central and northern California. In October 2016, a critical aspect of this work began with the injection of oxytetracycline into 12 barred surfperch for age validation. As of January 2017, 11 of the surfperch remained alive in an aquarium in Redwood City. Staff continued to capture, and/or tag and release redbtail surfperch in, and adjacent to, a marine protected area in northern California.



Herring fishermen on San Francisco Bay at dawn
CDFW photo by R. Bartling



Surfperch: redtail and barred, young and old.
CDFW photo

True Smelts - Primarily due to unfavorable environmental conditions, night smelt and particularly surf smelt landings decreased in 2016 from previous years. In 2016, night smelt fishery landings totaled 274,772 pounds, a 30 percent decline from 2015, while surf or “day” smelt landings declined 95 percent to 5,854 pounds in 2016. These fisheries are shore-based and primarily in far northern California. Program scientists occasionally sample the small fishery in central California, but were unsuccessful in 2016. With cooler water temperatures expected and a return to “El Niño neutral” conditions,

staff will attempt fishery independent surveys in 2017 to collect life history information. Visit the CDFW website at wildlife.ca.gov/Conservation/Marine/NCCFRMP/True-Smelts for more information about smelt.

White Seabass - Staff collected and analyzed commercial and recreational data for white seabass as part of the annual review of the White Seabass Fishery Management Plan for the 2014-2015 season. The numbers and sizes of white seabass landed, information on forage fish availability, and socioeconomic data were evaluated to determine if points of concern had been met. The results were presented to the White Seabass Scientific and Constituent Advisory Panel and a report was sent to the Fish and Game Commission.

Staff engaged in a new study to better determine age at maturity for white seabass. With the collaboration of sport fishermen, staff collected 24 individuals within the size range needed. Gonads from these fish have been histologically processed and analyzed. Staff intend to ramp up collection efforts next year as these fish, especially within the size range needed, have been hard to find. Visit the CDFW website at wildlife.ca.gov/Conservation/Marine/NCCFRMP/White-Seabass for more information about white seabass.

State/Federal Marine Species Program

This program is responsible for fisheries jointly managed by state and federal entities.

Highly Migratory Species (tuna, swordfish, etc.) – Staff coordinated with NOAA Fisheries and industry partners to expand and improve commercial and recreational fishery monitoring programs that track landings and biological data for bluefin tuna. During the peak of the 2016 season, staff sampled seven of 17 total commercial purse seine landings (roughly 40 percent of trips) to collect representative biological data on 168 individual tuna. CRFS staff also monitored the recreational bluefin catch, collecting 69 samples. The biological data and genetic material collected will be used in state, federal, and international research.

In cooperation with NOAA Fisheries and the Sportfishing Association of California, staff continued outreach to the angling public, developing new fliers and handouts, writing Marine Management News blog articles and a press release, and talking to anglers at the 2016 Fred Hall Fishing, Tackle, Boat and Travel Shows.

The development of deep-set buoy gear under federally exempted fishing permits may add a new source of domestic swordfish landings to California markets. Deep-set buoy gear is being tested to determine if it is economically viable and whether it will reduce bycatch of non-target, protected species. Staff worked with NOAA Fisheries and the Pacific Fishery Management Council to review experiment results and discuss options for this gear type.

Staff worked with NOAA Fisheries to track California landings from Hawaiian longline fisheries operating on the high seas. New, more specific gear codes were implemented for the longline fishery to better document landings by gear and ultimately improve management. Visit the CDFW website at wildlife.ca.gov/Conservation/Marine/CPS-HMS for more information about highly migratory species.

Coastal Pelagic Species (CPS - market squid, anchovy, mackerel, sardine) – In 2016, staff continued fishery monitoring and management activities, working with the fishing industry to closely track commercial landings for

market squid, northern anchovy, Pacific sardine, Pacific mackerel, and jack mackerel to ensure catch limits were not exceeded. Our team of scientific aids visited seven ports ranging from Half Moon Bay to Terminal Island to collect landings information and biological samples. Length, weight, sex, and sexual maturity were recorded for each sampled fish, and otoliths or statoliths were extracted for aging purposes. Staff estimated the ages of 275 pairs of sardine, 1,375 pairs of Pacific mackerel, and 1,150 pairs of anchovy otoliths or statoliths.

Staff used biological sample data to update the stock assessment for Pacific sardine. Due to a low biomass estimate, the directed commercial fishery for Pacific sardine was again closed for another fishing season; however, incidental take was allowed in other coastal pelagic species landings. To help supplement biological samples, staff collected sardine samples from non-directed commercial landings, and also worked with the live bait industry to collect samples in southern CA. Staff conducted the CDFW Southern California Coastal Pelagic Species Aerial Survey, which has been ongoing since 2012.



Spearfisherman with state record bluefin tuna. CDFW photo



Lingcod, a groundfish species popular with both recreational and commercial fishermen. *photo by A. Maguire*

Coastal observations for sardine and anchovy were recorded from Pt. Conception to the California-Mexico border, including the Channel Islands. Approximately 3,200 miles were flown during the spring and summer surveys. Additionally, staff submitted a request for a Pacific Fishery Management Council methodology review in 2017 for the data that will be used in future coastal pelagic species stock assessments.

Staff were actively involved in the federal management process as members of the Coastal Pelagic Species Management Team and the Pacific Fishery Management Council. Management Team staff helped to prepare various reports on topics related to sardine harvest specifications, anchovy management status, Magnuson-Stevens Act status determination criteria such as minimum stock size thresholds, and the potential for small-scale fishery operations for coastal pelagic species finfish. Team members also attended the Coastal Pelagic Species Stock Assessment Workshop and a meeting to review anchovy biomass estimates.

New versions of the market squid logbooks that were approved by the Fish and Game Commission in late 2015 went into effect in 2016. New logbooks were printed and distributed to commercial squid fishermen. Also related to squid logbooks, staff worked with CDFW's Data and Technology Division to start the process of transitioning squid logbook data into the electronic Marine Logs System.

Staff also participated in various outreach activities. At the Tri-national Sardine Forum, staff presented an update on the sardine fishery and a poster on the aerial survey. Staff also attended the scientific CalCOFI meeting

and the industry-sponsored California Wetfish Producers Association annual meeting, and responded to several inquiries from media outlets and the public. Visit the CDFW website at wildlife.ca.gov/Conservation/Marine/CPS-HMS for more information about coastal pelagic species.

Ecosystem – In spring of 2016, regulations went into effect to increase protections in federal waters for a select list of unmanaged forage fish, due to their ecosystem importance, by preventing the development of future fisheries on these species while continuing to allow existing activities.

This action was the result of collaboration that commenced in 2014 with West Coast state and federal agency partners through the Pacific Fishery Management Council. CDFW pursued similar conforming regulations for state waters in 2016, which were finalized in early 2017.

Endangered Species Act – Staff assisted in updating the federal Endangered Species Act Section 6 agreement to include all marine Endangered Species Act-listed species that occur in California. Staff provided expertise in determining potential CDFW activities that could benefit listed species, and communicated with National Marine Fisheries Service staff to determine activities that would qualify for Section 6 funding. This new agreement will allow CDFW to request grant funding from the National Marine Fisheries Service for CDFW work that benefits listed species.

Groundfish –

Education and Outreach – With help from the California Recreational Fisheries Survey project, staff completed 24 outreach assignments during season-opening weekends in the Northern, Mendocino, San Francisco and Central recreational groundfish management areas. Staff provided anglers with over 500 packets containing the 2016 recreational groundfish regulations, species identification flyers, and information on the CalTIP program. Staff also distributed approximately 200 descending devices (donated for this purpose by the National Marine Fisheries Service) and educated anglers regarding the importance of using a descending device when discarding fish suffering from barotrauma.

Through a Sport Fish Restoration Act grant, under the Aquatic Education Program, staff engaged in rockfish barotrauma education. As part of the grant work, staff conducted at-sea field work to collect video and photos

of rockfish suffering from barotrauma, rigging and usage of descending devices, and the reduction of barotrauma effects on descending rockfish when using descending devices. The footage was compiled into an educational presentation and will be presented at marine fishing venues to increase awareness and encourage the practice. Additional funds were used to print rockfish identification flyers and barotrauma information that are routinely handed out at dockside launching facilities, CDFW offices, and sportfishing show events.

Research – Staff participated in one leg of the 2016 National Marine Fisheries Service Rockfish Recruitment and Ecosystem Assessment Survey which covers the California coast from Trinidad to San Diego. Cruise priorities included collection of small, upper water level organisms (including pre-settlement rockfish) and adult rockfish. Oceanographic sampling also focused on quantifying the distribution and abundance of krill.

During eight days at sea as part of the evening scientific crew, staff assisted with deployment and retrieval of midwater trawl gear, identified and enumerated trawl catches, and isolated representative samples of key species for subsequent analysis by other agencies. Some of the many uses for survey data are to inform groundfish stock assessments on annual recruitment success of young-of-the-year rockfishes and other species, and to provide an annual picture of krill abundance off the coast.

CDFW's D. Wilson-Vandenberg and P. Reilly, with support from C. Ryan, co-authored a NOAA Fisheries Technical Report with M. Monk (National Marine Fisheries Service), *Documentation for California Department of Fish and Wildlife's Onboard Sampling of the Rockfish and Lingcod Commercial Passenger Fishing Vessel Industry in Northern and Central California (1987-1998) as a Relational Database*. Visit the CDFW website at wildlife.ca.gov/conservation/marine/groundfish for more information about groundfish.

Pacific Halibut – CDFW continues to actively manage the recreational Pacific halibut fishery off of California. The 2016 season was scheduled to begin on May 1 and end on October 31, with only the first half of each month open in May, June, July and August, and full months scheduled to be open in September and October as long as there was unharvested quota

available. However, based on projected early attainment of the 2016 California quota, an in-season fishery closure was implemented on September 24, following discussions with the International Pacific Halibut Commission, Pacific Fishery Management Council and National Marine Fisheries Service.

Final 2016 recreational catch estimates totaled 30,893 net pounds—or 104 percent of the quota. The average net weight per kept fish in 2016 was approximately 24 pounds, one pound less than the average weight of fish taken in California's 2015 fishery.

Notably, in 2016 a total of four vessels participated across two of the opening days in the commercial directed fishery; the preliminary landings were 1,002 net pounds. Visit the CDFW website at wildlife.ca.gov/Conservation/Marine/Pacific-Halibut for more information about Pacific halibut.

Salmon – Monitoring of recreational and commercial ocean salmon fisheries was conducted at approximately 20 ports along the California coast. In the commercial fishery, staff sampled approximately 14,800 salmon and collected snouts from more than 3,200 adipose fin-clipped (or "ad-clipped") salmon for subsequent coded-wire tag (CWT) processing. In the recreational fishery, field staff coordinated with California Recreational Fisheries Survey staff to interview 17,700 salmon anglers, sample 11,400 Chinook salmon and collect more than 2,800 heads from ad-clipped salmon. Staff utilized these sample data to produce annual ocean catch and effort estimates by fishery, management area, and half-month period.

Staff processed approximately 6,100 CWTs from the ocean fisheries and uploaded these data, along with



Two nice Chinook salmon caught on a beautiful day on the ocean.
CDFW photo courtesy B. Forman



Successful salmon anglers, 2016
photo courtesy B. Miller

Staff coordinated with federal, tribal, and other state agencies to produce the Review of 2015 Ocean Salmon Fisheries and several other Pacific Fishery Management Council pre-season reports for use in drafting ocean salmon seasons in 2016. These documents report on ocean harvest, inland escapement, abundance forecasts, regulatory season alternatives, and final ocean regulations.

During the annual Ocean Salmon Information Meeting, which attracted 150 interested stakeholders, staff provided information on 2015 ocean salmon fisheries, spawning escapement, stock-specific abundance forecasts, and the outlook for 2016 sport and commercial ocean salmon

fisheries. Members of the public provided input to a panel of California salmon scientists, managers, and representatives for consideration in the development of 2016 ocean salmon regulations.

CDFW and the Pacific Fishery Management Council again worked together to take additional actions to protect endangered Sacramento River winter Chinook salmon, which have been impacted by California's severe drought. Commercial and recreational industry representatives on the Council's Salmon Advisory Subpanel also recognized the need for additional protections. As a result of this cooperation between industry representatives and regulatory bodies, fishing seasons were curtailed to reduce fishery impact rates on this endangered stock.

Klamath River Technical Team staff continued to collaborate with tribes, federal agencies and other state programs to consolidate and summarize catch and other survey information on Klamath River fall Chinook for use in the 2016 management cycle.

In collaboration with partner agencies, staff continued to implement the Central Valley Scale Age Project. The goal of this project is to improve management of Sacramento River fall Chinook, which supports approximately 85 percent of California's ocean and river salmon fisheries. Visit the CDFW website at wildlife.ca.gov/Ocean-Salmon for more information about ocean salmon.

their respective catch-sample data, to the Regional Mark Processing Center in Portland, Oregon. These data are used to determine stock contributions and fishery impacts, information needed to sustainably manage West Coast fisheries and protect California salmon stocks. Approximately two-thirds of the salmon caught in California ocean fisheries were of hatchery origin, with almost all fish produced, raised, and released from California hatcheries located in the Central Valley and Klamath-Trinity River Basin. The majority (82 percent) of these fish were Sacramento River fall Chinook.

Staff responded to nearly 150 public inquiries from recreational anglers and commercial trollers received through the Ocean Salmon Courtesy Request Program. Based on the head-tag numbers provided by the requestor, staff provided information on their respective salmon, including hatchery of origin, brood year, stock name, run type, release date, location and other pertinent information obtained from the CWT recovery.

Staff collected scales and salmon heads at Central Valley salmon hatcheries. Staff collected, processed, and recovered the CWTs from the heads of approximately 21,600 ad-clipped salmon during Central Valley escapement surveys in 2015. These data were validated and merged with their respective catch-sample data and uploaded to the Regional Mark Processing Center. Project staff are now processing and validating approximately 19,000 heads collected in the Central Valley during 2016.

Resource Assessment Program

This program is responsible for collecting and disseminating recreational and commercial fishery-dependent data.

California Recreational Fisheries Survey (CRFS) – CRFS field operations are supported by 15 permanent staff and, on average, 75 part-time Fish and Wildlife Scientific Aids. CRFS contacted over 51,000 angling parties for a total of over 98,000 anglers. Anglers reported catching roughly 500,000 fish and invertebrates, and CRFS was able to observe over 186,000 of the retained fish and invertebrates. In addition, CRFS measured over 99,000 fish and invertebrates. CRFS and CDFW's Ocean Salmon Project staff together recovered over 2,800 salmon heads from the ocean salmon recreational fishery. All the data collected during the field surveys was entered into the CRFS data system (see below). Visit the CDFW website at wildlife.ca.gov/Conservation/Marine/CRFS for more information about CRFS.

California Recreational Fisheries Survey (CRFS) Outreach - CRFS field staff provide outreach to the recreational fishing community by sharing informational materials on sportfishing regulations, species identification, marine protected areas, barotrauma and the use of descending devices, whale entanglement, and domoic acid. In addition, staff solicited volunteers for the NOAA Fisheries National Economic Survey conducted by CIC Research Inc. Visit the CDFW website at wildlife.ca.gov/Conservation/Marine/CRFS/Additional-Information#fliers to see some of the information CRFS staff distribute to the recreational fishing community.

Recreational Fisheries Data Project - Marine Region and Data and Technology Division staff continue to develop and maintain a data system for CRFS catch, effort, biological and spatial data, and estimates. The system includes a centralized relational database to store information, a data entry system with built-in error checks, validation routines to improve data accuracy, and automated reports. The data system increases CDFW efficiency, improves data accuracy and provides the flexibility to align data capture with changing management needs. CRFS data and

estimates are essential for managing California's diverse marine fisheries. CDFW, the California Fish and Game Commission, the Pacific Fishery Management Council, the International Pacific Halibut Commission, and National Marine Fisheries Service used the CRFS data and estimates for management during 2016. These uses included: in-season monitoring for species of concern such as cowcod, yelloweye rockfish, and Pacific halibut, developing harvest guidelines, stock assessments, and status reports (for black, canary, and China rockfish conducted in 2015 and published in 2016), regulatory analyses and other critical management decisions.

Improving Data Systems – In addition to the recreational fisheries data system described above, the Marine Region and Data and Technology Division have made progress on developing two very important commercial fisheries data systems: the Marine Log System (MLS) and the Marine Landings Database System (MLDS). These data systems will provide CDFW with the modern fisheries-dependent data systems that ensure secure, centralized and easily accessible data. The goal is to move towards electronic reporting such that near real-time data will be available for fisheries managers to use in decision making. Effective July 1, 2016 regulations were modified to allow the use of electronic logs for reporting the fishing activities of the commercial passenger fishing vessel (CPFV) fishery. The e-log application continues



CRFS personnel measuring a lingcod
photo courtesy E. Roberts III



Nice vermilion rockfish caught on a commercial passenger fishing vessel.
photo courtesy B. Dao

Pacific Recreational Fisheries Information Network (RecFIN)

– Staff submits all CRFS estimates to RecFIN on a monthly basis. RecFIN provides a centralized data system to house recreational fisheries information from California, Oregon, and Washington. CRFS and Recreational Fisheries Data Project staff represented California on the RecFIN’s Technical Committee, Data and Technology Subcommittee and chaired the Statistical Subcommittee. Through these committees, staff coordinate coastwide on the collection of marine recreational finfish data and procedures for estimating catch, effort, and participation, in support of RecFIN. CRFS and Recreational Fisheries Data Project staff also collaborated with RecFIN programmers to validate estimates and routines on the new RecFIN database. A new RecFIN website with recreational data and estimates for California, Oregon and Washington is expected to be launched in 2017.

Statistical and Technical Support

– Recreational Fisheries Data Project staff provided statistical and technical support to various projects related to the management and restoration of fish stocks. These included:

- Providing advice on use of CRFS data and estimates
- Conducting GIS analyses using CRFS spatial data and reviewing spatial analyses conducted by other researchers (for example, see map.dfg.ca.gov/marine/)
- Providing data and data summaries to various CDFW projects, stock assessors, university researchers, graduate students, and the U.S. Navy
- Providing statistical advice on survey design and estimation procedures for sardine biomass aerial surveys
- Analyzing an auto-correlated time series and sample sizes for a dockside survey of commercial squid landings

Staff conducted a study to test the impact of a written pre-notice on response rates for a telephone survey. The study concluded that a written pre-notice did not substantially improve response rates. Another study analyzed CPFV log compliance to assist with targeting outreach designed to improve submission rates.

to improve as enhancements are implemented. In 2016, 19,800 CPFV logs were submitted electronically. This represents approximately 60 percent of the 33,300 CPFV logs submitted last year. Currently, there are 190 CPFVs and 237 operators signed up to submit logs electronically. Development of MLDS is now in Phase II and implementation is anticipated in mid-2018. MLDS will integrate with the federal commercial fisheries reporting system, E-Tix, which is required for the groundfish trawl individual quota program and for all sablefish landings. The benefits to fish businesses will be the use of a single reporting system to meet both state and federal reporting requirements for all their landings. Visit the CDFW website at wildlife.ca.gov/Conservation/Marine/Recreational-Fisheries-Data for more information about recreational fishery data analysis.

Marine Fisheries Statistical Unit – Staff collects, processes, and audits commercial fishery landings data, including landing receipts, commercial passenger fishing vessel logbooks, spiny lobster logbooks, and transportation receipts. Staff design, order, and distribute all paper landing receipts and commercial passenger fishing vessel logs for our constituents. In addition, MFSU staff process all commercial fishery data requests received from commercial fishing license holders and other authorized requestors. Staff received and keyed approximately 55,000 commercial landing receipts in 2016.

Habitat Conservation Program

Environmental Review and Water Quality – During 2016, staff continued to work on a wide variety of projects, permits, and statewide plans. Staff participated in over 60 pre-project review meetings and reviewed over 600 environmental documents (plans, surveys, reports, permits, public notices, CEQA, CESA, etc.). The review effort included over 80 CEQA documents, 175 U.S. Army Corps of Engineers Public Notices, 170 monitoring reports, 45 invasive species survey reports, and 75 permits from various agencies. Topics reviewed included: wave energy, desalination plant impacts, power plant impacts, dredging impacts, beach nourishment projects, contaminant site remediation, mitigation projects, CESA impacts, tribal concerns, State Water Resources Control Board policy review, artificial reefs, mitigation proposals, eelgrass restoration, invasive species control projects, Scientific Collecting Permits, aquaculture projects, alternative energy projects, and dock and pier construction impacts. In addition, staff participated in the review and development of several U.S. Navy, U.S. Marines and U.S. Air Force Integrated Natural Resource Management Plans.

Collaborative Work – Staff worked closely with other agencies, applicants, and CDFW regions to coordinate environmental review activities. Some 2016 activities include:

- Surveying eelgrass in the Ten Mile River, Estero Americano, and Estero de San Antonio watersheds
- Submission of a manuscript to *Fish and Game* scientific journal for longfin smelt, a State Endangered Species
- Participation on the Humboldt Bay Eelgrass Management Plan Team
- Giving a presentation on longfin smelt at Humboldt State University Fisheries Seminar Series
- Participation in multiple interagency meetings on the proposed Broad Beach Shoreline Protection Project
- Participation on the CDFW Mitigation Banking Team
- Addressing sand mining, dredging and oyster shell harvesting impacts in

San Francisco Bay as part of the San Francisco Bay Conservation and Development Commission

- Participation on the statewide and regional Coastal Sediment Management teams
- Participation on the Los Angeles Dredge Material Management Team
- Submission of comprehensive comments, concerns, and recommendation letters for a proposed Coast Seafood aquaculture expansion project in Humboldt Bay
- Participation in the development of a monitoring plan to determine impacts to longfin smelt from hydraulic dredging operations in San Francisco Bay
- Participation in the internal working group to develop a mitigation plan for impacts associated with the Poseidon Desalination Facility in Carlsbad, California
- Completion of Amendment No. 5 for Caltrans San Francisco-Oakland Bay Bridge Seismic Retrofit Project Incidental Take Permit
- Reviewing and consulting on an action for live munition removal at the former Mare Island Naval Shipyard
- Attending and presenting at the National Artificial Reef Workshop in Alexandria Virginia





New California Marine Protected Areas logo

- Representing CDFW on the newly formed California Ocean Renewable Energy Taskforce
- Representing the Marine Region on the Interagency Decommissioning Workgroup
- Initiation of an intra-agency pre-project onsite meeting (U.S. Fish and Wildlife Service, California Coastal Commission, NOAA National Marine Sanctuaries, Central Coast Water Board) for a discussion about proposed maintenance dredging work for Moss Landing Harbor
- Submission of a comment letter on the Carmel Lagoon draft EIR in regards to the Scenic Road Protection Structure project component

Visit the CDFW website at wildlife.ca.gov/Conservation/Environmental-Review for information about statewide environmental review.

Statewide Marine Protected Area (MPA) Management, Monitoring, and Outreach Coordination – California is home to the largest scientifically designed network of marine protected areas (MPAs) in the United States, including 124 MPAs and 15 special closures encompassing approximately 16 percent of state waters. CDFW manages California's MPAs as a statewide network using a partnership-based approach which includes four core components: 1) outreach and education, 2) research and monitoring, 3) enforcement and compliance, and 4) policy and permitting. This collaborative program facilitates the design, implementation, and ongoing adaptive management of California's MPA network to meet the goals of the Marine Life Protection Act (MLPA).

Marine Protected Area Outreach Coordination – Outreach and education efforts in 2016 focused on increasing public awareness and understanding of California's statewide network of marine managed areas. Emphasis was also placed on fostering compliance with MPA regulations, primarily informing individuals engaged in recreational and commercial fishing. In addition to fostering compliance, staff worked to cultivate stewards who understand the purpose and scientific design of the

individual MPAs and the statewide network. Information was distributed through regional guidebooks and brochures with MPA-specific maps and regulations, posters featuring a map of the statewide network with key species and habitats, outreach events, MPA-related meetings, public presentations, email correspondence, blog posts, onsite signage, and video-conferencing classroom programs. An MPA logo was also developed to help with public recognition of the protected areas. To ensure regulatory accuracy and consistent messaging, staff also reviewed materials produced by partner organizations.

Updated and newly printed MPA publications included 63,500 guidebooks, 105,000 brochures, and 3,000 information cards. Over 39,000 of the publications were shipped to 360 locations such as sporting goods stores, scuba and ecotourism groups, academic institutions, parks, harbors, non-profit businesses, commercial fishing enterprises, and individuals. The guidebooks and brochures were also made available online, through CDFW offices, and at special events such as the International Sportsmen's Expos and Fred Hall shows, MPA Collaborative meetings, Coastal Marine Interpretation meetings, and other ocean-related venues. CDFW staff such as wildlife officers and CRFS fishery samplers also assisted with distribution of MPA outreach materials.

Staff also responded to public queries about MPA resources and related information through two dedicated email accounts, AskMPA@wildlife.ca.gov and AskMarine@wildlife.ca.gov. Fourteen installments of the *Exploring California's Marine Protected Areas* series were written, edited, and posted to the Marine Management News blogsite by staff. Five of the articles also had companion videos showing underwater footage of the area. Other MPA-related articles written by staff included updates on the 2016 Master Plan for MPAs. Staff also wrote informational articles published in NOAA's MPA Center Newsletter, California's Collaborative Network blog, and in the March/April 2016 issue of *Outdoor California* magazine, titled *Conserve & Protect: California's Oldest Marine Protected Area Safeguards Resources for Generations to Come*.

At key marinas and harbors in Ventura, Morro Bay, Santa Cruz, Berkeley, Richmond, and Crescent City, staff developed signage with MPA collaborative groups and other CDFW partners to highlight fish and invertebrate identification, MPA and fishing regulations, and other local information of interest. Staff also worked with

CDFW's Law Enforcement Division and local community groups to identify areas where additional signage would inform the public of MPA boundaries and regulations.

Another cooperative project was the second full year of providing MPA-related lessons through Parks Online Resources for Teachers and Students (PORTS), a video-conferencing program that connects resource experts in parks with students in their classrooms. This partnership between CDFW and California State Parks began in 2014 and culminated in delivery of MPA PORTS programs to 17,200 students in 2016. A new MPA PORTS site was created at Point Lobos in 2016, and an online MPA curriculum now available for use in conjunction with the live-video conferences at ports.parks.ca.gov/mpa.

Development and production of regulation booklets for ocean sport fishing and commercial fishing were also completed by staff working with the Law Enforcement Division and the Office of Communication, Education and Outreach.

Staff presented at many scientific or other marine resource management venues in 2016 regarding MPA management activities, including:

- Four California Fish and Game Commission/Marine Resources Committee meetings
- Annual California Recreational Fishery Survey sampler training in Southern California
- California State University's Council on Ocean Affairs, Science and Technology annual meeting
- NOAA's National System of MPAs Workgroup bi-annual meeting
- Co-hosted an exhibitor table with OST at the 9th Annual California Islands Symposium
- PISCO Dive Exchange workshop
- Western Society of Naturalists annual meeting
- North Coast Baseline Monitoring Principal Investigators annual meeting
- Oregon-California MPA Forum
- CDFW, in partnership with USGS, hosted a one-day workshop on seafloor mapping data acquisition, mapping, and analysis

Research and Monitoring– Staff continue to build and implement the MPA Monitoring Program in partnership with the Ocean Protection Council (OPC) and Ocean Science Trust (OST). The MPA Monitoring Program consists of two phases: 1) regional baseline monitoring and 2) statewide long-term monitoring. Phase 2 is rolling out concurrently

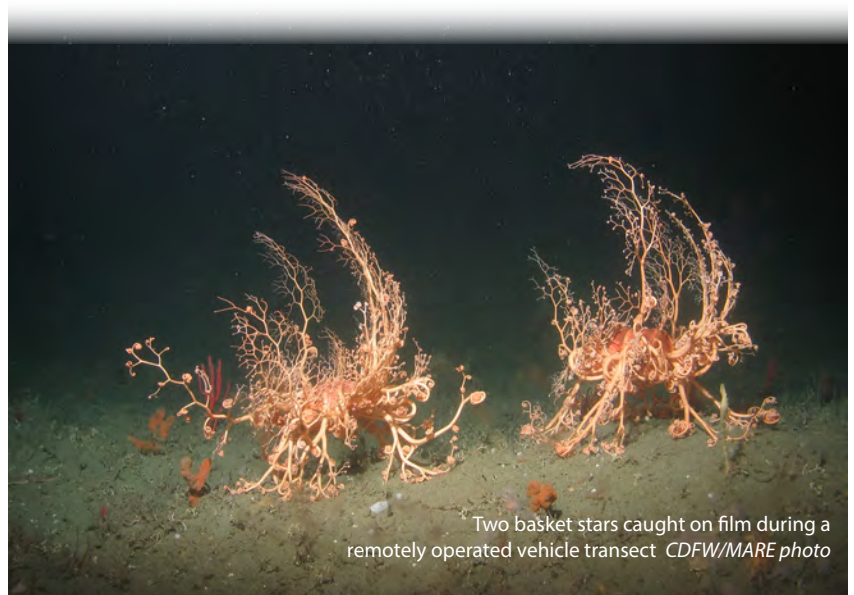
as Phase 1 is completed over the next 1-2 years.

In collaboration with the OPC and UC Davis, staff interviewed and hired three post-doc fellows to: 1) help develop a Statewide MPA Monitoring Action Plan to inform long-term statewide MPA monitoring; 2) help analyze and integrate extensive remotely operated vehicle (ROV) data, along with other visual data, to gain insights on MPA performance; and 3) develop effective methods to integrate MPAs with fisheries management.

Staff led a deepwater visual survey off of California's central coast using a remotely operated vehicle. Staff completed video transects that covered 96 kilometers (almost 60 miles) of rocky habitat across 33 sites. Thirteen MPAs and reference sites were visited. This survey was one part of a three-year survey conducted at predetermined sites along the entire California coastline, excluding San Francisco Bay. The federal Coastal Impact Assessment Program funded the survey.

Through interagency coordination, staff represented CDFW on the California Seafloor and Coastal Mapping Steering Committee and provided guidance on future strategies for habitat mapping. Staff also held membership on the OST Data Management Plan Technical Advisory Team and provided guidance on the development of a new data portal for MPA monitoring data.

In collaboration with Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO) and Reef Check California, CDFW research vessels and scientific divers conducted subtidal nearshore census counts to assist those projects in implementing state-funded MPA monitoring work in the central and south coast regions.



Two basket stars caught on film during a remotely operated vehicle transect CDFW/MARE photo



and other assessments over the first five years of MPA implementation in the north central coast region.

In August, the Commission adopted the 2016 Master Plan for MPAs (available online at wildlife.ca.gov/Conservation/Marine/MPAs/Master-Plan). The Marine Life Protection Act requires CDFW to develop, and the Commission to adopt, a Master Plan that guides the implementation of a Marine Life Protection Program (better known as the “MPA Management Program”) to improve the design and management of California’s MPAs to the extent possible, as a statewide network. A draft Master Plan for MPAs, developed by CDFW and adopted by the Commission in February 2008, guided the regional development of MPA proposals. The 2016 Master Plan for MPAs focuses on the shift from MPA design and planning to managing California’s redesigned MPA network to meet the goals of the MLPA. To create the 2016 Master Plan for MPAs, staff worked in close collaboration with the Commission, OPC, and OST. The 2016 Master Plan for MPAs also reflects input received from other state and federal agencies, California Tribes, many other organizations, and the general public.

Enforcement and Compliance – Staff coordinated with the CDFW Law Enforcement Division to: 1) write sections of the 2016 Master Plan for MPAs; and 2) compile, analyze, and interpret Law Enforcement Division citation data for the first five years of MPA implementation in the north central and south coast MPA planning regions. Coordination efforts continue on various MPA implementation activities to improve the enforcement of and compliance with MPA regulations, such as developing a records management system and clarifying MPA regulations to improve compliance, when appropriate.

Staff mapped the evidence collected by wardens in the field relevant to prosecution of individuals charged with violations. Mapping and analysis supported the Law Enforcement Division in pursuing MPA violation cases in court. Additionally, staff completed mapping and boundary delineation for determining safe harbor navigation corridors for proposed lobster regulations, and for the incremental closing and opening of the crab fishery due to the safety concerns caused by high levels of domoic acid in the crab.

Policy and Permitting – In partnership with the OST and OPC, staff developed and presented the North Central Coast State of the Region report to the Fish and Game Commission. The report provides a summary of key highlights and insights from baseline monitoring

Staff engaged in CDFW’s internal effort to overhaul the antiquated scientific collecting permit program. This effort involved numerous internal meetings, and a series of external public scoping meetings throughout the state to solicit input on the proposed approaches for overhauling the program. The programmatic changes will involve re-drafting regulations in California Code of Regulations Title 14 Section 650. The changes will include moving to an online Scientific Collecting Permit application system and establishment of general use and project-specific collecting permits. The proposed regulations will be available for public comment in mid-2017.

Through interagency cooperation and coordination, Marine Region and OPC Science Advisory Team staff continued to develop an ecological impact assessment tool that will assist in understanding and estimating ecological impacts from scientific collecting in MPAs, with a goal of shielding MPAs against cumulative impacts from research activities or projects. Staff is beta testing the assessment on a variety of MPA-related projects and plans to fully implement the new assessment tool at the end of 2017. Visit the CDFW website at wildlife.ca.gov/Conservation/Marine/MPAs for more information about California’s MPA network.




Administration

Marine Region administrative staff bind together all the working parts of the expansive Marine Region, which extends from the border with Mexico all the way to the Oregon border, through administrative guidance and support. It's no easy task. Administrative staff work tirelessly behind the scenes to support Region staff, making sure they have the tools to get the job done.

Administrative staff help to hire all of the Marine Region's temporary and permanent staff, manage storage and office facilities for staff and vessels, procure all supplies for field work, scientific cruises, offices and laboratories,

and track and processes all out-of-state travel and training request, while managing and staying within Regional budget — and that hardly scratches the surface.

Administrative staff also help various staff conform to state laws and CDFW policies as they work to achieve their project goals. From San Diego to Crescent City, Marine Region scientists, biologists, and others rely on the services provided by Marine Region administrative staff — without whose help it would be a much tougher job to protect, maintain, enhance, and restore California's marine ecosystems for all to enjoy.



Marine Region Mission: To protect, maintain, enhance, and restore California's marine ecosystems for their ecological values and their use and enjoyment by the public through good science and effective communication.

For more information about CDFW's Marine Region, visit the CDFW website at wildlife.ca.gov/regions/marine