



**COLLABORATIVE  
FISHERIES  
RESEARCH WEST**

## From the Director...



When it comes to fisheries management, **one of California's greatest assets is the on-the-water knowledge of our fishing communities.** Since our establishment in 2010, Collaborative Fisheries Research West (CFR West) has made it our mission to unite the experience of fishermen, the ingenuity of scientists, and the dedication of fishery managers to solve our toughest challenges. For an industry that provides \$231 million in annual revenue, 145,000 jobs, and impacts 800 miles of coastline – sound fishery management is critical to California's economic and environmental future.

The idea for our program was hatched when the Ocean Protection Council and Resources Legacy Fund Foundation convened dozens of fishery experts in Oakland, California in 2008. Their enthusiasm for a collaborative approach to fisheries research led to the founding of CFR West, intended to **leverage the practical knowledge held by the fishing community and strengthen the science behind marine resource management.** In collaboration with our partner California Sea Grant, CFR West has since identified, funded and administered 15 projects on topics ranging from gear design to seafood marketing.

These initial efforts led to far-reaching improvements, including the recovery of lost fishing gear, increased access to healthy fishing grounds, and California's first ever legislation to permit the operation of fishermen's markets. **Through the partnerships built, each project has made significant contributions to relations between fishermen, scientists, and management agencies.**

But there's more work to be done. The research and monitoring needed to successfully manage California fisheries are substantial, particularly given changing ocean conditions. Many of these needs require long-term funding to successfully monitor the impacts of management policies on our coastal ecosystems and fishing economies.

As Director, I invite you to learn more about our first years at CFR West in these pages, and to join our effort to bring California's best minds – both citizen and scientist – to bear on ensuring sustainable fisheries for generations to come.

Sincerely,

Peter Nelson, Ph.D.

Executive Director, Collaborative Fisheries Research West

**CFR-West.org**



**Collaborative Fisheries Research West engages commercial and recreational fishermen, resource managers, tribes, nongovernmental organizations, and scientists by facilitating and supporting applied research focused on fisheries and fisheries resources and their human dimensions.**

**Through open and collaborative partnerships, CFR West contributes to the management of sustainable marine resources, and fosters the stewardship of those resources.**



## OUR GUIDING PRINCIPLES

1. Projects will be relevant to fisheries management;
2. Research partners must include participants from the recreational fishing community, commercial fisheries, or seafood processing industry;
3. Focus on projects to be completed or transitioned to a collaborating management agency within 3 years;
4. Projects with a limited geographic scope should be applicable to other areas or fisheries;
5. Management or policy issues may only be addressed from a research perspective (CFR West does not make management or policy recommendations);
6. Research data will be held in an electronic database (CFR West website) accessible to all collaborators in that project including CFR West;
7. All research data will be publicly available, with appropriate provisions for publication, unless special circumstances are approved prior to project implementation;
8. Projects must be designed to minimize negative impacts to ecosystems or marine organisms;
9. Projects must be consistent with accepted ethical research practices, including the use of animals and human subjects in research; and
10. Research must be scientifically rigorous and intellectually honest.

## TRAPPING RULE BOOSTS CATCH QUALITY WHILE PROTECTING FUTURE PACIFIC HAGFISH FISHERY



You won't find "slime eels" on menus in California, but the Pacific hagfish (*Eptatretus stoutii*) supports a consistent export fishery. Prized by foodies in South Korea, the depletion of Korean hagfish has sent demand abroad.

Hagfish, however, take years to mature and produce few eggs each spawning season. To ensure that California's fishery remains healthy, Department of Fish and Wildlife scientist Travis Tanaka was awarded a CFR West grant to

investigate how trap hole diameter can help conserve hagfish stocks. By interviewing hagfish fishermen, sampling their catch, and ultimately testing this information on the water, Tanaka was able to zero in on the right trap hole diameter to retain high quality catch, yet allow juveniles to swim free. The results of this work were adopted into a new hagfish trap regulation effective January 2015, ensuring that future generations of hagfish and fishermen alike will continue to thrive.

## FILM TEACHES FISHERMEN “ROCKFISH RECOMPRESSION”

Rockfish pose a challenge for fishermen who want to catch-and-release. When hooked at depth and pulled to the surface, the gas in their swim bladder expands. This causes their eyes and stomach to bulge out and prevents them from descending again once thrown back. Recreational fishers who catch their limit on rockfish, or accidentally catch a protected species, need a way to help the fish return home.

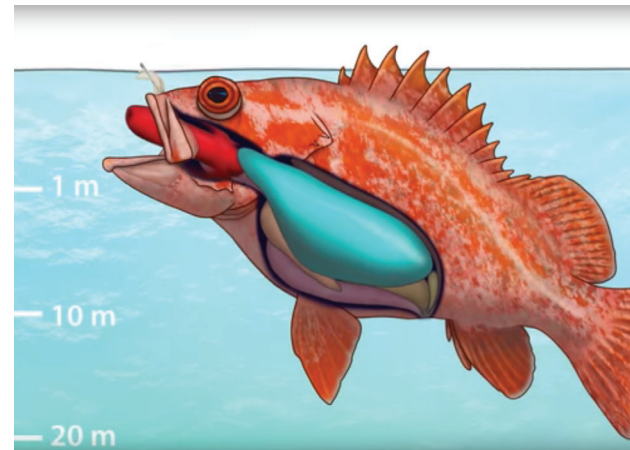
Scientists at the Pacific FishSmart Barotrauma workshop tested low cost and easy-to-use devices designed by fishermen – which include using a weighted inverted milk crate, barbless weighted hooks or weighted grippers – for their effectiveness on short and long-term survival of rockfish. Their results showed the devices work, but they needed a way to spread the word. CFR West funded Alena Pribyl, John Hyde (NMFS), Milton Love (UC Santa Barbara) and renowned fish artist Ray Troll to produce a short, engaging video on rockfish recompression that has since been viewed more than 32,000 times on YouTube, with the bulk of views coming from angler forums and sportfishing websites.



### WATCH NOW

*Is Barotrauma  
Keeping You Up?  
Try Getting Down  
with Recompression!*

[https://youtu.be/  
EiZFghwVOyl](https://youtu.be/EiZFghwVOyl)



“

As we've seen by the massive growth of farmers markets across the state, allowing direct sales of produce benefits farmers and consumers.

Coastal communities throughout California deserve these same opportunities. **Pacific to Plate** does this by removing hurdles in state law.

ASSEMBLYWOMAN TONI ATKINS  
(D-SAN DIEGO)

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## COLLABORATIVE RESEARCH INFORMS NEW LAW TO PERMIT FISHERMEN'S MARKETS

Despite California's rich fishing history and booming public interest in local food, options for fishermen to sell directly to their customers were limited. San Diego's fishermen were interested in selling straight from the docks, but no permit for the venue existed. With CFR West support, California Sea Grant scientist Theresa Talley and Adina Batinzky of University of San Diego conducted a dockside market feasibility study. Through conversations, surveys and seafood events with San Diego residents and fishermen, Talley and Batinzky found evidence of a strong demand for local seafood, raised public awareness, and connected a network of citizens and professionals interested in seeing a fishermen's market become a reality.

With continued work by the partnership, the Tuna Harbor Dockside Market opened in San Diego in August of 2014 under a temporary operating permit, its 18 vendors selling an average of 6700 lb of seafood to an average of 1400 people per month.

To allow similar markets statewide, Assembly Speaker Toni Atkins (D-San Diego) sponsored the "Pacific to Plate" bill, AB 226, which allows fishermen's markets to operate as food facilities, vendors to clean their fish for direct sale, and multiple fishermen to organize a market under a single permit. The bill passed into law in October 2015 with unanimous support.

## MORE THAN 1,000 ANGLERS REEL DATA ON SALTWATER BASS

Kelp bass, barred sand bass and spotted sand bass are among the most common recreational fishery landings in Southern California, and overfishing has been a concern for decades. In recent years, fishery conditions for these species were changed by new bag and size limits as well as the creation of Marine Protected Areas. Scripps Institution of Oceanography researchers Brice Semmens, Ed Parnell, and graduate student Lyall Bellquist

created a plan to take stock of southern California's saltwater bass populations with the help of San Diego's recreational anglers, and formed the Coastal Angler Tagging Cooperative.

Over two years, this project supported 52 chartered trips and involved more than 1,000 volunteer recreational anglers in citizen science. Practicing catch-and-release, anglers gathered data on the catch per unit effort

(CPUE), size frequency and post-release mortality rates for these species. Additionally, Bellquist and Semmens used acoustic telemetry, (recording the movements of individual tagged fish), to gather information for stock assessment models and shed new light on spawning locations and behavior in the process. The results will inform future stock assessments for these popular sportfish.





## FISHERMEN RECOVER LOST CRABBING GEAR

Dungeness crab is one of the most successful fisheries in California, valued at more than \$30 million per year. Yet prime fishing grounds are littered with thousands of lost crab traps that continue to capture crabs and pose an entanglement hazard to newly set gear, creating a cycle of gear loss at significant costs to fishermen. While no angler ever plans to abandon a \$200 trap, California's rugged northern coastline is subject to huge winter swells and high-energy storms that can roll and tumble pots along the seabed.

Researchers Kirsten Gilardi and Jennifer Renzullo of the UC Davis Wildlife Health Center worked to recover the lost crab gear in close partnership with the Humboldt Fishermen's Marketing Association (HFMA) and the California Lost Fishing Gear Recovery Project. With support from CFR West, the researchers

collaborated with the commercial Dungeness crab fleet in Humboldt and Del Norte Counties to develop a self-supported, community-based, fishermen-led gear removal program.

Project participants went on to successfully retrieve 1,100 lost crab pots in 2014-2015 with support from the National Fish Wildlife Foundation and the NOAA Marine Debris Program. The pots' original owners reimbursed the project for recovery costs, generating \$25,805 in proceeds in 2014 for future gear recovery. With the backing of California's Dungeness Crab Task Force, Senator Mike McGuire introduced SB-1287 in February 2016, which would amend the Fish and Game Code to enable a dedicated crab gear recovery program.

## AERIAL SURVEYS IMPROVE PACIFIC SARDINE STOCK ASSESSMENTS

The constant movement and expansive geographic range of pelagic fish species makes accurate stock assessments a challenge, including for California's valuable sardine fishery. Aerial surveys in Southern California, helpful for nearshore observations, were discontinued for sardine assessments in 2007. The Southern California Bight is a spawning ground for Pacific sardine, and many younger fish congregate in high numbers in nearshore waters.

With funding from CFR West, members of the California Wetfish Producers Association worked with CDFW's Coastal Pelagic Species (CPS) Project to resume aerial surveys, this time paired with ground-truthing boat sampling operations. The partnership gathered information on Southern California's nearshore biomass of Pacific sardine, as well as northern anchovy and Pacific mackerel. The new data can be used to develop an index of abundance and improve the accuracy of future stock assessments, which is crucial to maintaining the environmental and economic sustainability of California's wetfish industry.





## CONNECTING THE NEEDS OF COASTAL COMMUNITIES TO FISHERIES MANAGEMENT

When fishery policies change, fishery participants and their communities are affected – often in unexpected ways. To help managers understand the human aspects of fisheries management, CFR West supported California Sea Grant social scientist Carrie Pomeroy to study the human dimensions of the commercial fishery for California halibut.

Pomeroy worked with the Department of Fish and Wildlife (CDFW), fishery participants, UC and CSU Monterey Bay researchers to characterize the people, practices, facilities and relationships that comprise the halibut fishery's human system. Through interviews, literature review, and analysis of fishery landings and related data since 2000, the team developed a profile of the fishery. The profile includes recent history, spatial and temporal features and trends, participants and their practices on and off the water, and factors affecting them, along with guidance for working with these stakeholders and information sources in the future. The results will help fishery managers and coastal communities anticipate and respond to change.

## TEAM DISCOVERS HABITAT REQUIREMENTS FOR NIGHT SMELT

Night smelt are a commercially harvested forage fish about which very little is known, and they have been affected by changing harvest rules. New policies by the Pacific Fishery Management Council (PFMC) and California Fish and Game Commission (CFGC) have called for a better use of scientific evidence to develop sound management practices.

With the help of a CFRW grant, scientists Neil Kalson and Adam Wagschal of H. T. Harvey and Associates worked with commercial fishermen Drew Barrett and Mike Zamboni and with Katherine Crane of CDFW to gather fishery and life history data on night smelt in Humboldt County. The fishermen contributed catch samples for bycatch research, and collected environmental data that allowed the team to determine basic life history information (e.g., sex ratio, length-to-weight relationship), characterize the night smelt spawning habitat, and substantiate reports that bycatch in this fishery was minimal. Their results are providing essential fishery information that lays the groundwork for successful management of this locally important fishery well into the future.



## INTEGRATING COLLABORATIVE DATA COLLECTION WITH MANAGEMENT: A LOBSTER FISHERY TEST CASE

Can commercial fishermen help gather and interpret data for long-term, cost-effective fisheries management? California Sea Grant scientist Carolynn Culver and her co-investigators think so. Following their success with a pilot citizen science program to monitor the southern rock crab fishery, CFR West provided support to expand their effort to the California spiny lobster fishery.

The project united lobster fishermen, scientists and managers to develop and test protocols for collecting data while fishermen conducted their commercial fishing operations. Their resulting program maintains scientific rigor and minimizes the burden on the program's fishing partners, while providing data that are being used to inform California's Lobster Fishery Management Plan (FMP).

The program also provides a means to address several scientific panel recommendations for improving the FMP. The project team will continue to explore the program's long-term feasibility and its application to other fisheries.

## ROCKFISH CONSERVATION AREAS ASSESSED AFTER 12 YEARS OF CLOSURE

California is home to 57 native species of rockfish, once the backbone of California's fishing industry. However, in response to the dramatic decline of several overfished species, the Pacific Fishery Management Council and the NOAA National Marine Fisheries Service closed areas along the entire west coast to fishing in 2002, designating them Rockfish Conservation Areas (RCAs).

To find out whether the closures had been effective, and to potentially re-open healthy stocks to fishing, California Sea Grant scientist Rick Starr worked with non-profits, NMFS, CDFW and

commercial fishermen to sample RCA waters near Cordell Bank, the Farallon Islands and Half Moon Bay. Over the course of the study, volunteer anglers gathered data on 2,444 fishes of 26 different species, tracking the impacts of RCAs on fish survivorship, growth and movement. The results provided new insights on rockfish reproduction and recruitment, and showed that RCAs have successfully increased the abundance of rockfish species. The PFMC is using data from this project to reassess whether certain areas of the RCAs have recovered, and whether boundaries should be reconfigured to allow more fishing.



## FISHERMEN HELP TRACK YELLOWTAIL MOVEMENT IN SOUTHERN CALIFORNIA

Yellowtail are a highly sought after game fish whose basic life history characteristics are poorly understood. While California's sport fishermen have intimate knowledge of yellowtail movements, decades have passed since the information was quantified for use in science and management.

With support from CFR West, investigator Stuart Sandin and graduate student Noah Ben-Adret worked with southern California anglers and charter boats to fit yellowtail with tracking devices and record their movements, particularly around marine protected areas. Approximately 150 anglers volunteered their catch for tagging and release. The results – which revealed that some individuals show greater site fidelity than previously thought – are being provided to the California Department of Fish and Wildlife and will be publicly available, providing a robust dataset for future management decisions and research. In addition, the project's findings will set a precedent for the study of movements and interactions of highly mobile species within California's new marine reserves through collaborative fisheries work.





## RECREATIONAL ANGLERS CAPTURE DATA ON HALIBUT FISHERY

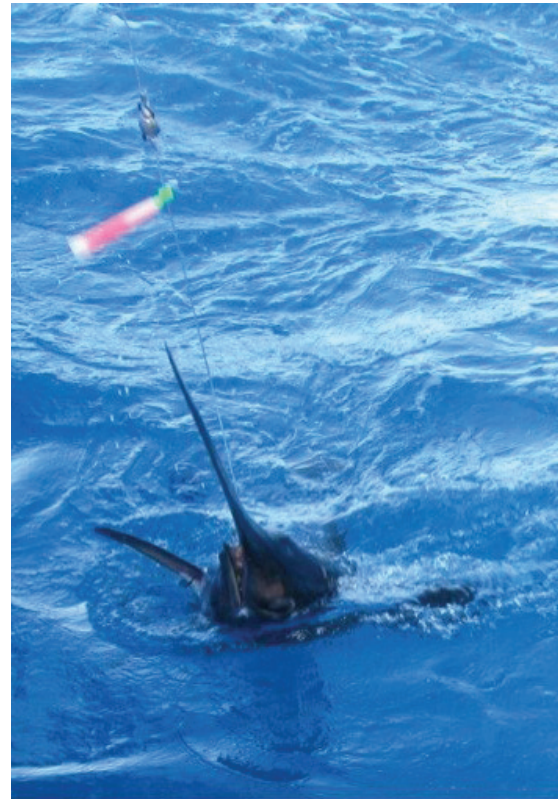
When catch numbers began to plummet at the annual halibut derby in Santa Monica, members of Marina Del Rey Anglers fishing club looked for a way to help. They soon learned that the Department of Fish and Wildlife was searching for better monitoring data for a new stock assessment of the fishery, a goal made challenging and costly in Southern California by infrequent halibut landings.

A team of citizen anglers came together with lead scientist Lia Protopapadakis and drafted a plan to “reel in” data on the area’s halibut. With support from CFR West, the partners provided chartered trips and training in data collection for Santa Monica’s halibut anglers. The project’s resulting citizen science database has since been racking up entries of sex-specific age and length data, which are critical for predicting population growth. Marina Del Rey Anglers plan to promote the program to other recreational clubs in California in the future.

## NEW FISHING TECHNIQUE SHOWS PROMISE TO HARVEST SWORDFISH, PROTECT SEA TURTLES

Although the West Coast swordfish fishery is considered healthy, concerns about leatherback turtle bycatch led to increased regulation and a substantial decline in commercial harvesting. With an eye to reviving the fishery, principle investigators Chugey Sepulveda (Pfleger Institute of Environmental Research) and Heidi Dewar (NMFS) worked with commercial fishermen to test experimental fishing gear that protects the endangered sea turtles from becoming bycatch, yet remains economically viable.

This project was the first to tag and track swordfish movements within the Pacific Leatherback Closure Area, finding that sea turtles and swordfish inhabit the same water depths at night, but by day, swordfish go deep in the water column. Researchers tested deployments of deep-set longlines that would capture fish at depths outside the range of sea turtles. One of the methods, deep-set buoy gear, shows promise for California waters and was issued exempted status by the Pacific Fisheries Management Council in 2015. PMFC will make a final determination of the gear in 2016.





## VOLUNTEERS IMPROVE SEAFOOD SAFETY THROUGH BIOTOXIN MONITORING

Toxic, harmful algal blooms are a natural, recurring threat to seafood safety and consumer health. Although California's Department of Public Health (DPH) has an ongoing monitoring program to test water and seafood species for these natural toxins, little information was available for offshore sites popular with fishermen and SCUBA divers. California Sea Grant scientist Carolynn Culver worked with DPH and the Department of Fish and Wildlife to engage southern California stakeholders who used the sites in a volunteer monitoring program.

The volunteers came from diverse coastal communities – commercial fishermen and seafood distributors, university researchers, marine educators, offshore oil and gas companies, and sportfishing and dive operators. The data they gathered successfully improved information on the areas impacted by harmful algae blooms, allowing DPH to lift a seafood advisory, providing more safe areas for fishing. Culver and her collaborators were able to expand the citizen science program, as well as develop multi-lingual seafood safety materials for consumers, that can be adopted by DPH in the future to fill critical information gaps.



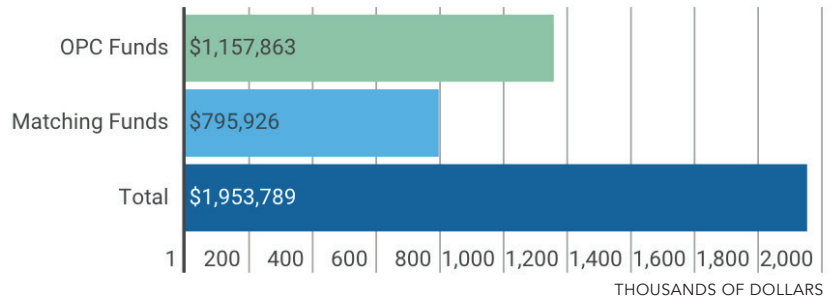
# COLLABORATIVE FISHERIES RESEARCH WEST

# BY THE NUMBERS

Numbers research  
projects funded:

15

Initial research funding:



Number of fishermen volunteers:

MORE THAN  
2,000

Citizens engaged in fisheries education:

MORE THAN  
34,000





COLLABORATIVE  
FISHERIES  
RESEARCH WEST

**CFR-WEST.ORG**

CFR-West projects supported and administered by:



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