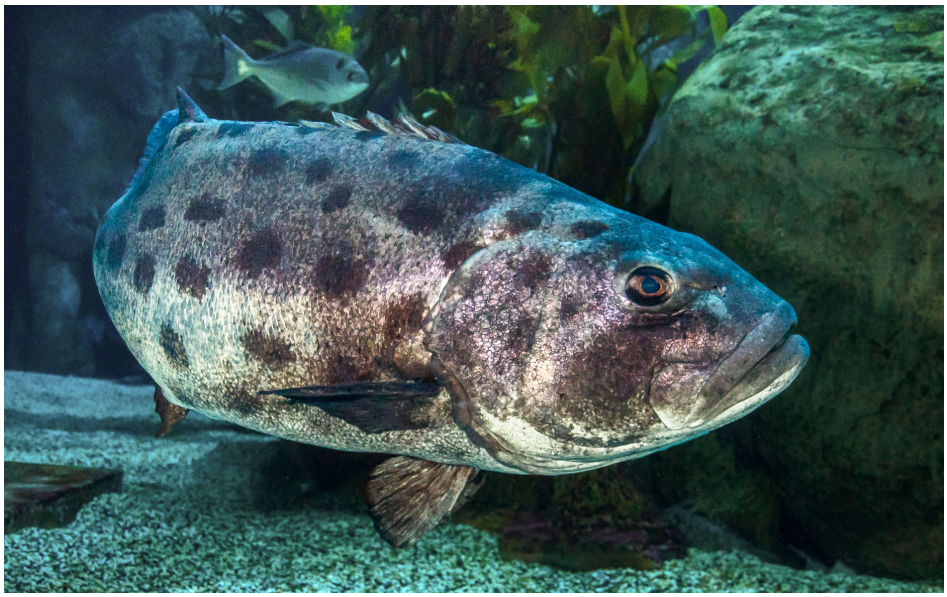
PACIFIC Currents



FALL 2023

Stories of Southern California Conservation

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LETTER FROM THE CEO

Finding Hope Amid Discouraging News

Inspired by the passion of Aquarium colleagues and the impatience of Gen Z, our CEO asks that we all do more so that our oceans and planet can rebound and thrive.

A hurricane hits Southern California, the ocean off the coast of Florida is literally a hot tub, and wildfires continue to break records none of us want to be broken. It would be easy to get discouraged. But then I learn about the Los Cerritos restoration, our mountain yellow-legged frog headstarting efforts, sunflower starfish breeding efforts, the now well-established giant sea bass spawning and release programs, white abalone releases into the wild, and the sour taste of discouragement is washed away. The stories of conservation action shared in this edition of *Pacific Currents* is just a small sample of Aquarium, community, and global volunteer efforts.

We have read about our oceans under a plastics siege, species going extinct, and what I can only call a deranged climate system. Things are urgent. I personally feel the happy-speak about renewable energy, the upsurge in sales of electric vehicles, and sustainability plans at virtually every major institution give us too much comfort. Emissions are still rising and species are still being lost…forever.

But then I encounter the impatience of Gen Z and the passion of my colleagues at the Aquarium, and I take hope. Two scientific truisms stand out: 1) because climate change is accelerating, our efforts to curb emissions also need to accelerate, and 2) nature is resilient and our efforts to restore imperiled species and damaged ecosystems can succeed.

To simplify: we are not doing enough, we can do more, and none of us can afford to leave it up to others, or to the federal government, or to Silicon Valley to solve our planetary environmental crisis. Decarbonizing the economy is a major social and economic overhaul that will be painful. If we do so fast enough, our oceans and the planet can rebound and thrive.

Often when I give public talks, someone in the audiences asks, "what can I do?" So many things. Volunteer for a local nonprofit that works on conservation and habitat restoration or that is concerned about making sure the transition away from fossil fuels does not leave less privileged sectors of society behind. Talk about climate change — to everyone. The more we talk about climate change, the more we will realize and be invigorated by the fact we are not alone in our concerns and others are there to join us. Technology by itself will not save us. Individual life-style choices by themselves will not save us. Corporate pledges for zero emissions by themselves will not save us. Government regulations and incentives by themselves will not save us. But all of these together will turn the tide of planetary degradation and nature is sufficiently resilient to rebound with a vengeance.

Peter Kareiva
Dr. Peter Kareiva joined the Aquarium of Pacific in August 2020. He holds a B.A. in zoology, M.S. in environmental biology, and Ph.D. in ecology and evolutionary biology. He is committed to science that engages the public and believes that connecting to nature is the one thing that can overcome the deep political and social divides that plague the nation today.

FRESH VOICES

Food, Culture, and Community

A traditional meal connects a community much in the same way the Aquarium does.

Growing up as a teen in a refugee household, I remember that food was the focus for my family. Food was more than just nourishment. It was a connection to the stories of our ancestors and the stories of our descendants. Eating our meals together was a way for us to share and reconnect with each other as a family. Food helped cultivate and build a stronger community.

I realized now that my strong sense of Cambodian culture and community was developed early on in life at the dinner table listening to stories of my parent's childhood and family traditions and how we were connecting to our new home and community. Food becomes a part of who each of us are, and many of us remember certain foods from our childhood with warm feelings and fond memories. Food from our family often becomes the comfort

food we seek as adults in times of frustration or in times of celebration. For me, it's the traditional Num Banh Chok, which is a rice noodle dish served alongside a light fish soup with lemongrass base, paired with fresh local herbs and green vegetables.

The story of Num Banh Chok goes back to the earliest days of Cambodian civilization, and the making of the noodles is a labor-intensive process that brought the community together to help with the process of grounding the rice by a stone mill. This is a meal made by the community and eaten with all community members.

The smell and taste of the lemongrass fish soup became something very familiar to me and reminds me of my mom.

Now, whenever I have gatherings of family and friends for any events, I often serve Num Banh Chok as I remember the fish soup my mom used to make for her family. Refugees and immigrants bring the food of their countries with them wherever they go and preparing traditional food is a way of preserving their culture when they move to new communities. We should embrace our heritage through our culture's food, but we should also become more informed about other cultures in our shared community by trying their foods. Food is a portal into culture and community.

"Traditional cuisine like Num Banh Chok is passed down from one generation to the next. It is an expression of cultural identity."

— SAM CHANWANTHA LIMON

I take pride as I get involved in the community. It's a privilege to serve as the Aquarium's ambassador and support the conservation projects by bringing awareness to the community through hosting different events and serving foods from my culture. I feel proud to see that the Aquarium of the Pacific has redefined the modern aquarium by serving as a community gathering place

where diverse cultures are celebrated and how diversity within our communities are supported. At the same time, how it allows spaces for real discussions and conversations to bring awareness on issues that harm our planet and ocean.

Sam Chanwantha Limon
Sam Chanwantha Limon serves on the Aquarium's Board of Directors and helped to create our Southeast Asia Day celebration. Her extensive community service includes serving on the board of advisors and as the scholarship chair for the Los Angeles County Cambodian Employees Association and serving on the board of United Khmer American Coalition.

CONSERVATION CORNER

Marine Protected Areas Places of Restoration and Recovery for the Ocean

Marine Protected Areas serve as a critical tool in the conservation of marine habitats. Explore the questions below to discover and learn.

What is an MPA?

A marine protected area (MPA) is a "defined region designated and managed for the long-term conservation of marine resources, ecosystems services, or cultural heritage." It is an effective conservation tool to restore natural habitats and the associated species by managing human activities. There are many other terms which have similarities or overlap with MPAs, including marine

reserve, marine park, marine sanctuary, marine national monument, and others.

A frequent misconception is that MPAs do not allow ANY access; this is generally not the case. Activities, like kayaking, snorkeling, paddleboarding, swimming, boating, and other uses that do not harm the animals, plants, and water quality, are often allowed in MPAs.

The demonstrated benefits of MPAs are restoration of the local animal and plant populations. MPAs have more animals and plants, which tend to be bigger and healthier, than unprotected areas. This wealth typically does not just stay in that one place. Many of the animals travel outside of the MPA, increasing the abundance and biodiversity in adjacent areas. The protection also can increase local economic activity by enhancing tourism in the area.

There must be a lot of MPAs, right?

California has been active in adopting MPAs. In 1999 the state embarked upon a comprehensive approach to marine conservation off our coast that established a network of 124 MPAs. Monitoring of the species within the protected areas is done annually, and earlier this year a decadal review was published documenting the impacts of the network.

You may have heard more talk in the last few years about MPAs. This is because in early 2021 President Biden signed an executive order committing to conserving "at least 30 percent of our lands and waters by 2030." Shortly thereafter the federal government released its plan for how to achieve this target in the "America the Beautiful" report and shares progress annually.

The U.S. is not the only country to pursue this lofty goal; globally this pledge is colloquially known as "30x30." Dozens of countries or smaller jurisdictions, like the state of California, have committed to it.

What does the Aquarium do to help MPAs?

The Aquarium's work regularly intersects with MPAs.

In the past we have hosted forums to discuss the placement of protected areas off the California coast.

We have an active partnership with the Channel Island National Marine Sanctuary to support giant sea bass monitoring, white abalone conservation, and other research.

Our divers participate in monitoring programs within (and outside) of protected areas collecting data so that decision-makers can track habitat and animal changes over time and make informed choices about the future.

The Aquarium also features protected areas in our galleries so that every visitor has the opportunity to become more familiar with MPAs and where they might encounter them.

How can I help MPAs?

You too can be involved with the California network of MPAs beyond being a casual visitor. MPAWatch is a community science initiative through which individuals are trained to collect data on human use of MPAs and adjacent areas. The data are used to help inform managers, as well as contribute to scientific research.

You can also support the state's MPAs by being an informed steward – knowing what rules or restrictions exist in the areas that you are visiting and adhering to them. Check out the state's comprehensive resource page.

Get involved in a local MPA.

Jennie Dean
Jennie Dean is the Aquarium's inaugural vice president of education and conservation. She focuses on the amplification and enhancement of the Aquarium's work in species conservation and learning for all audiences. Previously Dean was a program director at the University of California, Los Angeles' Institute of the Environment and Sustainability, where she oversaw programs engaging the private sector on corporate sustainability and consulted with island governments on sustainable development of their blue economy.

FEATURE ARTICLE

Stories of Southern California Conservation

Conservation of our Southern California waterways and marine environment takes many forms at the Aquarium of the Pacific.

Behind each program is a team of dedicated and passionate individuals working to make a meaningful difference for nature and our community. Each has a story to tell that illustrates the inspirations, challenges, and rewards behind giving nature a helping hand.

Giant Sea Bass

Nate Jaros, *senior director of fish and invertebrates*

The Aquarium is proud to have been the first aquarium to successfully rear a giant sea bass from eggs collected in our Honda Blue Cavern. This special fish, named Yutaka, currently lives in our Casino Point exhibit in our Southern California Gallery. This monumental event triggered the first Giant Sea Bass Symposium, where we brought scientists together from very diverse organizations to share research and find new collaborations. One such collaboration led California State Universities Northridge and Long Beach to join forces with us and Cabrillo Marine Aquarium to spawn and release hundreds of giant sea bass for the first time ever in 2019 and 2020. These individuals were identified by their unique spot patterns, and some were outfitted with radio transmitters to study their movements and integration into the wild. The Aquarium also supports the community science program led by University of California, Santa Barbara, where recreational divers can report their photographs to help contribute valuable data on the movement and longevity of these massive fish.

OUR CONSERVATION ROLE

The Aquarium is currently planning the third iteration of the Giant Sea Bass Symposium, alongside Cabrillo Marine Aquarium. Out of this symposium, we hope to explore how public aquariums can collaborate with researchers to learn more about these amazing fish and share those stories with our visitors. We are also making plans through a special partnership between the Aquarium and the Channel Islands National Marine Sanctuary to help tag adult giant sea bass to learn more about annual spawning aggregations. Understanding the location and fidelity of these sites can help regulators adjust protections for this endangered species to aid in their natural population recovery after a tragic history of being overfished. These apex predators play a crucial role in kelp forest population dynamics.

Wetlands Restoration

Leah Young, *volunteer outreach program coordinator*

In the summer of 2009, we partnered with the Los Cerritos Wetlands to restore about 72 acres of land around a tidal pool in Long Beach, which became known as Joy Zedler Marsh. This land, across the street from a power plant, is still used for oil production today.

The first task was to remove the road coverings made of asphalt or heavy crude oil. The removal was labor intensive and sometimes dangerous. When the roads were cleared, the focus turned to removing non-native plants such as black mustard and saving rare natives such as southern tarplant. We then prepared the soil for planting and introduced water to help the plants grow.

Overseen by Principal Restoration Ecologist Eric Zahn, a crew erected a greenhouse to propagate the native plants used for planting. Zahn's crew set up monthly sessions inviting neighborhood groups to come in to learn about wetland biology, plant native plants, and remove non-native invasive plants. These efforts continued throughout the years with Aquarium staff and supporters contributing countless hours of hard work. Among the many community volunteers, four Aquarium volunteers Bill Robinson, Dan Dabelstein, Tina Cox and I were awarded Super Volunteer status and presented personalized lounge chairs for our years of dedication. The restoration is ongoing due to non-native plants being blown in by the winds and bird droppings.

OUR CONSERVATION ROLE

Today, the Los Cerritos Wetlands is transformed. Where there once was asphalt is now a lush environment for local species with local vegetation and waterways. Walking trails and places to sit allow visitors to connect with nature. The work is not complete, so volunteers can take part and be part of a remarkable change.

Sunflower Sea Stars

Jen Burney, *senior aquarist*

When I started my biology career 15 years ago, nothing sounded more thrilling than working with sharks, and today I am equally thrilled to be working with sunflower sea stars. In 2022, I'm part of a new Pycnopodia (sunflower star) Recovery Working Group with some of our partner organizations. They needed aquariums and laboratories who could help "write the book" on spawning and raising sunflower stars. As the cold-water aquaculture aquarist at the Aquarium, that responsibility fell into my lap. At first it felt alien. I've worked my way into aquaculture over the years and have come to love it, but I had been focusing on fish up to that point.

Now, if I wanted to participate in this initiative, I needed to learn all there is to know about culturing sea stars and sea urchins. It's a year later now, and I never anticipated how much I would fall in love with the world of invertebrate culturing. It's been a year filled with discoveries, frustrations, a lot of victories, and more meetings than I could ever imagine. Conservation projects are

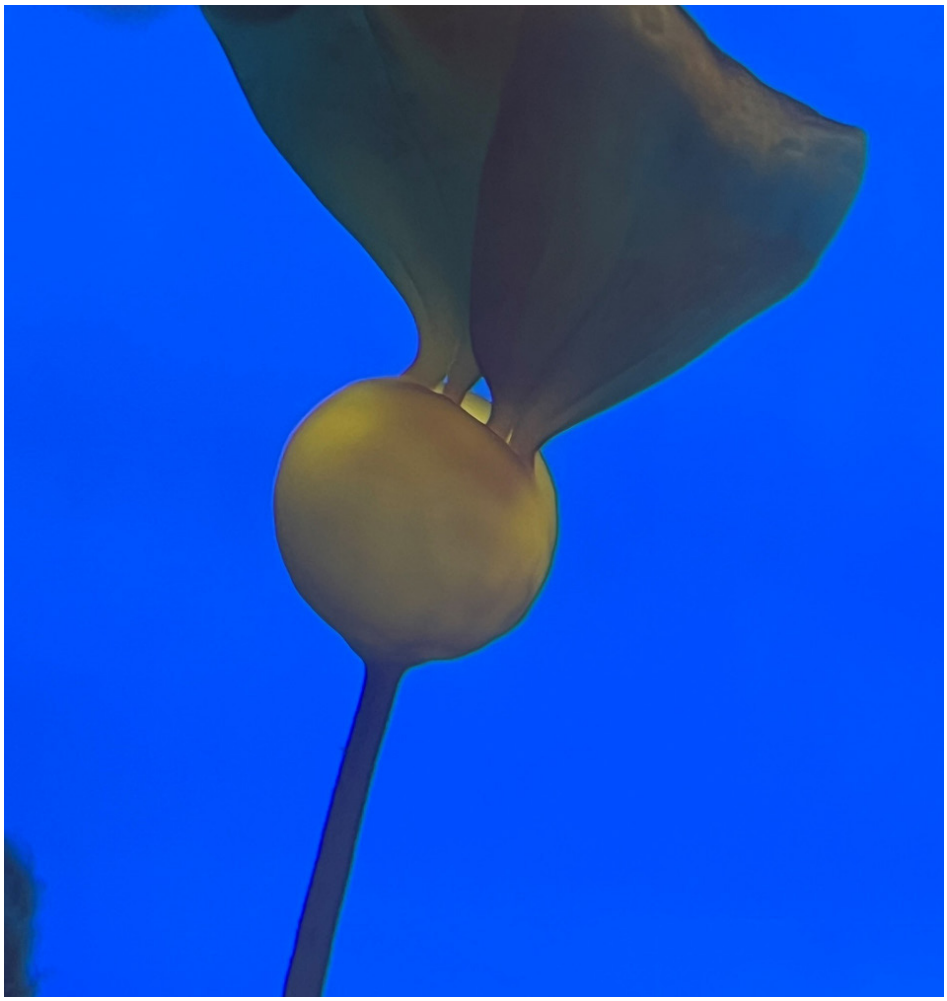
slow-moving, and roadblocks to the end goal are essentially guaranteed. But despite that, my passion for invertebrates has only grown as I've explored the weird, wild world of sea stars.

It's still a long road ahead for the sunflower star (and all their supporters), but every day brings more knowledge and more passion into my life here at the Aquarium. I'm excited to see where the project will be this time next year and am constantly reminded how fortunate I am to work in a field where husbandry, research, and conservation combine to accomplish big things.

OUR CONSERVATION ROLE

Burney works with endangered sunflower sea stars to better understand them and to help save these important sea stars that live in our kelp forests. In this case, the team's hope is to breed them. Sea star wasting disease has severely affected their population diminishing their ability to successfully broadcast spawn.

This August the Association of Zoos and Aquariums (AZA) approved a new Pycnopodia SAFE (Saving Animals from Extinction) program. This will give the sunflower star team additional support to accomplish long-term goals and expand their network of partners. The Aquarium and Henry Doorly Zoo will co-lead the SAFE group. With the support of zoos, aquariums, laboratories, and more behind them, the future for the sunflower star looks brighter every day.



Bull Kelp Stasis

Jessica "JJ" Soski, *senior aquarist*

The bull kelp gametophyte project is exciting to work on because it's truly amazing how complex and interesting these seemingly simple organisms are. Unlike true plants, kelp have an unusual life cycle that includes microscopic male and female individuals that breed to form the giant kelps that make up kelp forests. It's mind boggling to peer into the microscope and see small groups of cells, then fertilized eggs that develop into little blades of kelp. What starts as a slow process accelerates quickly.

Day-to-day, I cannot discern much change in the gametophytes, but once they develop and start to grow into kelp, things really take off. Tiny leaves start to form and each day they double in size. That might not seem like much growth when its two millimeters one day and for the next, but seeing something go from one inch to two inches, then four inches over the course of two days is shocking! Knowing that a microscopic egg in a petri dish will grow into a 30- to 60-foot tall kelp is mind boggling. Small things can make a giant impact.

The best part of my job is learning new things about my favorite subject, seeing the science happen in front of me, and having the opportunity to make a positive impact. The bull kelp gametophytes I'm working with today could be instrumental in restoring bull kelp forests in the future.

OUR CONSERVATION ROLE

Northern California bull kelp is dwindling at alarming rate. Soski is part of a team managing and storing bull kelp genetic material called gametophytes through light and temperature. The hope is to never reach a point where the team needs to activate these bull kelp gametophytes and outplant them, but this work brings them into instrumental territory to be ready to jump in if needed.

White Abalone

Lauren Samarov, *senior aquarist*

When I was growing up, I always knew that I wanted to work with animals, but I never imagined I would fall in love with an endangered marine snail. It turns out that working with the endangered white abalone is one of the most fulfilling experiences I have had in my career as an aquarist thus far. It feels amazing to know that you are saving a species from extinction and working to restore their numbers in the wild. When we raise abalone at the Aquarium, the first week of their lives is so exciting. It takes about a week for the microscopic free-swimming larvae to settle as tiny abalone. Each day I look at the larvae under a microscope to track their development, and each day they look different! By the second day they are already developing their shells and by day five their eyes start to develop. By the end of their first week of life the larvae start to test out their muscular foot and transition from free swimming larvae to benthic mini abalone. Once we move the baby abalone into our settling trough, it takes about three months to be able to see them with the naked eye. This period can be filled with some anxiety, but it is mainly feelings of excitement and hope for this iconic California species. It will be about two to three years before they are large enough to be released in the wild. It is

a labor of love to raise these amazing snails from microscopic larvae to inch-long juveniles returning to the ocean.

OUR CONSERVATION ROLE

White abalone were over harvested, a key factor leading to their endangered status. The Aquarium has a white abalone program along with other partners, where these marine snails are grown behind-the-scenes to be out planted in the ocean when they become big enough. When these juveniles get out planted, they are placed by a structure called a BART, Baby Abalone Recruitment Trap, to protect them from predators like lobsters and sea stars. Since the Aquarium joined the program in 2007, the Aquarium has helped released over 10,000 white abalone and monitor them in the wild.

Mountain Yellow-legged Frog

Erin Lundy, *conservation coordinator – mammals and birds*

Walking into the mountain yellow-legged frog room is like stepping into a different universe than the rest of the bustling Aquarium. It's quiet, it's cold, and it's just me and the frogs. Sometimes, when the air is still, just over the rumbling of the pumps, I can hear the frogs vocalizing: a low, comforting sound, reminiscent of a door creaking. Frogs, like the mountain yellow-legged frog, play a vital role in any ecosystem. The mountain yellow-legged frog program has been the defining project of my career. It challenges my ability to provide excellent husbandry for these sensitive animals. I feel extreme highs: Releasing 188 mountain yellow-legged frogs in conjunction with United States Geological Survey (USGS). It was exhilarating last September knowing that in that moment, we have effectively doubled the wild population of these animals. Despite knowing that the genetic bottleneck and the stress of metamorphosis makes some degree of loss unavoidable, we persevere, much like the amphibians. Every day, I revel in the hum of the pumps, the cool of the room, and when I'm lucky, the soft croaks of the frogs. And when I revel, I remember why we do what we do: because we owe it to the frogs.

OUR CONSERVATION ROLE

When a conservation crisis unfolds such as the Bobcat Fire in 2021 in California, institutions and organizations quickly mobilized to save the small yet important endangered mountain yellow-legged frog that lives in our local mountains. The Aquarium built a space behind-the-scenes to house tadpoles from partner institutions to help them grow until ready for release. The Aquarium recently raised 120 froglets that were released at the end of August.

Diving into Science and Conservation

Sean B. Eckley, *dive safety officer – field operations*

Growing up in Southern California, I frequently visited the Aquarium, whether it was for school field trips, family outings, or just because. Each time I visited, I learned more and more about the ocean, its inhabitants, and conservation efforts to help protect these amazing animals.

I would watch the dive shows every time I visited wondering just how I could be that diver and make a difference. Years later, I found myself working at a dive shop in Monterey, California, teaching SCUBA and giving guided tours to guests from all over the world. Having completed my American Academy of Underwater Sciences (AAUS) scientific diver course in college, I would often fuse my passion for marine research and conservation with my work as a SCUBA instructor.

Now, as the new dive safety officer of field operations for the Aquarium, I hope to continue sharing my knowledge and skills teaching new scientific divers, assisting with collections, and increase our opportunities and involvement with ongoing research and conservation projects. It's my belief that aquariums

are a gateway to teach our communities about marine life and our oceans and what we can do to protect and conserve them for future generations, just as it inspired me all those years ago.

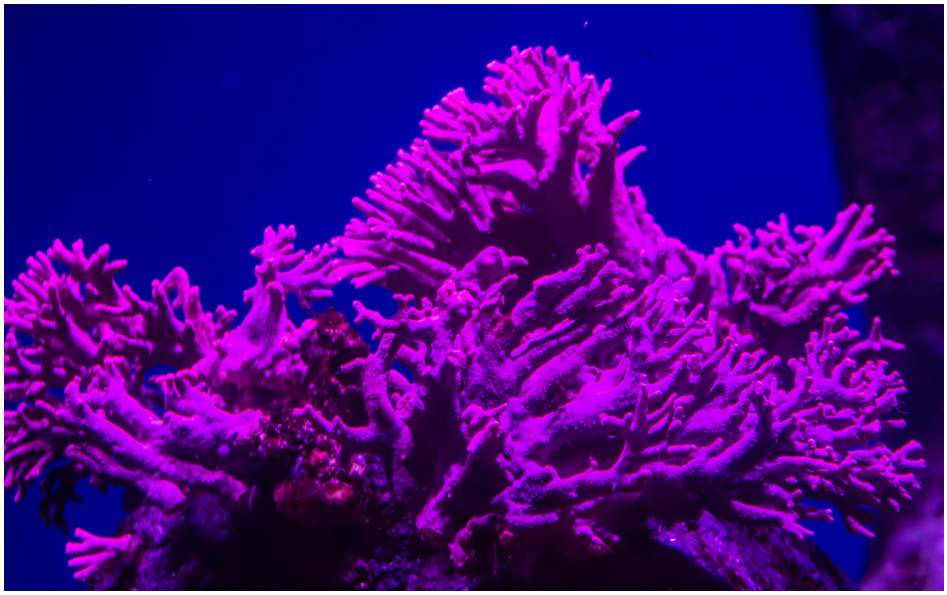
OUR CONSERVATION ROLE

Scientific divers at the Aquarium, both paid and volunteer, collect a variety of data used by organizations and agencies to better understand and conserve local marine life and habitats.

The Aquarium of the Pacific is committed to the conservation of our Southern California marine habitats, from kelp forests to wetlands, and waterways, reaching high up in our local mountains, ensuring these local treasures live on and thrive for future generations. That conservation is possible due to the hard-work, dedication, and commitment of our staff.

Animal Updates

Discover the warty frogfish and the bay pipefish as well as a coral endemic to California featured in the reimagined Southern California Gallery.



Hydrocoral

The coast of California is home to a soft coral called the California hydrocoral (*Stylaster californicus*). Near the Aquarium, hydrocorals can be found at a dive site called Farnsworth Banks on the southwest side of Catalina Island. At first glance, these corals look like the typical coral one might find in warmer waters, but hydrocorals are a bit different.

Because hydrocorals thrive in the deeper parts of the ocean, these purple corals have adapted to feed on small zooplankton that might be floating around the water column and brought nearby via water currents. This means, unlike other corals, they require no sunlight. Guests can see hydrocorals in the Beauty in the Deep exhibit in the Southern California Gallery. Due to their deep-water habitat, notice how dark this exhibit is compared to the coral exhibits in the Tropical Pacific Gallery.

Bay Pipefish

Carefully scouring the sand, bay pipefish (*Syngnathus leptorhynchus*) use their small mouths to find tiny crustaceans. Their slender bodies and small fins help them blend in with the seagrass, a habitat where they are commonly found. Bay pipefish are syngnathids related to seahorses. Like seahorses, male bay pipefish carry the eggs of the young at the end of their bodies until ready to hatch. Guests can find bay pipefish in the Aquarium's new Marine Meadows seagrass exhibit in the Southern California Gallery.

Warty Frogfish

Due to their coloration, these fish seemingly disappear into their environment. The warty frogfish (*Antennarius maculatus*) at the Aquarium is a pinkish red and may not be the easiest to spot, which is why it is part of the Hidden Potential exhibit in the Tropical Pacific Gallery.

Frogfish have fins like other fish, but their fins are adapted so they can push off the seafloor or rocks to help them move. This might be why it's called a frogfish because its front pectoral fins look like a frog's front legs. Warty frogfish have a jaw described as prognathous or protruding, meaning they can extend it outwards to help catch prey almost equal to their size.