



MARINE REGION

2021 YEAR IN REVIEW



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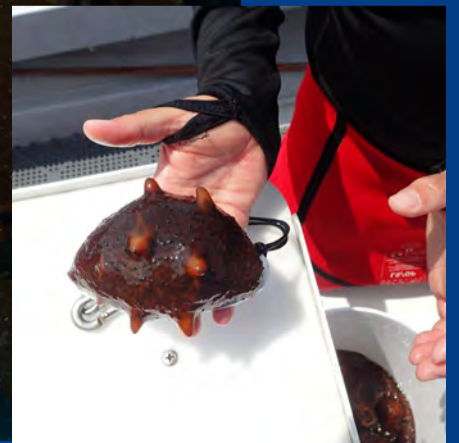
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Previous page: Young angler with his freshly caught rockfish at 12 Mile Bank. Research diver on a transect in an MPA. Residents of the kelp forest. Top of page: California Recreational Fisheries Survey(CRFS) Scientific Aid(SA) Miranda King at Fort Bragg Jetty. Chinook salmon. SA Jeffrey Wang on the commercial passenger fishing vessel(CPFV) KingFish out of Emeryville. Marine Applied Research and Exploration(MARE) submersible footage of a rockfish. SA Monique Silva-McCuen at Shelter Cove. Giant kelp frond. Warty sea cucumber being measured.



Message From The Regional Manager

Resilience was a persistent theme for Marine Region staff and our partners over this past year. Not only were we resilient in the face of COVID-19, but we continued to build resilience into our marine ecosystems, fisheries, and coastal communities. While resilience in ecological systems is typically defined as the ability of a system to resist change or return to its previous state after a disturbance, our social view of resilience is defined by our ability to adapt to a difficult or new situation.

As you will see in the 2021 Marine Region Year-in-Review, we are actively pursuing both definitions of resilience to achieve our mission. With the help of our partners, we are continuing to manage the statewide network of Marine Protected Areas to, in part, build natural resilience into coastal systems and help buffer those systems from external stressors. We are continuing to explore urchin mitigation and kelp restoration strategies to help restore kelp to areas of our coast that remain at historically low kelp levels and are aggressively working to protect and restore abalone populations in central and Southern California. We are also adapting to a changed environment by actively transforming the way we fish for Dungeness crab and swordfish to minimize the risk of whale and sea turtle entanglements and are evaluating new data collection program and sustainable fishing opportunities.

I remain optimistic that the challenges created by the COVID-19 pandemic will soon be a thing of the past. Unfortunately, no amount of optimism will address the challenges created by our changing climate. These climate driven challenges will force us to make very difficult choices in the coming years, especially as we work toward improved resilience. When should we intervene to attempt to prevent change or return a system to its previous state? When should we accept that change is inevitable and focus our efforts on adaptation? When might it be practical to hedge our bets and try to do both? These, and other difficult questions await us as we navigate the ecological and social complexities created by climate change.

**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.**



School of kelp bass and a garibaldi.

2021 was not the year many of us hoped for. Restrictions on travel, indoor activities, and concerns for safety continued to create challenges for research, data collection and management activities. While we had glimpses of pre-pandemic "normal," we spent most of the year reliving many of the trials and tribulations of the prior year. Once again, our resolve, fortitude and resilience were put to the test, and once again, we rose together to meet these challenges head on to achieve our mission.

2. Fishing Licenses and Fishery Data

2.1. Recreational Licenses

The final tally for 2020 sport fishing license sales was 1,959,119. This was a 10.6% increase over the 2011 to 2019 average (1,771,678). In contrast, license sales in 2021 were 1,768,271 representing a 9.7% decrease from 2020 but consistent with the previous 10-year average.

2.2. Commercial Licenses

Commercial fishing license and vessel registration sales for the April 1, 2021 – March 31, 2022 season decreased from the 2020 season total. The Department sold 6,607 commercial fishing licenses in 2020, which is in line with the previous 10-year average. Preliminary sales in 2021 (6,318 licenses), however, represent a 16% decrease from 2020.

The number of registered commercial vessels in 2020 was 3,219. This was above both the previous year and the 2011 to 2019 average. So far, 3,101 vessels were registered in 2021 representing a 4% decrease compared to 2020, while still being slightly above the previous 10-year average of 3,094 registered vessels. While commercial fishing licenses and registered vessel sales decreased over the last year, commercial fish business license sales continued to increase in large part due to sales of the Fisherman's Retail license, which was also well above the 2011 to 2019 average. In 2020, the Department observed a 29% increase in commercial fish business sales compared to the previous year, and 2021 sales remain high but have dropped slightly by 2% since 2020. This likely reflects the adaptation of many fishermen to incorporate direct sales to consumers as part of their business model during the COVID-19 pandemic.

2.3. E-Tix

Marine Region continued to observe a high level of compliance from fish businesses using the E-Tix application to submit commercial landings data. Most businesses must submit within three business days, but the sablefish, groundfish trawl, and Pacific bluefin tuna fisheries are required to submit within 24 hours. In 2020, fish businesses were taking an average of 2.34 business days to submit their landings to the Department, and in 2021 the average dropped to 2.06 days. This is likely due to ongoing outreach efforts from our Law Enforcement Division, scientific staff, the Marine Fisheries Statistical Unit, and the Pacific States Marine Fisheries Commission, as well as efforts made by fish businesses as they become increasingly familiar with the E-Tix application.

3. California Recreational Fisheries Survey

California Recreational Fisheries Survey (CRFS) sampling in the beginning of 2021 was still restricted due to the COVID-19 pandemic. CRFS continued to operate under modified sampling guidelines to ensure compliance with all department, county and state COVID-19 health advisories and best practices. These guidelines reduced CRFS efficiency but were mitigated by doubling the number of party/charter boat dockside surveys and streamlining the angler interview process at launch ramps, man-made structures (i.e., piers, breakwaters and jetties), and beaches and banks.

As guidelines relaxed in the spring, CRFS transitioned away from the modified sampling protocols. This transition allowed for direct sampler observations of catch and species

SA Connor Stewart processing redbtail surfperch in the lab. SA Bill Doo interviewing a woman with a leopard shark, Fort Point Pier, San Francisco. SA Stephanie Hammond measuring fish aboard the CPFV Redondo.





DUNGENESS CRAB CALIFORNIA DEPARTMENT OF FISH AND GAME

Regulation Changes for the Recreational Crab Fishery

Attention NEW Sport Crab Regulations

Season Dates Subject to Change

To reduce marine life entanglement risk, season dates are subject to change and public notice will be provided a minimum of 5 days in advance of the scheduled Dungeness crab season or before a closure becomes effective. Please visit the Whale Safe Fisheries web page for more information and to join CDFW's email list: <https://wildlife.ca.gov/Conservation/Marine/Whale-Safe-Fisheries>
Reminder: ALL crab traps must be removed 7 days prior to the Dungeness crab season opener.

Gear Marking Requirements

All crab traps must be marked with specific sized buoys. The Main Buoy must be at least 5" diameter and 11" in length with an additional Red Marker Buoy that is 3" in diameter and 5" in length, attached to main buoy with 3' of line or less.

9-Day Trap Service

Crab traps must be raised, cleaned and emptied (serviced) at intervals not to exceed 9 days. Gear must be removed when you no longer intend to fish or you are unable to service at least every 9 days.

Trap Limit

Every individual may use up to 10 traps and service 10 additional traps with written permission from the operator of the trap.

Trap Validation Program

Individuals who use a crab trap are required to purchase an annual \$2.42 trap validation this season. This fee does not apply to other methods of take.

For More Information Including Public Notices on Season Modifications: <https://wildlife.ca.gov/Conservation/Marine/Whale-Safe-Fisheries>



identification, reducing the reliance on angler reported catch for rockfish species. Fish length data, which can be used to estimate weight, was also collected from the northern California Pacific halibut fishery to help track the pounds landed.

In July, COVID-19 modified sampling protocols were removed and normal sampling resumed. However, the modified sampling protocols that prevented onboard party/charter boat sampling coupled with staff turnover created a shortage of trained staff. As a result, sampling rates onboard party/charter vessels did not return to normal until September when new staff were trained.

Despite these challenges, CRFS staff interviewed California's marine recreational anglers at more than 400 sampling sites coastwide and conducted more than 7,000 field intercept surveys. Monthly estimates were used by various Department projects, external stock assessors, scientists, other agencies, and the public (via the [Pacific Coast Recreational Fisheries Information Network website](https://wildlife.ca.gov/Conservation/Marine/Whale-Safe-Fisheries)). CRFS field staff also provided information and outreach materials to anglers on species identification, marine protected areas, barotrauma and the use of descending devices, and sport fishing regulations including the new sport crab regulations.

The beaches and banks survey was re-established in November 2020 and 2021 marked the first year CRFS had full beaches and banks coverage since 2017. This sampling was made possible by funding received through the Modernizing Recreational Fisheries Management Act. In addition to sampling beaches and banks, CRFS resumed the Angler License Directory Telephone Survey to collect recreational fisheries information. This technique allowed data to be collected from nighttime fishing, as well as fishing originating from private marinas or slips which may otherwise be excluded from regular field intercept surveys.

For more information about CRFS, visit the Department website at <https://wildlife.ca.gov/Conservation/Marine/CRFS>.

Environmental Scientist(ES) Kandice Morgenstern making judicious use of vacation time to support and enjoy the recreational salmon fishery. Humpback whale breaching. Recreational Dungeness crab flyer. CPFV operator using E-Log.

4. Fishing Gear Innovation

4.1. Whale Safe Fisheries

4.1.1. Risk Assessment and Mitigation Program

Risk Assessment and Mitigation Program (RAMP), conducted by the Department and partners, assesses marine life concentrations and entanglement risk for humpback whales, blue whales, and Pacific leatherback sea turtles through aerial and vessel surveys, as well as satellite telemetry, and implements management actions when risk is elevated. RAMP was implemented for the first time during the 2020-21 commercial Dungeness crab fishing season. Over the course of the fishing season, Marine Region staff conducted 13 aerial surveys and 10 risk assessments to evaluate marine life entanglement risk. Marine Region staff also coordinated development of recommendations from the California Dungeness Crab Fishing Gear Working Group and updated the [Best Practices Guide](#) accordingly. As part of the RAMP program, fishery participants were required to submit a report containing the following information: permit, number of traps deployed in each RAMP Zone and depth range (fathoms). Reports were submitted via email or text twice a month. Final reports also included the total number of traps lost during the season. More than 1,900 reports were received over the course of the 2020-21 season. This fishing activity dataset informed the fleet dynamics for over half the risk assessments conducted and supported implementation of a depth restriction in northern California midway through the season. The fishery opened statewide on December 23, 2020 and closed statewide on June 1, 2021. The delayed opening and early season closure helped to minimize the risk of marine life entanglement and marked the first successful fishing season formally implemented under the RAMP.





4.1.2. Conservation Plan for the Commercial Dungeness Crab Fishery

The Marine Region prepared an updated draft [Conservation Plan](#) addressing protected species interactions in the commercial Dungeness crab fishery. The updated version reflected preliminary feedback from the National Marine Fisheries Service, as well as comments

from industry, environmental organizations, and other stakeholders. The updated draft plan was released for a 45-day public review period on December 1st. A virtual public meeting was planned for January 2022 to provide an overview of the conservation plan and answer questions about the plan.

4.1.3. Recreational Crab Trap Regulations

The Fish and Game Commission (Commission) adopted new regulations to incorporate whale safe fishing practices for the use of recreational crab traps. Regulations became effective November 1, 2021 and include the following elements:

-  The Director can restrict the use of crab traps when entanglement risk is elevated under the RAMP regulations;
-  Recreational crab traps must have a standardized main buoy and red marker buoy and be serviced at least every nine days;
-  Each recreational crabber must have a Trap Validation;
-  There is a 10-trap per person limit.

Marine Region staff, in coordination with several other Department functions, conducted outreach to inform the public of the new fishing regulations. Outreach included email updates, blog posts, an informational flyer, press releases, social media posts, and updates to frequently asked questions on the Department's crab web page. In addition, demonstration buoys with the new marking requirements were given to Marine Region staff between Morro Bay and Eureka to augment outreach efforts with the public.

4.2. Drift Gillnet Transition Program

Marine Region staff continued implementation of the Drift Gillnet (DGN) Transition Program, required by Senate Bill 1017 (2018). In 2021, the remaining \$1.3 million necessary to fully implement the program was provided in the state budget. Seventeen new participants completed the process this year, relinquishing their permits to the Department and submitting their nets for recycling. So far, 30 DGN permit holders have participated. If every DGN permit holder who submitted a declaration of intent to participate in the program completes the process, 43 State permits will be retired.

4.3. Clam Pump Prohibition

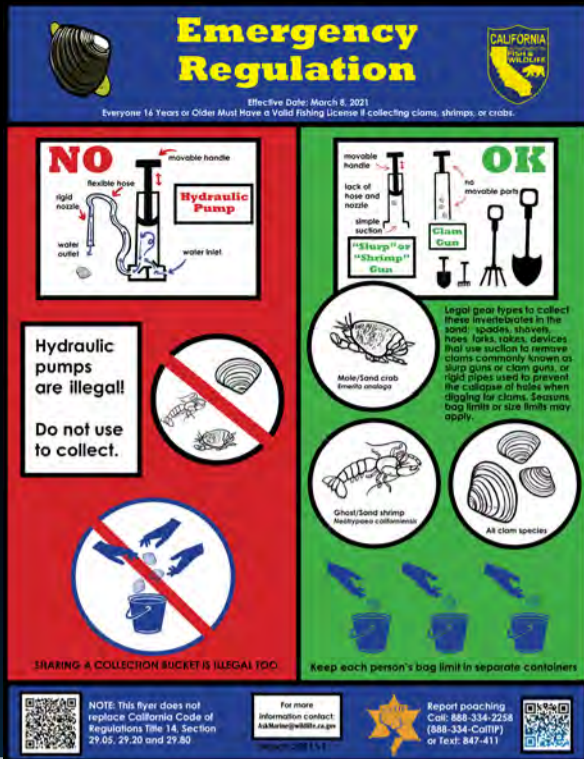
The Fish and Game Commission adopted an emergency regulation in February to prohibit the use of hydraulic pumps to harvest clams in response to concerns of overharvest, habitat damage, and a significant increase in clamming regulation violations. Marine Region staff and volunteers conducted clam creel surveys over the summer, finding the emergency regulations to be effective, and having strong public support. The effort to convert the emergency regulations to standard regulations is ongoing, and Marine Region staff will continue to monitor the recreational clam fishery throughout California.

4.4. Experimental Box Crab Fishing Program

At-sea monitoring of the brown box crab experimental trap fishery started in 2019 and continues to collect essential fisheries information related to the crab's biology, movement, habitat, catch per unit effort, and incidental take of non-target species in the fishery. This collaborative effort involves commercial fishermen, members of the electronic monitoring industry, professional observers, and research and fiscal partners

Commercial boats in the harbor. Humpback fluke in Monterey. Retrieving Dungeness crab pots.





at California Sea Grant, Ocean Protection Council, Resources Legacy Fund, and Pacific States Marine Fisheries Commission (PSMFC). Data will be used to evaluate the feasibility of developing a new commercial fishery and management elements for brown box crab. Two electronic monitoring systems are being used in this experimental fishing program to evaluate their potential application to state-managed trap fisheries and have highlighted benefits and challenges related to these technologies.

4.5. Experimental Fishing Permit Program

In December, the Commission adopted new regulations for the Experimental Fishing Permit (EFP) Program. This will establish a regulatory framework for full implementation of the program pursuant to the California Fisheries Innovation Act of 2018 (Assembly Bill 1573). A thoughtful, phased approach with input from stakeholders and the public was taken toward developing this new state permitting program. Under the new program, experimental or exploratory marine fishing activities are allowed that would otherwise be prohibited by Fish and Game Code or existing fishing regulations. The Program is intended to advance gear innovation and scientific information to improve management of state fisheries and explore the development of new fisheries. Unlike the experimental gear permit (repealed in 2018) that restricted experimental fishing activities to commercial uses only, the new EFPs allow fishery participants from both commercial and recreational sectors to apply. The new EFP regulations are expected to become effective on April 1, 2022.

5. Data Modernization and Data Sharing

5.1. Drone Work

In 2021, Marine Region staff worked collaboratively with an unmanned aerial vehicle (UAV) imaging

Outreach flyer for emergency regulation. Sport clammers in Campbell Cove. A bent nose Macoma clam collected during the creel survey. ES Christy Juhasz (left), SA Hannah Brawn, and Humboldt State volunteer (top) measuring clams from a sport clammer in Lawson's Landing Tomales Bay. UAV returning with CPS photos.

company to develop a pilot project that used UAVs to capture images of coastal pelagic species (CPS). The goal of this effort is to develop digital techniques to more accurately quantify and identify CPS in nearshore waters. Marine Region staff worked near the Ventura coast and flew in manned aircraft with Department wardens to help locate CPS schools. Crew on the water used the Marine Region's *R/V Irish Lord* as a launching platform for the UAVs, and many CPS schools were observed and photographed for analysis. This field work will continue into 2022.

Marine Region staff also worked collaboratively with The Nature Conservancy, the Greater Farallones National Marine Sanctuary, and other partners to conduct UAV surveys of bull kelp canopy at selected sites along the Sonoma and Mendocino coast. The goal of this effort was to support a bull kelp monitoring network along the north coast, and to evaluate the efficacy and feasibility of using drones for kelp management and restoration monitoring.

6. Fishery Management Plans

6.1. Pink (Ocean) Shrimp *Pandalus jordani*

On December 16, the Draft Pink Shrimp Fishery Management Plan (FMP) was submitted to the Commission. The Draft Pink Shrimp FMP proposes to improve management of the fishery by establishing a catch-based harvest control rule that incorporates an environmental indicator and measures to reduce bycatch of federally threatened eulachon. It meets the goals of a basic FMP as described by the Department's 2018 Marine Life Management Act (MLMA) Master Plan, providing a streamlined, cost-effective approach to implement FMPs for less-complex fisheries. The Commission will consider adopting the Pink Shrimp FMP at its April 2022 meeting.

6.2. Red Abalone *Haliotis rufescens*

Marine Region continued work on the new "climate smart" Red Abalone FMP that includes environmental indicators to track climate stressors. The draft FMP framework integrates multiple sources of information on the

health of the environment and red abalone using a stepwise process to make management and catch decisions. This decision making process consists of a harvest control rule, developed with the help of a management strategy evaluation. The management strategy evaluation was conducted by a workgroup consisting of stakeholders and fishery experts. The first draft of the new FMP is expected to be shared for public comment by spring 2022.

7. Marine Protected Areas

In 2021, the primary focus of Marine Protected Areas (MPA) Management Project staff was preparing for the first comprehensive Decadal Management Review of the MPA Management Program (Program). The Review will focus on evaluation of the four pillars of the Program: Outreach and education, research and monitoring, enforcement and compliance, and policy and permitting, as well as the MPA Network in meeting the goals of the Marine Life Protection Act. The Review will include adaptive management recommendations for the Commission's consideration in early 2023.

Outreach efforts kept stakeholders informed on notable Program activities, including 10 blog posts that highlighted California's MPAs and protected habitats. Marine Region staff coordinated distribution of 79 no-take MPA signs for posting at State Parks adjacent to MPAs, adding to the more than 400 MPA-focused interpretive and regulatory signs already installed statewide.

Marine Region staff actively engaged California native tribes through a steering committee comprised of Tribal representatives to help inform the state on Tribal-specific interests and needs related to the Review. In addition, a series of community engagement meetings were held to share information about the Review process and receive input from stakeholders about what they would like to see in the Review.

Long-term monitoring program data collection to inform adaptive management and evaluation

of the MPA Network continued. Results from each of seven funded research projects will summarize MPA performance in each key habitat. The research projects include comparing baseline conditions with long-term monitoring data and addressing questions related to MPA performance statewide for the upcoming Review.

8. Outreach

8.1. Marine Species Portal

Enhancements continue to be made to the Department's Marine Species Portal. Enhanced Status Reports (ESRs) can now include a new, easier to update, graphic for commercial landings as well as an acknowledgement section in the footer. Three ESRs covering four species and Species-at-a-Glance pages for 36 non-ESR species also were incorporated into the Portal in 2021. In addition, most ESRs were updated to encompass more current information such as more recent commercial and recreational catches. An appendix with the Data-Limited Toolkit Management Strategy Evaluation summary results also was added to seven of the ESRs (barred sand bass, California spiny lobster, kelp bass, red sea urchin, rock crabs, redbtail surfperch, and warty sea cucumber).

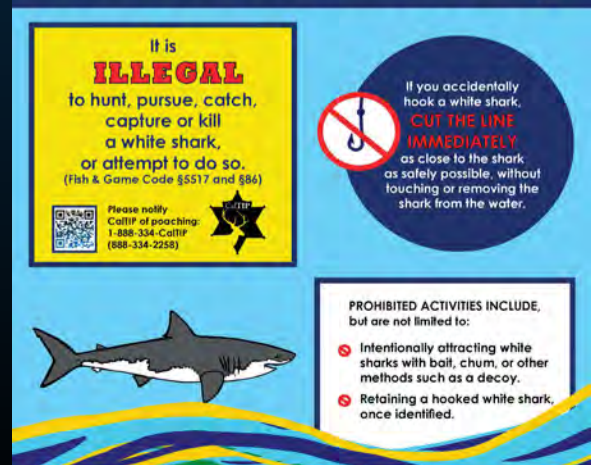
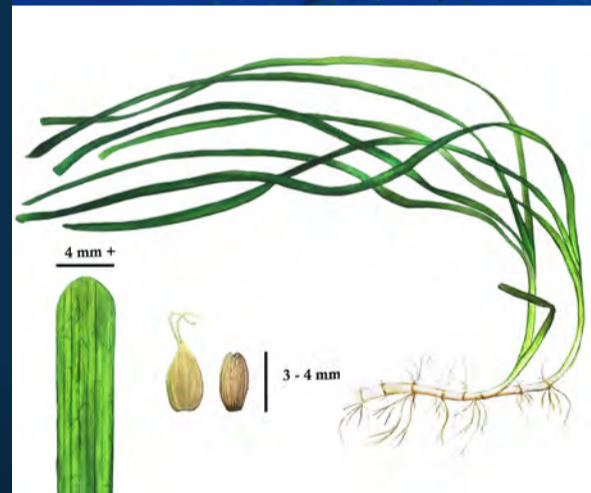
8.2. MLMA and Master Plan Web Pages

The MLMA home page was updated to reflect the various processes that are now included within MLMA-based management. These include the prioritization process and the process for determining the appropriate scale of management for key fisheries. The Resources Legacy Fund funded the development of a set of web pages that display the 2018 MLMA Master Plan in a very accessible and readable format. See the completed pages here.

8.3. Data-Limited Fisheries/ Management Strategy Evaluation

Marine Region staff, in collaboration with scientists at Blue Matter Science and SeaChange Analytics, completed a project to conduct

Red abalone munching on kelp. Southern sea otter. White shark. New eelgrass illustration on the Marine Species Portal. New white shark signage designed by Marine Region.



several case study management strategy evaluations (MSE) for California fisheries and completed a [report](#) on integrating MSE into the management of California's data-limited state fisheries. MSE is a modeling approach that explores the future of fisheries under alternative management scenarios to identify those that achieve our goals despite multiple types of uncertainty. Summaries of case study results can also be found in appendices from a subset of Enhanced Status Reports featured on the Department's [Marine Species Portal](#). In addition, Marine Region staff presented lessons learned and prospects for the future of incorporating MSE in California's state-managed fisheries at the World Fisheries Congress.

8.4. In-Person Outreach Events

8.4.1. Youth Fishing Workshops

Throughout the summer, Marine Region staff and partners from Sportfishing Association of California (SAC), Coastal Conservation Association – California (CCA) and Captain Rollo's Kids at Sea Program conducted four educational fishing trips for approximately 200 underprivileged and at-risk youth, following all COVID safety protocols. The children fished aboard chartered commercial passenger fishing vessels (CPFVs) out of Long Beach, Dana Point and San Diego. For many, it was their first time aboard a boat on the ocean. Prior to each trip, Marine Region staff gave educational presentations to each group that covered an array of topics, including oceanography, marine biology, ethical angling, introductions to the fish they might catch, and what to expect when on the trips. Once onboard the CPFV, Marine Region staff assisted the young anglers while fishing, identified the fish they caught, and answered questions.

In addition to the educational fishing trips, Marine Region staff also assisted on two "Fish for Life" trips, where children with special needs were taken ocean fishing. "Fish for Life" is a non-profit partner organization dedicated to enhancing the lives of kids with disabilities by providing complimentary fishing trips for them to enjoy. Similar to the educational fishing trips, Marine Region staff assisted the young anglers, identified their fish, answered ocean fishery

questions, and represented the Department as marine scientists.

8.4.2. Pismo Clam Outreach Events

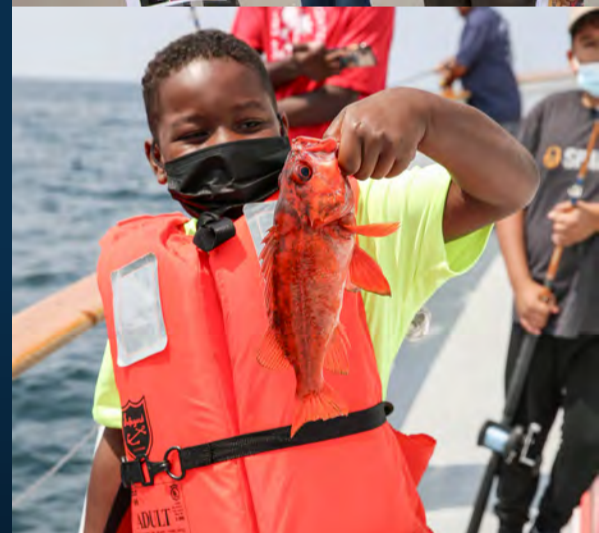
High levels of Pismo clam poaching continued from 2020 into the summer of 2021. This prompted an immediate need for outreach to educate the public on regulations and help decrease poaching violations. Marine Region staff coordinated multiple Pismo clam outreach events with the Department's Law Enforcement Division (LED) and [Natural Resource Volunteer Program \(NRVP\)](#), California State Parks, and the City of Pismo Beach. Marine Region staff posted Pismo clam regulation signs in both English and Spanish at beach access points between the Pismo Dunes and the Cayucos pier two weeks prior to the lowest tide events during the summer and fall months. Volunteers from both the Department and State Parks walked the beach and engaged with the public by answering questions about legal sized clams and giving demonstrations on how to properly rebury an undersized clam. Outreach efforts also included social media posts, interviews with the media, and an educational webinar for the Central Coast Virtual Mind Walk Program to educate the public on the history, biology, regulations, and status of the Pismo clam.

8.5. CalCOFI

The Marine Region hosted the December California Cooperative Oceanic Fisheries Investigations (CalCOFI) conference in coordination with the Southwest Fisheries Science Center, Scripps Institution of Oceanography (SIO), and California Sea Grant. The conference's symposium was focused on "Social-ecological indicators to support marine management in a changing climate." The annual meeting was attended virtually by over 260 stakeholders and interested parties.

Also in 2021, CalCOFI underwent an SIO three-year review, with panel participants from academia and state and federal agencies. Presentations highlighted CalCOFI's vision

Happy angler with his first catch during the San Diego Youth Fishing Workshop. ES Travis Buck identifying a young angler's catch. NRVP Gloria Nelson, ES Claudia Makeyev, and NRVP Jim Martin doing Pismo clam outreach in collaboration with State Parks, LED, and NRVP in San Luis Obispo county. More happy kids with their catch during fishing workshops.



and partnerships and included lightning talks related to research and resource management. Check out the website at <https://calcofi.org/>

CalCOFI was funded by the Ocean Protection Council to expand research into the impacts of ocean acidification by studying the condition of shells of pteropod plankton in historical samples as well as expanding monitoring of pteropod and larval fish demography and distribution relative to acidified waters. This year the annual State of the California Current Report, previously published in CalCOFI Reports, was moved to a new venue. Look for it in the peer reviewed journal, *Frontiers in Marine Science*.

9. Vessel Operations

9.1. Boating Safety Manual

After a two-and-a-half-year development period, Director Bonham signed the Department's new Boating Safety Manual in February. Marine Region staff played a central role in the Manual's development. The new manual ensures a consistent approach to vessel operations across the Department and defines the protocols for using vessels, including program oversight, onboard operation, operator training and approval, and safety and equipment requirements. The manual establishes a Boating Safety Committee comprised of Boating Safety Officers designated by each major Department function (Region, Branch, Division, etc.). The Marine Region's vessel Captain Chuck Dobbins was designated Boating Safety Officer for the region and will oversee the Marine Region's vessel operations moving forward.

9.2. R/V Garibaldi

The Research Vessel (R/V) *Garibaldi*, the 45-foot-long flagship of the Marine Region, was underway only 71 days in 2021 due to continuing restrictions related to the COVID-19 pandemic. Even so, the *Garibaldi* traveled an estimated 2,567 nautical miles, an increase in activity from last year but still much less than the vessel's annual average of 126 days at sea and nearly 4,300 nautical miles traveled during the four years before the pandemic. The *Garibaldi* was involved with trawling studies for California halibut, diving surveys

for abalone, barred sand bass, and the invasive alga *Caulerpa prolifera*, and collecting fish samples to help evaluate the effects of the Orange County Oil Spill (Pipeline P00547 Incident).

9.3. Other Marine Region Research Vessels

COVID-19 restrictions limited travel and field work activity of the Marine Region's other vessels, including the Monterey-based *R/V Mystinus*, which completed just a handful of research support days. The short-range dive platform with capacity for six divers can also support research fishing surveys, light oceanographic work, and remote sensing, and the vessel remains ready to resume operations as field opportunities return. The *R/V Irish Lord* was used by the Southern Invertebrate Management Project to begin a collaborative study with members of the California Sea Cucumber Dive Association addressing concerns regarding the take of sexually immature warty sea cucumber by the commercial dive fishery, and for scuba-based abalone research in San Diego and San Pedro. The *Irish Lord* was also used for scuba diving operations in support of the endangered white abalone restoration program, primarily to conduct post-stocking monitoring surveys. The vessel was also used by the Coastal Pelagic Species (CPS) Project to conduct drone-based aerial surveys of CPS along the Ventura coastline. The *R/V Megathura* supported the same efforts as the *Irish Lord*. She was used for scuba diving operations in support of the endangered white abalone restoration program, primarily to conduct post-stocking monitoring surveys. The *R/V Pinto* was only operated for maintenance and made local runs around the Bodega Bay Harbor. The *Pinto* supports kelp forest monitoring, and abalone and sea urchin research in California's nearshore environment. The *R/V Smoothound* worked 25 days in 2021, and is one of two vessels utilized to conduct Pacific herring spawning surveys in San Francisco Bay as part of the management strategy identified in the Pacific Herring FMP. Finally, the *R/V Surf Scoter*, which supports Pacific herring spawning surveys in Humboldt Bay, only worked one day in 2021, with through-hull corrosion occurring for

R/V Triakis. **Lingcod via MARE ROV. CDFW divers Taylor Leischner and Kristen Elsmore prepare for survey work in Pacific Grove Marine Gardens State Marine Conservation Area (SMCA). Salema schooling in a MPA. Sensor deployment during SIO CalCOFI. Research diver collecting data for the MPA project.**





good measure. In good news, the hull repairs are newly completed, and more usage is anticipated in 2022 for Pacific herring spawning surveys and collaborative eelgrass surveys.

10. Diving Safety Program



Diving efforts remained scaled back in 2021 as well. Department divers completed approximately 600 dives in 2021, far fewer than the roughly 2,000 dives usually completed each year. Biologist divers worked on abalone and kelp forest restoration efforts, invasive algae (*Caulerpa*) surveys, and nearshore fish assemblage and sea cucumber surveys. Law enforcement divers also continued to rely on scuba as a tool to achieve their mission. Dive activity included efforts with four scientific diving organizations (agencies, and others) that contributed approximately 15 visiting divers for work on collaborative projects.



With the annual Department diver certification course again canceled due to COVID restrictions, no new Department divers were qualified this year and the 65 divers on the current roster were provisionally re-qualified until full operations resume.

11. Marine Species Highlights

11.1. Black Abalone

Haliotis cracherodii

The primary black abalone rocky intertidal habitats in the Big Sur area were inundated by debris flows following storms near the Dolan Fire scar, requiring immediate action. Notably, Marine Region staff worked with the Department's Office of Spill Prevention and Response, NOAA, and researchers at UC Santa Cruz to permit the recovery and rescue of the federally listed endangered black abalone. About 150 abalone were successfully relocated to sites in Monterey County in the summer.

11.2. White Abalone

Haliotis sorenseni

The Marine Region along with its White Abalone Restoration Consortium (WARC) partners continued its work to restore the

endangered white abalone to Southern California waters. 2021 marks the third consecutive year of stocking captive-produced white abalone into the wild. Stocking efforts in 2021 achieved a new milestone of conducting two stocking events (Spring and Fall) within the same year, with around 2,700 white abalone outplanted across two Southern California sites. The WARC partnership has now stocked more than 7,000 captive-produced white abalone since 2019 and will continue stocking into the future with plans to expand efforts to other sites throughout Southern California. The goal of stocking activities is to help establish self-sustaining reproductive populations of white abalone and save this species from the brink of extinction.

Marine Region divers, while conducting other white abalone-related recovery work in 2021, found a wild juvenile (36 mm) white abalone in a Baby Abalone Recruitment Trap in the Los Angeles area. This wild juvenile is the first evidence of natural white abalone recruitment in decades, indicating some reproduction is occurring in the wild population. This is very exciting news and provides hope that the species' population is progressing towards recovery and away from possible extinction.

11.3. Barred Sand Bass

Paralabrax nebulifer

Marine Region staff completed the fourth year of barred sand bass monitoring in the fall to assess their abundance and size structure, using a combination of scuba and baited remote underwater video (BRUV) surveys at 10 sites throughout Southern California. Data from this study showed a large number of juvenile barred sand bass growing in size over the study period, and it is estimated the fish are approaching legal size this year. This coincides with the reappearance of the first spawning aggregations accessible to recreational anglers in more than half a decade that occurred. Data from this study will continue to be used to help assess the health of this fishery.



CDFW Diving Safety Officer David Osorio aboard R/V *Mystinus*, gearing up for a dive to assess recreational urchin removal efforts at Tanker Reef, Monterey Bay. CDFW diver Taylor Leischner navigating in Monterey Bay. Recovered black abalone in the aftermath of the Dolan Fire. A flyover of a washed-out section of Highway 1 at Rat Creek after the Dolan Fire. White abalone taking a peek outside the tank.

11.4. California Halibut

Paralichthys californicus

In 2019, the Department assessed the state's fisheries under the [2018 Master Plan for Fisheries](#) framework. A prioritization process identified California halibut (halibut) as a species in need of management attention due to potential risks to bycatch species and from a changing climate. To facilitate transparent and accessible management of the halibut fishery, the Department convened a two-part public webinar series to learn the priorities and concerns of stakeholders regarding the management of the state's recreational and commercial halibut fisheries.

A peer review process determined that the 2020 stock assessment requires improvements before being used to inform management. In 2021, the Department began actively working on recommendations for additional data collection, analyses, and model improvements. This included reconstructing historical halibut landings to reflect an unfished (or nearly unfished) condition and initial population estimates. Field efforts included fishery independent trawl surveys and market sampling to address knowledge gaps in halibut size/age at maturity compared to the current size limit.

In partnership with Moss Landing Marine Laboratories, the Department began a bycatch evaluation effort for state trawl and gill net fisheries. The initial efforts summarized available datasets. The Department is conducting in-depth analyses to improve understanding of commercial fishery bycatch, especially for the halibut fishery.

The Department is completing a comprehensive Enhanced Status Report (ESR) for halibut. The ESR will include the history of the fishery, as well as the biology and ecology of the species. In early 2022 it will be added to the [Marine Species Portal](#).

11.5. Pacific Halibut

Hippoglossus stenolepis

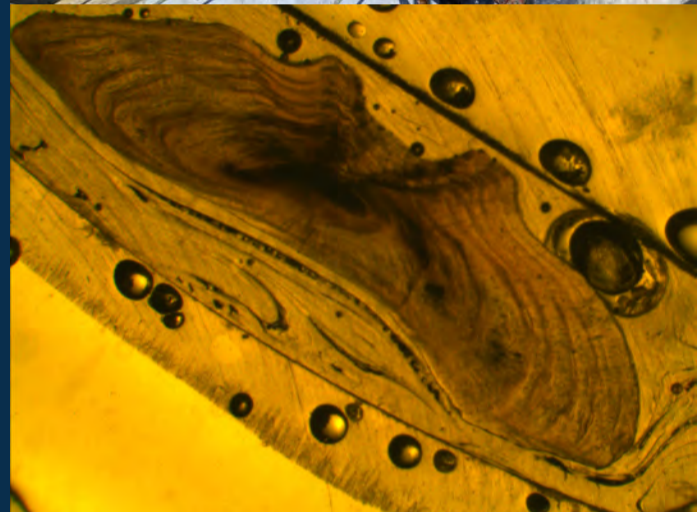
Marine Region staff actively monitored recreational and commercial Pacific halibut fisheries and tracked catch numbers as they

approached the annual recreational quota. The recreational Pacific halibut fishery in California was open May 1-June 30 and September 3 – November 15. A record-breaking number of Pacific halibut were caught during June, and preliminary catch projections indicated the quota would be exceeded by early July if the fishery remained open. In response, the Department closed the recreational fishery on June 30. Despite the projection, formal catch estimates for June became available in early August and indicated more than half the quota remained. In response to the number of fish that remained in the California quota, Marine Region staff, in consultation with the National Marine Fisheries Service, International Pacific Halibut Commission, and Pacific Fishery Management Council, re-opened the fishery on September 3 to allow for additional opportunity to harvest the quota. The Department resumed monitoring the fishery, including daily catch tracking, for the remainder of the season.

11.6. Groundfish

Marine Region staff contributed to and reviewed seven stock assessments for groundfish species conducted during 2021, acting as the chair of the review panel for the vermilion rockfish assessment. The results of these stock assessments were accepted for use in management to develop harvest limits and management measures for the 2023-2024 biennial groundfish management measure development process. The results of the quillback rockfish and copper rockfish stock assessments indicated less optimistic stock populations for these species, and reductions to fishing opportunities starting in 2022 are expected to reduce catches.

Uncertainty in these assessments was correlated to the need for additional age and sex data specific to California. To increase availability of these data, Marine Region staff quickly established ad hoc biological sampling efforts in the recreational and commercial groundfish fisheries. Data collected from these efforts will be used for age and growth rate analyses specific to California



Kelp bass. SAs Shoshana Lescht-Smith (left) and Raeann Iler (right) on a CDFW halibut trawl survey. Halibut otolith. Vermilion rockfish. BRUV view of a kelp bass. California halibut.

groundfish stocks. The results of these analyses are essential to ensure future stock assessments are well informed and reduce uncertainty with the assessment results. Work continues to incorporate population abundance information from remotely operated vehicles (ROV) into stock assessments. Information from ROVs is extremely useful for estimating stock sizes in areas that are closed to harvest or extractive surveys, such as MPAs. Fishery-independent data such as these are extremely useful in stock assessments.

Additionally, Marine Region staff launched a new tool which provides recreational anglers with a series of 38 detailed regional maps that may be printed. The maps display areas that are closed or open to recreational groundfish fishing under current regulations, including waypoints in federal regulation which define boundaries of closed areas. These maps are available for statewide coastal, island, and offshore waters.

11.7. Grunion

Leuresthes tenuis

Marine Region staff monitored grunion runs throughout the spawning season (March through August) to determine grunion abundance on beaches, number of people taking grunion, and amount of grunion taken. In response to a petition for regulatory change submitted to the Commission, Marine Region staff prepared a regulatory package to amend existing regulations to include a potential additional month closure and establish a bag and possession limit. The Notice of Proposed Changes in Regulations was published in November with proposed adoption in early 2022.

11.8. Pacific Herring

Clupea pallasii

The 2020-21 commercial fishing season for Pacific herring (herring) in California ended in March. Despite a zero-ton quota for the commercial herring fishery in San Francisco Bay that season, Marine Region staff conducted the first-ever Rapid Spawn Assessment (RSA) to assess spawning performance and inform quota setting for the following 2021-22 season. Based on the RSA and assessment of ecosystem indicators that are considered essential fishery

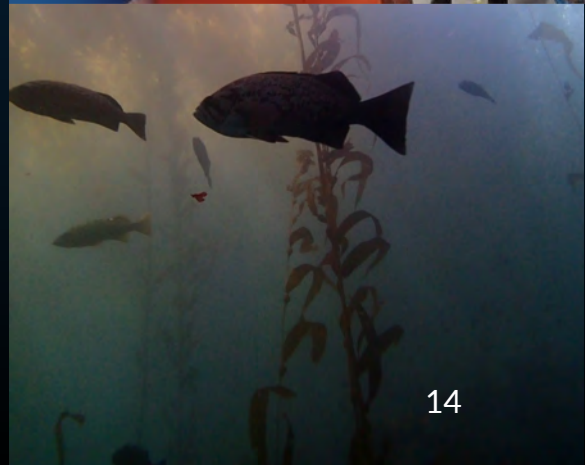
information, and after meeting with the Director's Herring Advisory Committee, the Department set the San Francisco Bay herring quota at the precautionary Tier 2 default of 750 tons for the 2021-22 season.

There was no commercial "herring egg on kelp" activity during the 2020-21 season in San Francisco Bay, and no commercial herring activity in the Tomales Bay and Crescent City Harbor management areas. The only fishery activity in any management area in 2020-21 was in Humboldt Bay, where a single commercial participant landed 1,655 pounds (0.8 tons) of herring against an 11-ton quota. This is the first commercial herring landed in that area since the 2004-05 season. Due to the recent landings, and as prescribed by the Pacific Herring Fishery Management Plan, the Humboldt Bay management area has been assigned to Tier 2 for the 2021-22 season.

11.9. Kelp and Other Marine Algae

Marine Region staff managed and coordinated marine algae harvesting, restoration, recovery, monitoring, and research activities. Staff refined potential regulatory changes for the commercial harvest of kelp and other marine algae, with bull kelp prioritized due to continued unprecedented declines on the north coast. This decision was based on input received from a wide variety of interested stakeholders and Tribal members through outreach and engagement efforts. Marine Region and Commission staff participated in government-to-government consultation meetings with InterTribal Sinkyone Wilderness Council members to discuss the proposed regulatory amendments and other issues pertaining to kelp and marine algae. Marine Region staff observed commercial bull kelp harvest, provided presentations and updates to the Commission, Marine Resources Committee (MRC), and Tribal Committee meetings, and hosted an ad hoc Bull Kelp Working Group (BKWG). The BKWG consisted of stakeholders representing key constituencies to discuss bull kelp management and data needs, with the goal of collaboratively developing potential regulatory changes to

CDFW scientific illustration of bull kelp. Grunion enthusiasts before learning that lights are not recommended when viewing the grunion run. Two grunion mating. ES Sara Worden holding a copper rockfish. Kelp forest residents.



manage commercial bull kelp harvest through a regional approach. The Department presented the proposed regulations to the Commission at their December 2021 notice hearing, and the Commission authorized the publication of notice of intent to amend the regulations as proposed. The Department anticipates presenting the proposed regulations at the Commission's February 2022 discussion and adoption hearing.

The Department, along with key partners from the Ocean Protection Council (OPC), California Sea Grant (CASG), Reef Check California, commercial urchin divers, Watermen's Alliance, Noyo Center for Marine Science, Moss Landing Marine Laboratory, The Nature Conservancy, and the Monterey Bay and Gulf of the Farallones National Marine Sanctuaries, implemented several priority actions identified in the [2019 Bull Kelp Recovery Plan](#) and [2021 Interim Kelp Action Plan](#). Highlights include the continuation of experimental restoration methods to facilitate kelp recovery (e.g., commercial and recreational urchin removals, urchin trapping, and kelp outplanting), supporting the [Kelp Recovery Research Program](#) which guides kelp restoration research essential to informing kelp management and recovery, and surveying and identifying potential kelp restoration sites along the Sonoma County coast.

11.10. Pacific Sardine, *Sardinops sagax*, Pacific Mackerel, *Scomber japonicus*, and Northern Anchovy, *Engraulis mordax*

In December, the first stock assessment for the central subpopulation of northern anchovy since 1994 was completed. The Department has conducted dockside sampling of commercial anchovy fishery landings since 2014. Marine Region staff collected biological data in the field including fish size and age from numerous anchovy samples. They also prepared and submitted biological and aerial survey data in support of the stock assessment efforts.

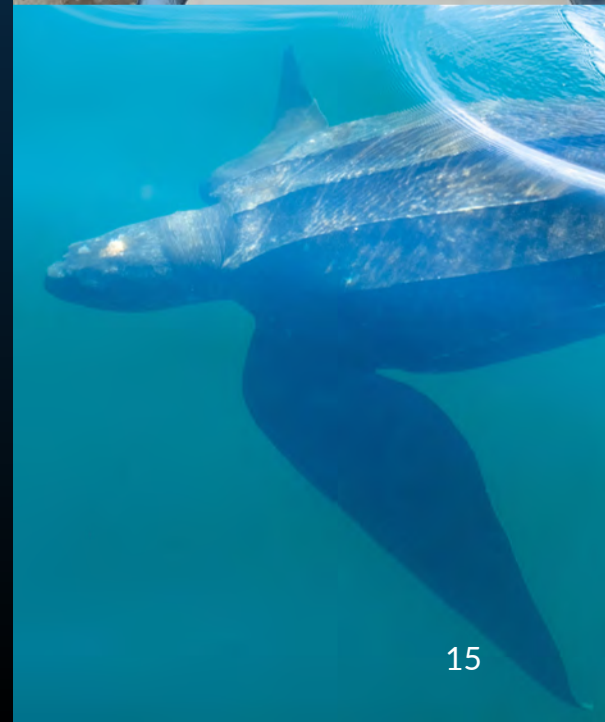
Marine Region staff worked collaboratively with partners at

NOAA's Southwest Fisheries Science Center to train scientists and expand coastal pelagic species (CPS) aging capacity. Close collaboration with our partners resulted in significant progress for Pacific sardine, Pacific mackerel, and most notably northern anchovy which hasn't been aged by the Department since 1982, for inclusion in federal stock assessments. Marine Region staff successfully navigated COVID telework challenges by setting up microscopes equipped with high-definition cameras in their homes and meeting remotely to conduct trainings and share data. They aged more than 10,800 pairs of CPS otoliths collected from the commercial fishery, including an impressive 8,847 pairs of northern anchovy otoliths collected between 2014 and 2021 for inclusion in the stock assessment.

Marine Region staff also completed age determination from 561 pairs of CPS otoliths from other nearshore surveys including point sets from the Department's California Coastal Pelagic Species Survey (CCPSS) aerial survey and NOAA acoustic trawl survey. Results from the age and growth work for northern anchovy were documented in a [NOAA Technical Memo](#) and presented at the 2021 CalCOFI conference. A second NOAA Technical Memo describing the history of partnerships and methodologies for sampling CPS from the California Current Ecosystem and commercial fishery landings was also produced.

11.11. Leatherback Sea Turtle *Dermochelys coriacea*

In June 2021, Marine Region staff completed a Status Review for the Pacific leatherback sea turtle in response to a 2020 petition to list the species as endangered under California's Endangered Species Act (CESA). [The Status Review](#) recommended listing as a CESA endangered species and was submitted to the Commission in July. Marine Region staff presented the findings for final consideration during the Commission's October meeting. The presentation detailed the Department's Status Review and recommendation. The Commission unanimously determined that listing the Pacific leatherback sea turtle as endangered under CESA was warranted and that findings will be formally adopted at a future meeting.



CDFW scientific illustration of giant kelp. CDFW scientist learning to extract CPS otoliths in a COVID safe manner via Microsoft Teams. CDFW illustration of a Pacific sardine. Pacific States Marine Fisheries Commission (PSMFC) contractor removing the head of a commercially caught salmon. Leatherback sea turtle.



11.12. Ocean Salmon

The 2021 ocean salmon season was marked by change and adaptation due to the ongoing pandemic, low abundance forecasts, and new regulations/management measures. The management cycle kicked off with the first-ever virtual Salmon Information Meeting, which allowed attendees to join remotely and more than doubled previous years' attendance. Marine Region staff worked closely with stakeholders to develop commercial and recreational salmon seasons that optimized catch and opportunity while achieving the year's conservation objectives, most notably defined by a low abundance forecast and the overfished status of Klamath River Fall Chinook. In contrast to 2020, this year's salmon season and associated monitoring program began on schedule with field samplers well prepared to proceed with COVID-safe sampling protocols from the season's start, which was fortuitous given the better-than-anticipated catches seen early in the season in the Monterey and San Francisco management areas. Marine Region staff also published monthly inseason catch estimates on the [Ocean Salmon Project's](#) web page for the first time.

Owing to a successful collaboration between Marine Region staff and the fishing community over several years, the boundary line between the Fort Bragg and Klamath management areas was shifted five miles to the north (from Horse Mountain [40°05'] to 40°10') for the 2021 season and beyond, in both state and federal waters. This shift simplifies fishing regulations by aligning salmon and groundfish management boundary lines. It also provides safer navigational conditions and more opportunity for commercial vessels originating from the state's northernmost ports.

Coho Salmon ***Oncorhynchus kisutch***

Marine Region staff collaborated with CDFW-Northern Region, as well as federal, tribal, and other state staff, and greatly contributed to the analytical work needed to develop a new conservation standard for ESA-listed Southern Oregon-Northern California coho salmon. It is anticipated the standard resulting from this work will be adopted and implemented during

the 2022 or 2023 fishing seasons and increase protections for these at-risk fish in California's salmon fisheries.

Chinook Salmon ***Oncorhynchus tshawytscha***

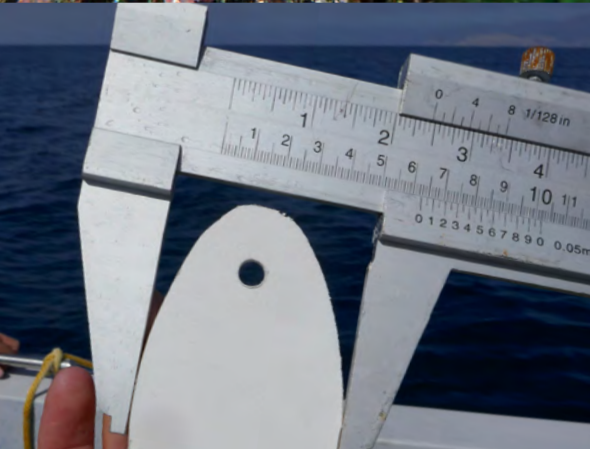
Staff authored two Constant Fractional Marking (CFM) reports during 2021—for run years 2018 and 2019. The Marine Region is now 'caught up' on the backlog of CFM reports and will be producing them regularly following the finalization of the current run year's component data. These reports continue to provide insight on the performance of coded-wire tagged salmon, including their contributions to ocean and inland catch, hatchery and natural spawning escapement, stray rates, and how these values differ under various release strategies (e.g., Bay-Delta vs. in-river releases). As such, CFM analyses/reports will be vital to understanding the benefits and costs of the Department's 2021 drought response actions aimed at Chinook salmon.

In a reversal to the 2018 'overfished' determination and following recent improvements in run size, Sacramento River Fall Chinook salmon were declared 'rebuilt' by the Pacific Fishery Management Council/National Marine Fisheries Service during 2021. However, with drought effects looming and early signs pointing to a low-to-moderate return to the river, it is uncertain whether abundance or status will continue to improve for this important stock.

11.13 Warty Sea Cucumber ***Apostichopus parvimensis***

In the spring, Marine Region staff began a collaboration with members of the California Sea Cucumber Dive Association to collect data on the size distribution of commercial warty sea cucumber (WSC) catch around the Northern Channel Islands. To address concerns regarding the take of sexually immature individuals, this research is also testing various measuring tools that could be used by the fishery to gauge size of catch, which could inform the feasibility of a minimum size limit. From June to August, Marine Region staff met commercial divers at sea to record size and weight of over 1,000 WSC harvested by the fishery. In addition, divers voluntarily recorded and

Commercial salmon fishing vessel Bernice headed out to sea. Experimental crab pots. Recreationally caught Chinook Salmon landed at Bodega Bay lined up for sampling. ES Katie Grady with a market squid. SA Marcus Fain sampling aboard the CPFV Redondo.



reported the number of WSC required to fill buckets of various sizes, to test the accuracy and feasibility of a “maximum bucket count” that could be used as a proxy for average size of catch. Preliminary results and feedback suggest gauges and bucket counts show promise for addressing take of sexually immature individuals. Findings will be used during the 2022 field season to refine and further test gauges and bucket counts with the fishery, along with testing two at sea monitoring systems to collect and report dive fishing activity.

11.14. White Seabass

Atractoscion nobilis

A study to update white seabass size at maturity is underway. Despite COVID protocols preventing traditional collaborations, Marine Region staff along with recreational anglers and the Pflieger Institute of Environmental Research (PIER) completed sample collections and reading of prepared slides. In addition, samples were shared with experts attending a virtual Maturity Assessment Reproductive Variability and Life Strategies (MARVLS) workshop which greatly aided in maturity determination.

Marine Region staff collected and analyzed commercial and recreational data for the annual review of the White Seabass Fishery Management Plan (WSFMP) for the 2019-2020 season. They evaluated white seabass commercial and recreational total landings, sex and lengths of white seabass landed, information on forage fish availability, and socioeconomic data to determine if the WSFMP points of concern were met. In May, the Department met with the White Seabass Scientific and Constituent Advisory Panel (WSSCAP) to review this information and to consider if current management measures were providing adequate protection for the white seabass resource. Although both commercial and recreational landings declined over the past three seasons, the WSSCAP and the Department agreed that none of the five main points of concern of the WSFMP were met for the season, so no further management action was needed in 2021.

CDFW scientists Carlos Mireles and Derek Stein sampling commercially harvested warty sea cucumber alongside a commercial fishing vessel off Santa Cruz Island on the R/V Irish Lord. A bucket o'cukes. Purple urchin. Warty sea cucumber version of a smile. Sea cucumber measuring device. More purple urchin

11.15. Purple Sea Urchin

Strongylocentrotus purpuratus

Climate change in the form of extreme marine heatwaves has negative consequences for kelp forests and the ecosystem services they provide such as productive fisheries, diverse marine communities, and carbon sequestration. For kelps, the impacts of a warming ocean are a double whammy. First, warm water holds less nitrogen, retarding kelp establishment in the early life history stage and kelp growth in adults. Second, warming temperatures favor sea urchin recruitment and population growth, leading to overpopulation of sea urchin herbivores which can then overgraze kelps and other algae. Once high densities of purple sea urchins are established, negative feedback loops prevent reestablishment of kelps, and sea urchin barren conditions dominate. In northern California the intense marine heatwave of 2014-2016 and the warm waters since then have favored purple urchin barren conditions.

The Fish and Game Commission along with the Department have been working with partner organizations to explore methods for sea urchin control in support of kelp restoration. A number of projects have been permitted to explore sea urchin removal and culling. Efforts are being tested to determine 1) the levels of sea urchin density which will allow algal regrowth, and 2) the impact of sea urchin smashing on urchin recruitment, urchin reinvasion, and substrates such as coralline algae. Test grids have been established in two regions, in central California at Lovers and Tankers reefs, and in northern California at Todd's Point, Caspar Cove, and Albion. Preliminary results suggest that kelps can regrow in areas where sea urchin densities have been thinned and that there are no negative impacts to the substrate. However, these test plots also highlight the amount of dive work needed to maintain small areas at low sea urchin densities and the necessity of increased effort and funding. The Ocean Protection Council and California Sea Grant have partnered to fund research into kelp restoration by allocating \$1.8M.



12. Aquaculture and Hatcheries

12.1. Ocean Resources Enhancement and Hatchery Program

The amended [Ocean Resources Enhancement and Hatchery Program \(OREHP\) statute](#) (Fish and Game Code Sections 6590-6598) became effective January 1, 2021. As a result of the amendment, Department staff spent much of the year addressing administrative priorities within the [OREHP](#), while continuing to manage white seabass research and enhancement. In May, the Director established a new [Ocean Resources Enhancement Advisory Panel \(OREAP\)](#), with members representing a variety of stakeholder interests including sport and commercial fishing groups, aquaculture, public/non-government groups, and state leadership.

Department staff also performed health checks and diagnosed diseases on cultured white seabass and developed a Memorandum of Agreement with Hubbs-SeaWorld Research Institute (HSWRI) and the OREHP Growout Committee to ensure the healthy release of marine finfish as part of the OREHP.

Additionally, Marine Region staff solicited nominations for an independent scientific advisory committee (SAC) to advise the Department and the OREAP on program research activities and to help ensure scientific integrity and transparency within the OREHP. The SAC will consist of six to ten members who have expertise in fish genetics and health, marine aquaculture, fish population biology or dynamics, benthic or water quality, and stock enhancement or fish hatchery science. The Director will appoint members to the SAC in early 2022.

12.2. Marine Aquaculture

Marine Region staff provided oversight and management of aquaculture activities in California while ensuring that marine resources and essential habitats are protected at both the state and federal level. They also evaluated proposals for an intertidal shellfish farm and an Atlantic salmon land-based fish farm, both located in Humboldt County. Modifications were proposed to existing aquaculture farms in Tomales Bay and the Santa Barbara Channel.

Marine Region staff issued a letter to all California aquaria clarifying permit requirements for importation of live plants and animals, resulting in an increase in the number of permits issued in 2021, and they also contributed to the development of an Aquaculture Action Plan led by the OPC. The Aquaculture Action Plan serves as a comprehensive, science-based framework for marine aquaculture in California that balances ecosystem health with sustainable development. In June, the OPC released [the Guiding Principles for Sustainable Marine Aquaculture in California](#), which provides guidance on increasing coordination and improving information sharing.

At the federal level, Marine Region staff reviewed aquaculture activity in federal waters off the California coast, including a proposed seaweed farm offshore of Santa Barbara. State-federal coordination continues on offshore aquaculture in Southern California. This effort is led by the National Oceanic and Atmospheric Administration (NOAA) and will implement [the presidential Executive Order on Promoting American Seafood Competitiveness and Economic Growth](#). The Department contributed data to NOAA's Technical Memorandum, an [Aquaculture Opportunity Area Atlas for the Southern California Bight](#), which identifies possible areas for sustainable aquaculture in federal waters. Marine Region staff will continue to engage in this effort as the selected locations are further evaluated through the National Environmental Policy Act (NEPA) process.

13. Fishery Disaster Relief

13.1. CARES Act Relief Funds, Round Two

In March, the Secretary of Commerce announced the allocation of an additional \$255 million in fisheries assistance funding provided by the Consolidated Appropriations Act of 2021. The funding was allocated to states and territories with coastal and marine fishery participants who were negatively affected by COVID-19, and California was allocated \$15,315,740 to support commercial fishing and associated

Commercial fisherman with red urchin catch. View of Frasier Cove. Red urchin. Gaper clams confiscated by LED. Urchin next to a china rockfish via MARE.

activities previously authorized under the CARES Act. Marine Region staff coordinated with partners to revise the prior spend plan to be consistent with the Consolidated Appropriations Act, the CARES Act, and NOAA's updated guidance, and they also updated the [Marine Region's CARES Act web page](#) and communicated with commercial fishery participants regarding the new round of relief funds. Outreach included publishing two Marine Management News blog posts, responding to nearly 500 email inquiries, as well as conducting a webinar for constituents to learn how to apply for the relief funds. More than 700 applications for relief under the CARES Act were received and are being processed now.

13.2. Red Sea Urchin

Mesocentrotus franciscanus

Marine Region staff worked with the industry and PSMFC to develop a spending plan for distributing \$3.2 million of federal fishery disaster funds. Funds will be used for direct payments to fishermen and businesses and for mitigation, specifically research projects focused on kelp restoration, marketing, recruitment, and socioeconomics. Direct payments were issued in December. The request for research proposals was completed in October and funds are expected to be distributed in early 2022.

14. Invasive Species and Oil Spills

14.1. Invasive Algae in Newport Bay

In March, an invasive algae species was confirmed in Newport Bay (Orange County). The algae, *Caulerpa prolifera*, is native to Florida and other subtropical and tropical areas. It can grow quickly, choking out native seaweeds and potentially harming marine life through lost habitat. Federal, state, and local agencies immediately joined forces to identify the extent of the algae's infestation in Newport Bay. Department divers were deployed in April and May to map and confirm the location of the infestation. In July, contracted divers began efforts to completely remove *Caulerpa prolifera*. Marine Region

outreach efforts to educate the public about the invasive algae included two press releases, developing a new [Caulerpa prolifera web page](#) that allows reporting suspect invasive species sightings, and creating and distributing two informational flyers, as well as a permanent sign for posting near the infestation site. Department divers conducted a follow-up survey to ensure the algae had not spread to adjacent coves. Marine Region also coordinated with volunteers to interact with the public near the infestation site to explain the situation and keep the public from disturbing the site.

14.2. Orange County Oil Spill (Pipeline P00547 Incident)

On October 2, 2021, the Department received notice of an oil spill in the ocean offshore Huntington Beach, Orange County. A Declaration of Fisheries Closure was implemented by the Department on October 3rd following confirmation of the spill and a recommendation from the Office of Environmental Health Hazard Assessment (OEHHA). The initial fisheries closure immediately prohibited the take of all fish and shellfish from Huntington Beach to Dana Point, including the shorelines and offshore areas and all bays. Fish or shellfish in this area may have been contaminated by the spill, and therefore consumption of these species was considered a threat to human health until testing could be completed. The fisheries closure was amended on October 5th, and again on October 7th, to extend its geographic boundaries to include approximately 650 square miles of marine waters and approximately 45 miles of shoreline from Seal Beach to San Onofre State Beach.

Marine Region staff quickly worked to communicate these fisheries closures to affected stakeholders by producing a press release, multiple Marine Management News blog posts, and email announcements to update the fishing community about the closures. Ocean sport fishing web pages were also updated to reflect the closures. Marine Region staff assisted the Office of Spill Prevention and Response (OSPR) and OEHHA in categorizing and mapping affected fisheries, developing contaminant sampling plans to collect more than 20 ecologically and economically important fish and invertebrate species throughout the



INVASIVE ALGAE



HAVE YOU SEEN THIS ALGAE?

Caulerpa prolifera is bright green with about 4 inch long blades



- DO NOT collect algae
- Report your sighting IMMEDIATELY
- For information, photos and reporting: <https://wildlife.ca.gov/Conservation/Invasives/Species/Caulerpa>

HELP FIND CAULERPA INVASIONS!

We are counting on you to find the next invasion of the aquarium seaweed *Caulerpa prolifera*. Watch for it!



Caulerpa prolifera is a non-native invasive alga. It can grow quickly, choking out native seaweeds and seagrasses and harming marine life through lost habitat. In 2021, an infestation was confirmed in Newport Bay that may have spread to other locations.

Identify *Caulerpa prolifera* by its bright green color, ~4 inch long blades, and long, horizontal runners. *Caulerpa* does NOT float and is most likely to be found on the seafloor, rather than on docks, boats, seawalls, or beaches.



How Divers Can Help:
Learn to recognize *Caulerpa*. Watch for it on saltwater dives (oceans, harbors, bays). If found, report it by following the QR code or web link below:
- Note the location, depth, and patch size.
- Record the location with a GPS if available.
- Take a photo if possible.
- DO NOT collect or disturb! (Be careful, even a tiny fragment can start a new infestation).



To See Photos and Report A Sighting: <https://wildlife.ca.gov/Conservation/Invasives/Species/Caulerpa>

Invasive Algae Response

What Is Caulerpa?
Caulerpa is an invasive algae considered a "living pollutant" because it spreads quickly and has previously caused significant and expensive damage to coastal waters in California. This species group has also had extensive impacts elsewhere, including throughout the Mediterranean. *Caulerpa* can take over natural habitats, disrupting the ecosystem and displacing native plants and the animals that rely on them.

Previous Caulerpa Impacts
Caulerpa taxifolia invaded Agua Hedionda Lagoon, and Huntington Harbor in the mid 2000s. In 2006, the \$7 million, multi-agency battle against *C. taxifolia* ended in success. The ground-breaking effort resulted in a helpful list of critical elements for successful future eradication responses.

Partners
During the 2000-2008 *C. taxifolia* eradication, the Southern California Caulerpa Action Team (SCCAT) was formed for the prevention and detection of new infestations through outreach and surveillance. This includes the California Department of Fish and Wildlife, Santa Ana Regional Water Quality Control Board, San Diego Regional Water Quality Control Board, NOAA National Marine Fisheries Service, and U.S. Department of Agriculture, Agricultural Research.



New Invasion Alert
As of April 2021, there is a new *Caulerpa prolifera* infestation near the entrance of Newport Bay. Immediate action is needed to prevent the infestation from spreading to other locations. The infestation is currently being monitored and managed. For more information, visit <https://wildlife.ca.gov/Conservation/Invasives/Species/Caulerpa>.

Existing Laws
Assembly Bill 1334(2001) bans nine species of *Caulerpa* but *C. prolifera* is not yet included on the list. The bill added Chapter 3.5 to Division 3 of the California Fish and Game Code. The City of San Diego has an ordinance banning the possession, sale, and transport of the entire genus of *Caulerpa* within city limits. The Federal Noxious Weed Act(1999) and the Federal Plant Protection Act(2000) prohibit the import, interstate sale, and transport of the aquarium strain of *C. taxifolia*.

Oil spill sampling of croaker spp. and walleye surfperch by Kennetic Labs. Invasive algae flyers and sign designed and distributed by CDFW Marine Region.

spill zone. The Marine Region also distributed information and resources to partners as well as the public regarding spill response efforts. Staff from the Fisheries Research and Management Project conducted shallow water trawl sampling (10-20 ft depth) aboard the Marine Region's *R/V Garibaldi* to collect key inshore fish species for testing. Additionally, members of the marine community, including commercial and sport fishermen, were contracted to utilize their expertise to collect the remaining specimens in a timely manner.

On November 29, 2021, OEHHA notified the Department that there was no further risk to public health from seafood consumption in the affected area and recommended that fishing and consumption of seafood from the area could resume. Marine Region staff assisted with a press release, blog post, and email announcement that same day notifying the public that the fisheries closure would be lifted at noon on November 30, 2021. Marine Region staff are working closely with OSPR and OEHHA to take our lessons learned from this spill to develop best practices and guidance to improve future fisheries closure design and sampling/testing protocols.

award for enabling us to continue to operate, keep the mail moving, and literally keeping the lights on during the COVID office closures. Marine Region Administrative Officer Lenore Phelps was recognized for this award on behalf of all Administrative Staff in the Marine Region.

The CARES Fisheries Relief Team won a Partnership award for their efforts to ensure our commercial fishing constituents received this important federal relief. The team included Todd Neahr, Joann Eres, Peter McHugh, Samara Maxey, John Ugoretz, Katie Perry, Marci Yaremko, Mary Loum, and Garrett Wheeler.

The California Recreational Fisheries Survey (CRFS) Team won an Innovation award for their efforts to continue critical statewide sampling during COVID-19 restrictions. The team included Ed Roberts, Jayna Schaaf-Da Silva, Jared Worland, Amanda McDermott, Marc Heisdorf, Toby Carpenter, Laura Ryley, Katie Perry, Mike Brown, Marina Hagen, David Astrue, Sarah Collins, Otis Horning, Ryan Denton, Tamarind Harman, Zachary Varela, Mike Curthoys, Daniel Wharton and CRFS Samplers.

15. Awards and Recognition

15.1. Director's Employee Excellence Awards

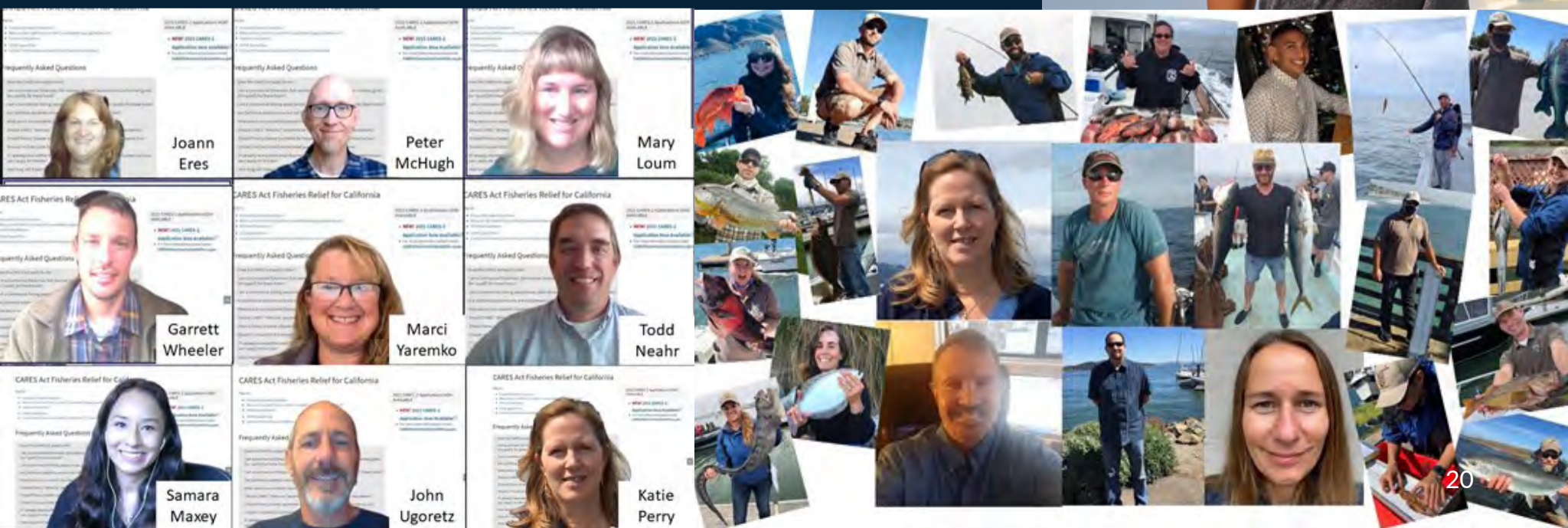
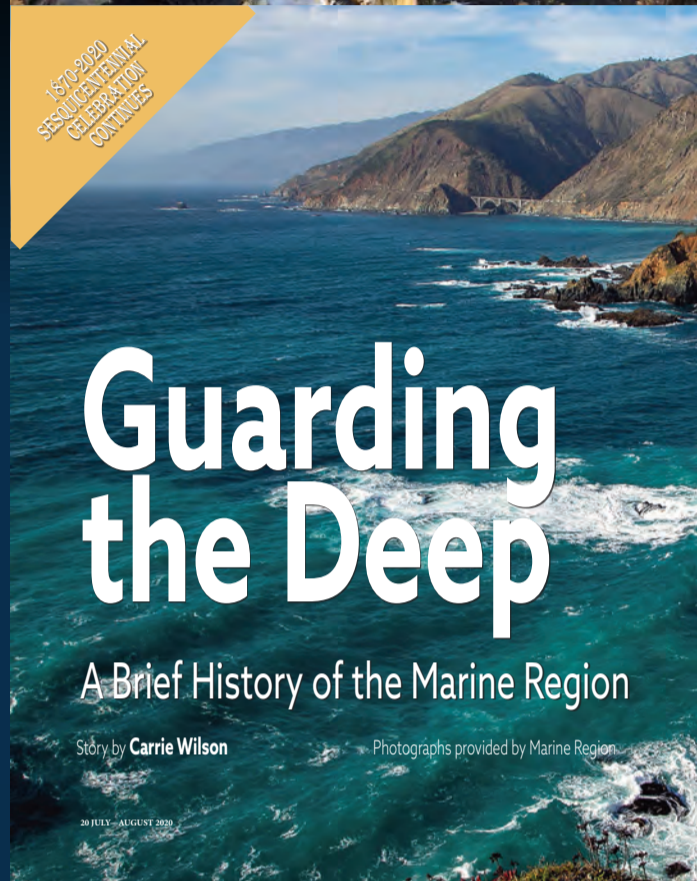
Marine Region staff were recognized by the Department's Director Charlton Bonham during the 2021 Employee Excellence Awards ceremony.

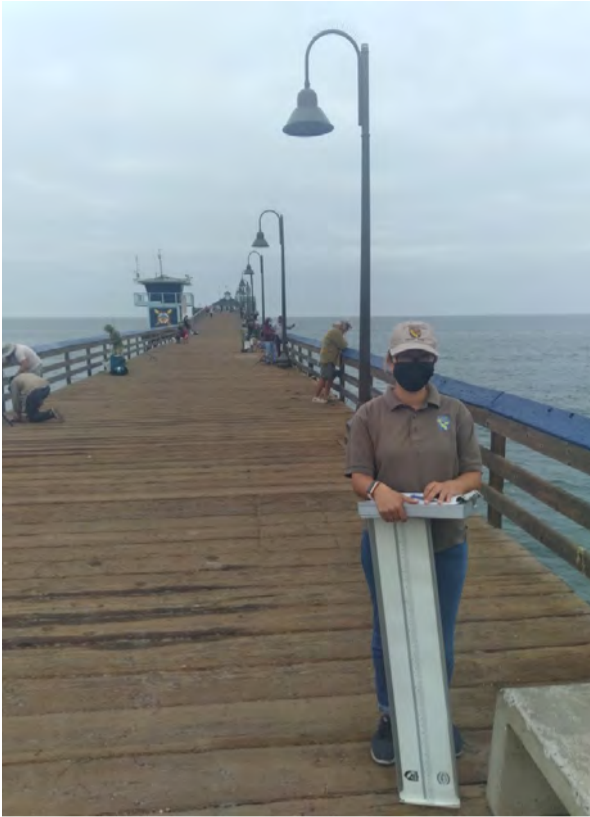
Administrative staff across the Department were given an Ovation

15.2. Outdoor Writers Association

The Outdoor Writers Association of California awarded the Outdoor California magazine article, "Guarding the Deep: A Brief History of the Marine Region," written by Carrie Wilson, their top conservation award.

Encrusted broken pier piling in Avila Beach. Outdoor California magazine story. Another happy first catch at the San Diego Youth Fishing Workshop. Some of the many talented award winners at the online award ceremony.





SQUID FISHERY

What are those lighted boats doing?

Squid fishing: The boats you see are seiners and light boats. Their lights attract squid making them easier to catch. The market squid, *Doryteuthis (Loligo) opalescens*, fishery is one of the most important in the state of California in terms of landings and revenue. Unless the seasonal catch limit is caught the fishery may operate from April 1st to March 31st with a two-day per week closure.

Why is squid fishing sustainable?

- 1 Squid have a short life cycle and reproduce more frequently than other edible ocean creatures. This means there are a lot of them, and they replenish their stocks often. Each squid lays thousands of eggs.
- 2 There is a 48-hour closure starting Friday at noon. This allows squid extra time to reproduce just before dying naturally as part of their life cycle.
- 3 Marine protected areas provide protection for uninterrupted spawning year round.
- 4 Squid school together. Fishermen are able to target squid and minimize bycatch.
- 5 To protect seabirds there are restrictions on how lights are used and designed.
- 6 There is a seasonal catch limit.
- 7 CDFW scientists carefully monitor and sample catch from the fishery throughout the year.

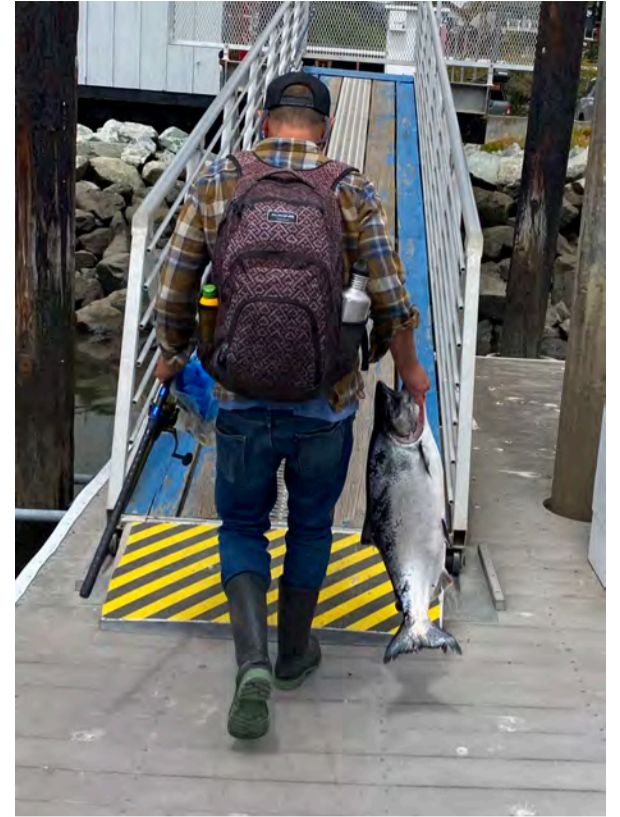


Photo Credits

Cover: San Diego Kid's Fishing Trip - Carrie Wilson. Pg 2: Young angler - Craig Shuman. Research diver - Dave Osorio. Fish - Miranda Haggerty. Pg 3: Miranda King at the Jetty - CDFW. Chinook - Chad Brealey. Jeffrey Wang thumbs up - David Astrue. Rockfish - MARE submersible. Monique Silva-McCuen weighing a rockfish - Sarah Collins. Giant kelp - CDFW. Cuke gauge - Derek Stein. Pg 4: Kelp bass - Miranda Haggerty. Pg 5: Selfie in the lab - Connor Stewart. Bill Doo - CDFW. Stephanie Hammond measuring - Marcus Fain. Pg 6: Kandice Morgenstern holding Chinook - Grace Ghrist. Fluke Skywalker breaching - Dane McDermott. Crab info flyer - Claudia Makeyev. E-Log - Brian Woolley. Pg 7: Crab vessels - Christy Juhasz. Walter Humpback - Dane McDermott. Crescent City crab quality test - Christy Juhasz. Pg 8: Emergency clam regulation flyer - Claudia Makeyev. Measuring clams - Derek Stein. Bentnose clam - Derek Stein. Drone work - Katie Grady. Pg 9: Red abalone - Derek Stein. Sea otter - CDFW. Eel grass illustration - Claudia Makeyev. White shark - Elizabeth Hellmers. White shark information sign - Claudia Makeyev. Pg 10: Kid with rockfish - Carrie Wilson. Travis Buck and kid identifying rockfish - Carrie Wilson. Pismo clam research - CDFW. Boy with rockfish - Carrie Wilson. Girl with rockfish - Carrie Wilson. Pg 11: Triakis - Tom Greiner. Lingcod - MARE. R/V Mystinus and divers - Dave Osorio. School of salema - Steve Wertz. Deployment - James R. Wilkinson. Research diver - Kate Vylet. Pg 12: R/V Mystinus - Kristen Elsmore. Diver in kelp - Kristen Elsmore. Rescued black abalone - Derek Stein. Rat Creek washout - Jonathan Warrick USGS. White abalone - Rachel Brooks. Pg 13: Kelp bass - Miranda Haggerty. Halibut trawl survey - Miranda Haggerty. Otolith - Travis Tanaka. Kelp bass BRUV - Shoshana Lescht. CA halibut - Miranda Haggerty. Pg 14: Bull kelp - Claudia Makeyev. Grunion flashlight - Cabrillo Aquarium. Grunion - Kim Walker. Sara Worden and rockfish - Tom Mattusch. Kelp forest residents - Miranda Haggerty. Pg 15: Giant kelp illustration - Claudia Makeyev. Fish training - Kyle Mooers. Masked sampler - Kandice Morgenstern. Leatherback sea turtle - CDFW. Pg 16: F/V Bernice - Grace Ghrist. Salmon - Kandice Morgenstern. Katie Grady holding a squid - Carlos Mireles. Marcus Fain measuring - Stephanie Hammond. Pg 17: Carlos Mireles and Derek Stein working - Alexa Mutti. Bucket of cukes - Derek Stein. Purple urchin - Derek Stein. Smiling sea cucumber - Derek Stein. Cuke measuring device - Carlos Mireles. More urchins - Derek Stein. Pg 18: Red urchin bag - Derek Stein. Frasier Cove - Derek Stein. Urchin - Derek Stein. Confiscated clams - Jerrad Swaney. China rockfish - MARE. Pg 19: Croaker spp. - Gary Lawley. Walleye perch - Gary Lawley. Caulerpa sign - Claudia Makeyev. Caulerpa dive flyer - Claudia Makeyev. Caulerpa information - Claudia Makeyev. Pg 20: Broken piling - Claudia Makeyev. Guarding the Deep - Carrie Wilson. Young angler - Carrie Wilson. Pg 21: Paulina Arellano on Imperial Beach Pier - Mike Curthoys. Squid flyer - Claudia Makeyev. Salmon angler - Dusty Mckenzie. Kids on dock - Carrie Wilson. Pismo clam sign on a pier - Claudia Makeyev. Crab vessel - Christy Juhasz.

