



# **MARINE REGION 2019 YEAR IN REVIEW**

## *Message from the Regional Manager*



One of my most distinct memories from 2019 was the historic [image of the black hole](#) that dominated the media during the month of April. Using a global array of radio telescopes, the Event Horizon Telescope Team peered 55 million light years into space to generate the image, further bolstering Einstein's theory of general relativity. My enthusiasm was quickly dampened as I contemplated the juxtaposition of this amazing feat with our general inability to peer beneath the surface of the ocean and understand the processes just off our coast. However, upon reflecting on our 2019 accomplishments, it is apparent the California Department of Fish and Wildlife's (Department's) Marine Region and our partners had a triumphant year filled with science-driven regulations, cutting edge data, and multi-stakeholder collaborations.

We reached a critical milestone on July 1, 2019, when we successfully implemented mandatory electronic reporting for all commercial landings. After years of planning, programming, and coordination, we now have near real-time access to one of our most important data streams. This along with other technological developments like the new [Ocean Sportfishing Interactive Web Map](#) significantly increased our ability to efficiently manage California's fisheries.

A longer-term effort that bore fruit in 2019 was the continued rebuilding of groundfish off California. Twenty years ago, the science revealed what our fishing communities already feared – groundfish stocks were collapsing. The Department, California Fish and Game Commission, and our management partners responded swiftly with harsh restrictions on groundfish fleets to allow stocks to rebuild. These efforts and sacrifices are beginning to pay off as populations of most stocks are now at healthy levels many years ahead of schedule. This is great news for both our fish stocks and our fishing communities as we slowly and deliberately expand opportunity and incrementally rebuild our groundfish fleets with a focus on accountability, sustainability, and innovation.

Another collaborative long-term project is the white abalone recovery program. Once widespread throughout southern California, white abalone populations plummeted in the 1970s and 80s prompting the first listing of a marine invertebrate on the federal endangered species list. The project reached a major milestone in late 2019 with the [first out-planting](#) of captive-bred white abalone into the wild. This is a huge multi-agency achievement. However, only time will tell if we will be able to bring this species back from the brink of extinction.

As we celebrate our many shared achievements from this last year, we must look ahead to the challenges that face us in 2020. We will continue to maintain a laser focus on our work to reduce whale and sea turtle entanglement in California fishing gear. We will expand our efforts to employ research and restoration programs to address the loss of kelp along our coast and we will continue to evaluate and implement proactive measures to sustainably manage our fisheries in a changing climate. We will also continue to expand our outreach and communication programs to improve relationships and foster productive dialog with our constituents and partners.

The biological, physical, social, and political factors that influence marine resource management in California will inevitably lead to challenges in 2020. However, through dedication, hard work, and creative problem-solving, Marine Region staff and our partners will continue to develop and implement innovative solutions to address these challenges and keep us from slipping past the event horizon into a black hole of the unknown. I'm looking forward to the challenges we face in 2020. With a team like this, it's going to be a great year!

**~Dr. Craig Shuman, Marine Region Manager**

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# Fisheries Data Collection and Sharing

## Electronic Commercial Fisheries Landings Reporting

Electronic reporting of commercial fisheries landings became mandatory in 2019, requiring fish businesses to submit their landings information within three business days via a web-based application called E-Tix. To guide this transition, Marine Region staff conducted extensive outreach through informative events, phone calls, email blasts, and mailings.

E-Tix data are now transferred twice daily into the Marine Landings Data System which houses and manages the state's official landings data. Marine Region programs provided valuable input into the development of the system to improve data functionality, reporting, and accuracy.

## California Recreational Fisheries Survey and Recreational Fisheries Information Network

California Recreational Fisheries Survey (CRFS) samplers interview California's marine recreational anglers at more than 400 sampling sites coastwide in order to accurately estimate catch and effort in a time frame and on a scale that meets management needs.

CRFS conducted several thousand assignments at launch ramps, piers, jetties, and breakwaters as well as party/charter boats both dockside upon landing and onboard while fishing. Data collected included catch, fishing effort, angler demographics, and biological measurements on recreationally caught finfish. When onboard party and charter boats, CRFS staff collect additional data on fishing location and returned finfish.



CRFS sampler holding a lingcod  
All photos © CDFW unless  
otherwise stated



Trinidad dock

Since 2010, California has been exempted from the federal National Saltwater Registry Program which means California anglers do not have to register and pay an annual fee (\$29 in 2019). To satisfy the requirements for this exemption, the Marine Region conducts CRFS in a scientifically sound manner that meets national standards set by the National Oceanic Atmospheric Administration's Marine Recreational Information Program (MRIP). In 2019, MRIP began a rigorous statistical review of CRFS methods. In 2020, the Fisheries Analytics Project, in close coordination with CRFS, will respond to MRIP's review, implement suggested improvements and align CRFS methods to better suit management needs.

The Marine Region is also required to submit CRFS estimates to the Pacific [Recreational Fisheries Information Network](#) (RecFIN) on a monthly basis to meet conditions for the exemption from the National Saltwater Registry Program. The RecFIN database hosts recreational catch and effort estimates from California, Oregon, and Washington coordinated through the RecFIN Technical Committee with members representing all three state fish and wildlife agencies, the National Oceanic and Atmospheric Association's National Marine Fisheries Service (NOAA Fisheries), Pacific Fishery Management Council (PFMC) staff, and Pacific States Marine Fisheries Commission (PSMFC).

## Ocean Sportfish Map

The Marine Region created a new [web-based interactive map](#) optimized for quick and easy access to ocean sport fishing regulations on mobile phones and other devices. The application organizes regulations for different species and management areas throughout the state, including all marine protected areas (MPAs). The map shows the user's position to help anglers link to relevant regulations in their area or any other state location.



## Sharing Confidential Data

State data security requirements were incorporated into new data sharing agreements. Seven data-sharing agreements and three memoranda of understanding were approved to allow federal, academic, fishery, and socioeconomic scientists to incorporate confidential state fisheries data into their project analyses.

## Data Management Project

A new Marine Region Data Management Project was formed as a result of the 2018-2019 Sustainable Funding Budget Change Proposal. A new supervisor and Environmental Scientist were added to seven existing positions to form the team. The Data Management Project leads the development of centralized data systems and expanded electronic reporting, improved data sharing and data security procedures and products, management of all our commercial fisheries data, and supports our regional spatial mapping efforts. In addition, two new Information Technology positions allowed the creation of a dedicated Marine/Fisheries Application Development team (one supervisor and four staff) within the Department's Data and Technology Division. This significantly increases our capacity to develop the software and data development tools that the Marine Region needs for fisheries management activities.

## Fishing Gear Innovation

### Invertebrate Management Program: Whale Safe Fisheries

Marine Region staff drafted proposed regulations and a conservation plan to support new Incidental Take Permits for whales and sea turtles. The conservation plan describes a comprehensive approach to minimize entanglement risk while allowing for a robust and sustainable commercial Dungeness crab fishery. To help support this, two funding proposals were submitted to NOAA Fisheries to expand aerial survey operations for large whales and satellite tagging for sea turtles.



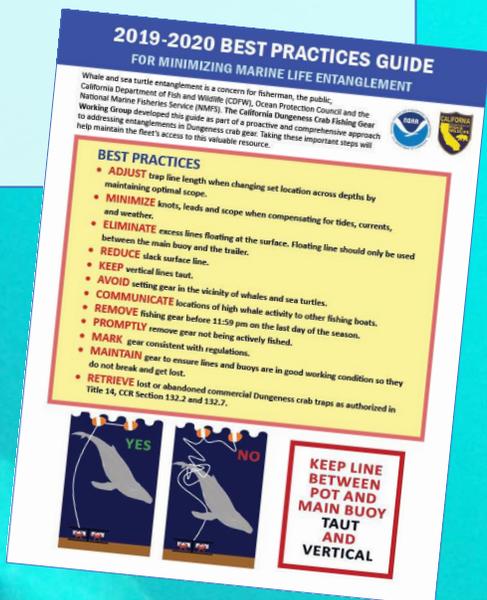
Entangled whale  
MFS MMHSRP Permit #18786-03  
Photo credit: Jodi Frediani

The Department also established a Commercial Dungeness Crab Trap Gear Retrieval Program and standardized marking requirements for other state-managed commercial trap fisheries. To support new gear innovations that help reduce entanglement risk, Marine Region staff hosted a Gear Innovation Open House. Working in partnership with the Dungeness Crab Fishing Gear Working Group and gear innovators, the open house focused on innovations to help reduce entanglement risk.

Deploying a Smart Buoy on Demo Day. Photo credit: Blue Ocean Gear



The Marine Region and Dungeness Crab Fishing Gear Working Group also prepared an updated [Best Practices Guide](#) prior to the start of the 2019-2020 season which is a valuable resource for trap gear fisheries.



## Drift Gill Net Transition Program

New regulations for the Drift Gill Net (DGN) Transition Program were finalized, published, and implemented. The program allows current DGN shark and swordfish permittees to voluntarily surrender their permit and relinquish their net(s) in exchange for a one-time payment.



Swordfish

Photo credit: Mindy Curtis

Participants in the program are exempt from payment of future fees for a state swordfish permit, are prohibited from obtaining a new California DGN shark and swordfish permit, and must agree to not fish under, renew, or transfer a federal DGN permit. All California DGN shark and swordfish permits must be surrendered or revoked as of January 31 of the fourth year following the Department's notification to the Legislature that \$2 million has been received for the program. Forty-three permittees submitted forms indicating a willingness to participate, including 28 of the 31 active permittees who had made DGN landings during the past five years.

## Deep-set Buoy Gear Authorization

After several years of work and analyses, the PFMC voted in September to approve deep-set buoy gear to target swordfish in federal waters off California and Oregon. The gear was designed and initially tested by the Pfleger



Successfully testing new crab pots

Institute of Environmental Research to catch swordfish at depth where they feed during the day, while minimizing interactions with non-marketable and protected species, such as marine mammals, blue sharks, and sea turtles. Two configurations of the gear, standard buoy gear and linked buoy gear, have been tested under federal Exempted Fishing Permits (EFPs) for the last several years, and participants will continue to fish and collect data under these EFPs until NOAA Fisheries completes the rulemaking authorizing both configurations.

## Fishery Disaster Relief

### Crab Disaster

The United States Congress allocated \$25.6 million for the 2015-2016 California Crab Fishery Disaster following pervasive Dungeness crab and rock crab fishery closures due to domoic acid. PSMFC received these disaster funds and the Marine Region worked with them to direct disaster payments to affected fishery participants including Dungeness and rock crab permittees, processors, receivers and Dungeness crab commercial passenger fishing vessels as outlined in the disaster spending plan.



Dungeness crab

The first phase of distributing funds to affected permit holders and businesses is considered complete with more than 98 percent of this portion of the funds distributed. The Department is coordinating with the California Department of Public Health to procure supplies and equipment to increase monitoring, collection, and processing capabilities for domoic acid samples. In addition, a request for research proposals was released by PSMFC in mid-December 2019 to fund projects to better understand domoic acid and how the fishery can better respond.

### Salmon and Sardine Disasters

In April 2019, the federal government determined that ten fisheries were eligible for new fishery disaster funding, including Klamath River Fall Chinook salmon fisheries and the California Pacific sardine fishery. Marine Region staff have developed a draft spending plan for Pacific sardine and are working on a plan for salmon to distribute more than \$6.6 million to participants in these fisheries affected by the disasters. These funds are anticipated to be available for distribution in 2020.

### Urchin Disaster

In October 2019, the federal government determined that there was a commercial fishery disaster for the northern California red sea urchin fishery. Funds to mitigate this disaster are yet to be determined. Marine Region staff worked with the sea urchin industry, California Sea Urchin Commission, and other constituents to draft a spending plan and develop potential restoration and mitigation projects.

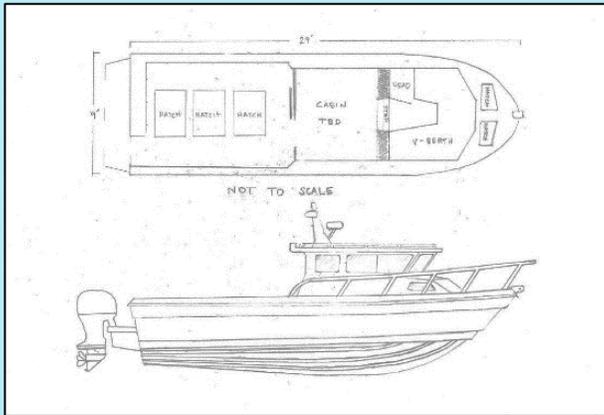


# Vessels and Diving

## Research Vessel Operations

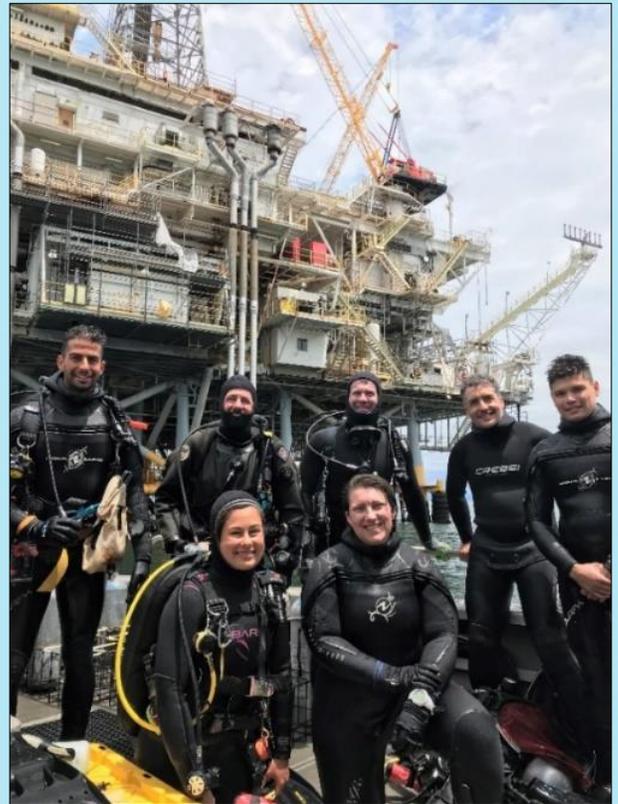
The Research Vessel (R/V) *Garibaldi* is the 45-ft. flagship of the Marine Region. Based in San Pedro, the R/V *Garibaldi* and crew assisted in a variety of Marine Region research studies as well as collaborative studies from San Diego to Point Conception, including the Channel Islands. The vessel was at sea for 115 days on 36 cruises and traveled 4,483 nautical miles conducting marine research.

R/V *Mystinus* is a Monterey-based 35-foot workboat with capacity for research fishing surveys, light oceanographic work, and remote sensing. It deployed 30+ field days in 2019 and hosted 200+ dives in support of central California MPA monitoring and diver training.



Line drawing of the R/V *Mystinus*

In 2019, the Marine Region used \$100,000 in new funds provided by the 2018-2019 Sustainable Funding Budget Change Proposal to help improve and maintain our vessel fleet. Five vessels received complete electronics package upgrades. Other improvements included required safety and navigational equipment, needed maintenance, equipment replacement, and repairs. Vessel trailers were repaired, and a dedicated position to assist with vessel operations and maintenance was created and filled.



Department Divers

## Diving Safety Program

The Diving Safety Program again maintained an enviable safety record in 2019, while continuing a high level of collaborative dive activity with universities and other agencies. Department divers completed more than 2,000 dives (amounting to nearly 50 days in total time under water) while conducting research, monitoring, and enforcement. In addition to re-qualifying 75 active divers, three candidates were newly qualified as Department Scientific Divers at the annual 100-hour training course. The Department's underwater research and monitoring efforts were achieved with the assistance of divers from 15 scientific diving organizations (universities, agencies, and others) that provided more than 70 visiting divers to work on collaborative projects.

## Outreach and Education

A new Marine Region Outreach Team was formed. Together they produced a new Marine Region Strategic Outreach Plan to coordinate and improve the Marine Region's outreach and education efforts, and help ensure these efforts are organized, consistent, and effective. The Strategic Outreach Plan focuses work over the 2019-2020 and 2020-2021 fiscal years and forecasts future work. It is intended to be a living document with a comprehensive review and update in 2021 to reflect completed tasks and new needs. Marine Region's new focus on outreach will help effectively communicate our projects, programs, rules, and regulations to the public.

### Outreach Products

Our own Marine Region Manager, Dr. Craig Shuman, and Invertebrate Biologist, Carlos Mireles, are featured in the 2019 film [Warty Sea Cucumbers: A Story of Collaboration in California](#). The Resource Legacy Fund Foundation provided funding for this video highlighting the Marine Region's collaborative research efforts with members of the fishing community, National Parks Service, and Marine Applied Research & Exploration to collect essential fishery information that is needed to improve management of the commercial warty sea cucumber dive fishery. The film will be screened at the International Ocean Film Festival in San Francisco March 12-15, 2020.



Carlos Mireles and Craig Shuman from the film.  
Photo credit: Resource Legacy Fund Foundation

More than 40,000 MPA educational and outreach materials were distributed and presented to diverse audiences across California. Staff completed a new [California Marine Protected Area Network Outreach and Education Guide](#) to provide Department

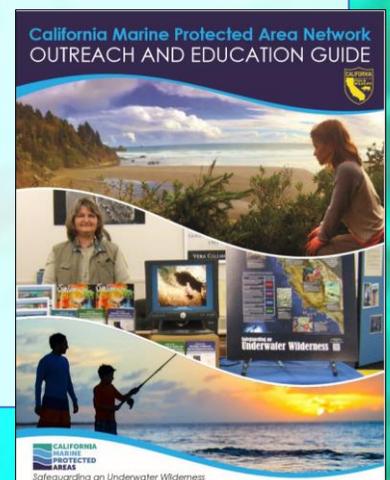


Warty sea cucumber

Photo credit: Clinton Bauder, Baue.org

approved MPA messaging for partners engaged in public outreach. Staff posted online articles to update stakeholders about notable MPA Management Program activities. Highlights included a special series featuring individual MPA Network Collaboratives that will continue into 2020. Staff wrote several articles for the Marine Management News blog series *Exploring California's Marine Protected Areas*, which include videos depicting underwater habitats and the species that rely upon them. An article on the conservation and MPA monitoring efforts on the remote Farallon Islands, located offshore near San Francisco, was published in the November-December issue of the *Outdoor California* magazine.

With assistance from CRFS, staff completed outreach assignments during recreational groundfish season-opening weekends statewide. Groundfish staff provided anglers with more than 3,000 outreach packets containing the 2019 recreational groundfish regulations, species identification flyers, and information on the CalTIP program. Staff also distributed approximately 120 descending devices and educated anglers regarding the importance of using a descending device when discarding fish suffering from barotrauma.



The Marine Region participated in seven different ocean fishing-related events with more than 59 staff providing information and communicating with the public. Marine Region staff published 40 blog contributions to the [Marine Management News](#), covering topics ranging from regulation changes to 'Creature Features' that detail the biology and life history of particular marine organisms. These posts reached thousands of viewers and several were picked up by popular media outlets. The most popular posts in terms of viewers this year included:

- [California Recreational Groundfish and Lingcod Fishing Regulation Changes for 2019](#)
- [2019 Ocean Salmon Seasons Finalized for the California Coast](#)
- [New California Sheephead Fillet-at-Sea Regulation Now in Effect](#)
- [Commercial Dungeness Crab Fishery Updates](#)
- [Rare 7-year-old Chinook Salmon Caught in California Ocean Salmon Fishery](#)

## Marine Species Highlights

### Kelp and Other Marine Algae

A 90 percent decline in bull kelp during 2014-2015 was quantified using Marine Region monitoring data and published in [Nature's Scientific Reports](#). Monitoring in the summer of 2019 showed a continued decrease in kelp and abalone in northern California and continued high population densities of purple sea urchins. The Marine Region co-published the [Bull Kelp Recovery Plan](#) in April 2019. Sea urchin removal is the primary restoration action at key recovery sites identified in the plan. The Greater Farallones Association and Noyo Science Center partnered with recreational and commercial divers to conduct focused removals in 2019 with Department monitoring. In addition, the Marine Region worked to increase the recreational purple sea urchin limits to 40 gallons per person, per day for Sonoma, Mendocino, and Humboldt counties in northern California, supporting efforts to control kelp predators.



Sea palm

Marine Region staff developed recommendations for potential changes to the commercial kelp and marine algae harvest regulations and implemented an online survey for commercial harvesters to assist with stakeholder discussions and potential regulatory changes. These new regulations are expected to be considered by the Fish and Game Commission in mid-2020.

Working with partners, staff began developing a Statewide Kelp Restoration Toolkit to inform the future development of a Kelp Enhanced Status Report and a Kelp Management Plan. Staff and stakeholders developed a funding proposal to implement restoration activities recommended in the 2019 Sonoma-Mendocino Bull Kelp Recovery Plan. This plan promotes the removal of purple sea urchins by commercial urchin divers to protect remnant bull kelp stands in northern California.

## Eelgrass

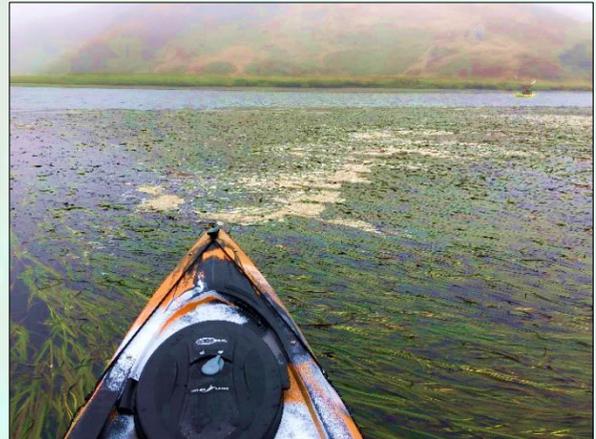
Eelgrass (*Zostera spp.*) expansion was noted in Morro Bay, which is a good sign after years of decline for reasons yet to be identified. In addition, *Z. pacifica*, a species specific to Southern California, was identified in and around Monterey Harbor while common eelgrass, *Z. marina*, was observed in Pillar Point for the first time. Marine Region staff confirmed these observations by collecting spatial data and biological samples at the sites. These observations will be added to annual Marine Region eelgrass surveys. These data will be used to inform future permitting decisions by relevant agencies while improving California Environmental Quality Act and National Environmental Policy Act document and permit reviews.



Department scientist monitoring eelgrass

Marine Region staff also participated in a variety of partner-led meetings and training, such as the workshop *Solving Policy Problems to Advance Eelgrass Protection* organized by Audubon California and Pew Charitable Trusts and marine spatial planning training organized by Monterey Area Research Institutions' Network for Education and Nicholas School of the Environment at Duke University.

Through a collaborative effort between California Sea Grant, Humboldt State University, Hog Island Oyster Company, and the Wiyot Tribe, staff implemented the final year of field research to investigate the extent to which eelgrass reduces the impact of ocean acidification on the growth of commercially grown oysters in Humboldt Bay.



Surveying eelgrass beds in Estero Americano estuary

## Abalone

In collaboration with partners, the Marine Region conducted a public process to integrate abalone management strategy concepts from the two peer-reviewed management proposals. A Project Team, guided by an Administrative Team and professional facilitators, developed concepts for the Abalone Fishery Management Plan (FMP) management strategy and a framework for providing limited fishery opportunities during stock rebuilding.



White abalone in a release habitat

This process was supported by a sub-group of scientists responsible for further model development and simulation testing through management strategy evaluation. The Project Team completed its charge in December. The Administrative Team will complete the process in early 2020 by delivering a report of process outcomes to the Fish and Game Commission. An FMP is anticipated to be completed by the end of 2020.



Divers outplanting white abalone

The White Abalone Restoration Consortium reached a landmark accomplishment in 2019: stocking captive-bred white abalone into the wild for the first time. More than 3,200 white abalone were stocked across two sites in Southern California. With grant funding from NOAA Fisheries, these sites will be regularly monitored and receive additional pulses of captive-bred animals every six months for the next five years. The goal is to establish self-sustaining reproductive populations of white abalone. This milestone brings new hope for the future of this endangered species.



Abalone survey in Sea Lion Cove SMCA



Box crab

## Box Crab

Non-*Cancer* crabs continue to be an emerging fishery. Strong interest in brown box crab led the Marine Region to initiate a collaborative research program with fishermen and California Sea Grant to assess possible regulations. Eight experimental fishing permits were issued across the state. The Marine Region is working with fishermen on a tag-recapture study, Sea Grant is studying box crab life history, and professional observers are monitoring the bycatch of this experimental fishery. The California Ocean Protection Council and the PSMFC are supporting the use of electronic monitoring systems on five vessels to monitor catch and effort. Data analyses will help evaluate the feasibility of a box crab fishery.

## Surfperch and Other Surf Fishes



Shiner perch

Monitoring continued for surfperch commercial and recreational hook-and-line fisheries in central and northern California. Barred surfperch and redbtail surfperch

continued to dominate commercial landings and the recreational catch among all surfperch species. Essential fishery information was collected using fishery-independent surveys with hook-and-line gear from Monterey County to Humboldt County. Progressive angler surveys were completed to document angler effort along Monterey County sandy beaches.

Marine Region staff began developing a management strategy evaluation for redbtail surfperch in conjunction with the Data Limited Method Toolkit project. Staff built an operating model for both the recreational and commercial beach fisheries for this species and began evaluating the effects of applying a wide range of management scenarios to this virtual fishery into the future.

## Barred Sand Bass and Kelp Bass



Barred sand bass

To help evaluate the current status of basses, Marine Region staff completed 47 sampling trips aboard commercial passenger fishing vessels to collect information on numbers, sizes, and mortality of released fish. Staff collected data on more than 2,307 kelp bass and 262 barred sand bass. Marine Region staff also completed fishery-independent surveys of barred sand bass for the third consecutive year during fall 2019. The number of sites surveyed were increased from three to ten sites, ranging from Santa Monica Bay to the U.S./Mexico border. Staff published a [journal article](#) comparing video to visual survey methods.



California halibut

## California Halibut

Fishing effort for California halibut in the San Francisco Bay Area spiked dramatically, and many referred to the fishing as 'historic' with an extended season and excellent catch rates.

Good fishing and increased effort were reported north to Humboldt Bay and south to Monterey Bay. The excellent fishing appeared to be the result of optimal oceanic conditions for halibut egg and larval survival five to six years ago. Prolonged relatively warm water during this period resulted in several successful new year classes. Continued catches of sublegal sized fish and continued warm water in 2018-2019 are indications that fishing success will continue, although the catch rates may dip until these new year classes reach the minimum size limit.

Marine Region staff developed separate stock assessments for northern and southern California populations of halibut. The process involved analyzing more than 47 years of fisheries, survey, and biological data obtained from a variety of sources, including Department, NOAA Fisheries, and PSMFC. Funding was secured from the Resources Legacy Fund to convene an external peer review panel, which is being coordinated by California Ocean Science Trust. Coordination and planning of the review began in 2019 and

will be convened in 2020. Staff also developed a management strategy evaluation for California halibut using the Data Limited Method Toolkit. This operating model simulates their population dynamics and continues to test this 'virtual fishery' under a wide range of management scenarios. The goal is to determine the likelihood of achieving certain sustainability and performance metrics into the future, given different management approaches.

## Pacific Halibut

Marine Region staff continue to actively monitor the recreational Pacific halibut fishery to ensure the established annual quota was not exceeded. Catch and effort in the 2019 recreational Pacific Halibut fishery was anomalously low. Anecdotal information suggests several factors may have contributed to the low catch and effort. These include availability of other targets such as salmon, California halibut inside Humboldt Bay, and albacore. Poor ocean and weather conditions during many of the summer months, and difficulty locating and catching fish on the Pacific halibut grounds may also have contributed. Catch in the 2019 commercial fishery was greater than in recent years, largely due to favorable weather



Department scientist measuring Pacific halibut

conditions during days open to directed commercial fishing. Marine Region staff coordinated with the International Pacific Halibut Commission to collect biological data from commercial catch to support various research projects and for ageing structures for inclusion in the annual stock assessment.

## California Sheephead



California sheephead

Marine Region staff continued collaboration with the Sportfishing Association of California to develop a California sheephead fillet length regulation. A fillet length minimum size of 6¾ inches for recreationally caught California sheephead was adopted by the Fish and Game Commission and implemented April 1, 2019.

## Groundfish

California's recreational and commercial groundfish fisheries (which include more than 90 species of rockfish, groundfish, ratfish, sharks, and skates) remained within annual catch limits for 2019. There was great news for previously overfished stocks: cowcod was declared rebuilt, and the latest stock assessment of the last remaining overfished groundfish species, yelloweye rockfish, indicated a more optimistic outlook of the stocks' population status.

Staff reviewed and recommended initial applications for federal Experimental Fishery Permits that are seeking approval to begin or continue operation starting in 2021, including



Young cowcod

several that propose to operate in California waters. If approved, data collected under these permits would help inform the feasibility of establishing a mid-water hook-and-line commercial fishery targeting underutilized shelf rockfish stocks, establishment of a midwater commercial trawl fishery, and collection of additional data for future cowcod stock assessments.

A methodology to generate population abundance information using data collected using remotely operated vehicles in nearshore surveys is being validated. If this fishery-independent method is accepted for use in management, it will likely enhance stock assessments of nearshore groundfish stocks. This methodology could provide information of stock abundance inside areas where extractive surveys or harvest is not permitted (e.g. MPAs).

The Marine Region conducted a commercial fishery sampling project that collected more than 2,000 fish samples from commercial fish businesses between Crescent City and Santa Barbara. These samples provide biological data for 14 groundfish species in need of additional size, age, sex, and maturity data. The collected information will be used in future stock assessments and likely result in better informed results. Staff also developed and verified protocols for external sexing of cabezon, eliminating the need to dissect cabezon to determine sex.

## Salmon

One hundred and thirty interested stakeholders attended the annual California Ocean Salmon Information Meeting. Staff provided information on 2018 fisheries and 2019 forecasts and gathered public input for developing 2019 regulations.



### Chinook salmon

Information on ocean harvest, inland escapement, and abundance forecasts continue to be important in the evaluation of stock contributions and fishery impacts to sustainably manage West Coast fisheries and protect California salmon stocks. During the ocean salmon fishing season, recreational and commercial fisheries were monitored at approximately 20 ports along the coast. Commercial landings, approximately 270,000 fish for 2019, increased compared to the previous five years. Approximately 87,500 landed Chinook were sampled, and snouts were collected from more than 15,000 of these for coded-wire tag (CWT) processing. In the recreational fishery, Ocean Salmon Project staff coordinated with CRFS staff to sample nearly 25,000 Chinook salmon and collect more than 4,900 heads for CWT processing. In total, staff processed approximately 20,000

coded-wire tags for the season. These data have been uploaded to the Regional Mark Processing Center and are currently being used in support of stock assessment and ocean salmon fishery planning.

The Marine Region completed data collection, management, and analysis work leading to the publication of the [2014](#) and [2015](#) Constant Fractional Marking reports. These reports detail hatchery contributions to central valley harvest, escapement, and ocean fisheries, and describe the effects of various hatchery release types, most notably on recovery and stray rates. Constant Fractional Marking results are central to evaluations of hatchery programs, bay and coastal net pen programs, barge studies, restoration activities, recovery goals, and salmon lifecycle model calibrations.

PFMC adopted final rebuilding plans for two of California's major salmon stocks, Sacramento and Klamath River fall Chinook, which met the criteria for overfished status a year prior. To reduce fishery impact rates on these depressed stocks and ensure higher future escapement levels, industry representatives and regulatory bodies curtailed fishing seasons in 2019. Marine Region staff were integral in the development of these rebuilding plans and will continue to monitor and report on stock status to facilitate timely rebuilding.

Marine Region staff assisted in the development of a risk assessment analyzing the effects of ocean salmon fisheries on federally-endangered southern resident killer whales (SRKW). This supplements National Marine Fisheries Service consultation to ensure management measures do not jeopardize SRKW by reducing their prey base. The final risk assessment is expected in 2020.

## Pacific Herring



Herring sampling

A [Pacific Herring FMP](#) and implementing regulations were adopted by the Fish and Game Commission at their October 2019 meeting. The herring FMP establishes a cohesive strategy to guide the sustainable management of California's commercial and recreational herring fisheries. The new regulations are anticipated to take effect March 1, 2020.

The 2018-2019 herring season in San Francisco Bay ended with a spawning stock biomass (SSB) estimate of 8,030 tons. This is the second lowest SSB estimate on record. With a low fishery quota of only 834 tons, no commercial fishing vessels participated in the fishery this year. This was the first season in the modern fishery with no participation in San Francisco Bay, other than the closed season in 2009-2010. The northern management areas Tomales Bay, Humboldt Bay, and Crescent City Harbor remained inactive, with quotas set at 350, 60, and 30 tons, respectively.

## Pacific Sardine and Northern Anchovy

The Marine Region coordinated with the California Wetfish Producers Association to conduct and validate aerial survey observations of sardine and anchovy for potential use in future stock assessments. An amendment to the Coastal Pelagic Species FMP was completed to allow flexibility in setting live bait catch limits if the sardine stock is deemed overfished.

## Pacific Bluefin Tuna

Marine Region staff completed another year of in-season catch monitoring for Pacific bluefin tuna and other tunas and expanded commercial dockside sampling of Pacific bluefin tuna to include smaller volume landings in the hook-and-line and gillnet fisheries. More than 200 Pacific bluefin tuna genetic samples were collected, contributing to a Pacific-wide population study.



Measuring bluefin tuna

## White Seabass

Staff continued to collect samples for a study updating the age at maturity for white seabass. Collaborating with recreational anglers and the Pflieger Institute of Environmental Research, staff collected about 150 fish that were sent out for histological processing and analysis planned to start in 2020.



Sampling Pacific sardines at the dock

## Enhanced Status Reports and Ecological Risk Assessment

Following the adoption of the 2018 Marine Life Management Act (MLMA) Master Plan by the Fish and Game Commission, staff developed an MLMA Implementation Work Plan (Work Plan) which they presented to the Fish and Game Commission at its June 2018 meeting. Actions outlined in the Work Plan and completed in 2019 included the prioritization of 31 key state fisheries (20 finfish and three invertebrates). Staff also completed Enhanced Status Reports (ESRs) for 30 state managed species. The ESRs are a much-improved version of the [Status of the Fisheries Reports](#) described in the MLMA. The ESRs contain information on the natural history of the species and the location, landings, and characteristics of the fishery along with details on bycatch, the effects of fishing on habitat, socioeconomics, research needs, opportunities for management changes, and climate readiness. These ESRs are posted on [the Marine Species Information Page](#). Construction started on a prototype design for the California Fisheries Portal with assistance from stakeholders and Ocean Protection Council-approved funding.



Market squid paralarvae

## Climate Change Activities

Marine Region staff continued to coordinate with various state and federal agencies on climate-related activities. These included a collaborative effort with the California Ocean Science Trust, Fish and Game Commission, and Ocean Protection Council to develop objectives and content for a climate and fishing communities workshop in July 2019. Staff also attended a second California Ocean Science Trust workshop in August 2019 to discuss spatial and ecological insights for decision making on changing ocean chemistry. Staff continue to explore how to incorporate climate change considerations into all aspects of fisheries management and habitat protection. Each ESR contains a section detailing potential climate change impacts to that fishery.

## Aquaculture

Staff coordinated and collaborated with many internal and external partners to manage the state's bay and estuarine resources through monitoring, research, and restoration activities. Staff collaborated in a research project with the NOAA Fisheries Southwest Fisheries Science Center and Humboldt State University to investigate the transport of domoic acid into Humboldt Bay from the nearshore ocean environment and the implications for recreational harvest of shellfish and commercial oyster production.

Fifty-four Live Importation Permits, 43 Aquaculture Registrations and eight Restricted Species Permits were processed, reviewed, and approved. Staff also prepared two Wild Broodstock Collection Permits and five Letters of Authorization.

Staff coordinated with the State Aquaculture Coordinator, Fish and Game Commission staff, other agencies, and constituents on marine aquaculture leasing and permitting activities in state and federal waters. This included renewals, amendments, consideration of new lease applications, and a variety of other administrative and oversight requests. Spatial analyses were performed to determine interactions between proposed lease areas and commercial and recreational fishing. The Marine Region also responded to a U.S. Army Corps of Engineers Public Notice for comment on the Ventura Shellfish Project, a proposed offshore shellfish farm in federal waters, streamlined procedures for Scientific Collecting Permits and Letters of Authorization, and conducted lease inspections.

## Ocean Resources Enhancement and Hatchery Program



White seabass ready to be released

With the completion of the [Ocean Resources Enhancement and Hatchery Program](#) (OREHP) multi-year evaluation and public input process, the Department issued two memorandums to the Ocean Resources Enhancement Advisory Panel (Advisory Panel) outlining recommendations and priorities for improving the program. The Department and the Advisory Panel began addressing OREHP's administrative and research priorities to ensure the program's long-term success. Both parties agreed to continue focusing on white seabass enhancement while updating the OREHP statute to reflect the current conditions, attitudes, and trends of the program. The Department and the Advisory Panel also began investigating mechanisms to increase funding to meet the basic needs of the OREHP hatchery and to continue research on post-release studies and identification of hatchery-raised fish using genetics and isotopes.

## Marine Protected Areas

The Department manages California's 124 MPAs and 14 special closures. The MPAs are managed as a network using a partnership-based approach through the [MPA Management Program](#). The MPA Management Program is composed of four key focal areas: Outreach and Education, Research and Monitoring, Enforcement and Compliance, and Policy and Permitting.

Following guidance in the [MPA Monitoring Action Plan](#), seven [long-term monitoring projects](#) were launched in 2019. A combined total of 24 universities, agencies and institutions are involved in this long-term monitoring investment. Results from long-term monitoring projects will help inform the

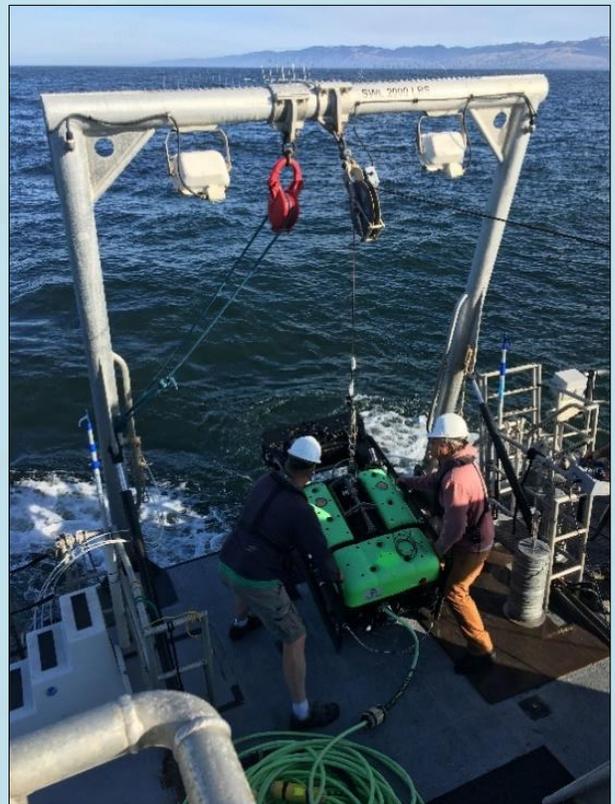


Blue Cavern Onshore SMCA

evaluation and adaptive management of the MPA Network.

Marine Region Staff continued to represent the Department on the [MPA Statewide Leadership Team](#) (Leadership Team). The Leadership Team is an advisory body, chaired by the California Secretary for Natural Resources, that ensures communication, collaboration, and coordination among entities that have significant authority, mandates, or interests that relate to the MPA Network.

Significant attention is now focused on preparing for the first decadal management review of the MPA Network and Management Program in 2022. The review will focus on each of the four focal areas of the MPA Management Program and evaluate the MPA Network's success in meeting the Marine Life Protection Act's goals.



ROV launch in Bodega Bay

## Awards and Recognition

Many Marine Region staff were recognized by the Department's Director Charlton Bonham during the 2019 Employee Excellence Awards ceremony.

The Marine Landings Data System Team, including Aaron Del Monte, Joann Eres, Derrick Hampton, Andrew Lemley, Eric Miller, Todd Neahr, and Katie Perry, was the recipient of the 2019 Employee Excellence Award for Innovation for their work modernizing the way commercial landings data are collected, stored, and reported.

Elizabeth Hellmers was recognized with the Scientific Excellence Award for her development of a Commercial Landings Data

Improvement Process, a new and innovative process to review commercial fisheries landings information entered into Department databases.

Our Commercial Dungeness Crab Crisis Response Team received the Director's Top Honors Award for the outstanding leadership exhibited by Christy Juhasz, Mary Loum (Office of General Council), Bob Puccinelli (Law Enforcement Division), and Sonke Mastrup during this fishery's crisis.

In addition, the Northern Channel Islands MPAs received a [Blue Park Award](#) from the Marine Conservation Institute at the Our Ocean Conference in Oslo, Norway in recognition of their science-based design and strong protection of marine ecosystems and biodiversity.



Marine Landings Data System Team



Elizabeth Hellmers receiving her award from Director Bonham (Left) and Chief Deputy Director Termini (right)



Commercial Dungeness Crab Crisis Response Team

