

# PACIFIC CURRENTS

MEMBER MAGAZINE OF THE AQUARIUM OF THE PACIFIC



# SEA JELLIES



© PAULA BRONSTEIN



© IWAN BAAN



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# SINK OR SWIM: DESIGNING FOR A SEA CHANGE

This exhibit features images by renowned photojournalists and fine art photographers documenting people's efforts to adapt to sea level rise around the world.

An exhibit of photographs organized by the Annenberg Space for Photography in Los Angeles will come to the Aquarium on June 1.

**R**ISING SEAS tied to global climate change and the resulting coastal flooding exacerbated by bigger, more powerful storm surges are prompting people around the world to search for new housing and infrastructure solutions. A traveling exhibit examining this issue organized by the Annenberg Space for Photography in Los Angeles will come to the Aquarium June 1 and remain on display through the end of September.

The exhibit, *Sink or Swim: Designing for a Sea Change*, collected images and video from renowned photographers and architects around the world to examine the ways people are responding to sea level rise, from building complex systems of sea walls and dikes in the Netherlands to floating schoolhouses in Nigeria. The primary focus of the exhibit is the architectural and urban planning innovations being used to adapt to higher seas, as well as the human stories behind these solutions.

Many of the solutions highlighted in the exhibit are low-cost, low-tech projects using locally available materials. The idea is that these projects could be replicated in many regions of the world, rich or poor. As is the case in many places, coastal cities often have a rich cultural history and sense of community for residents, who are sometimes unwilling to abandon their home because of changes to the environment like higher sea levels. Rather than migrating away from these places, new architecture and infrastructure will allow communities to adapt to sea level rise and mitigate its impacts.

Aquarium visitors will be able to learn about adaptive projects in various locations around the world, including housing and school facilities built in Japan out of paper tubes and shipping containers after the 2011 earthquake and tsunami and flood-resistant housing

in New Orleans built after Hurricane Katrina. The exhibit also includes renderings illustrating ideas for urban infrastructure that would improve resilience to storms and flooding for coastal cities.

*Sink or Swim* includes photographs by photojournalists and fine art photographers such as Iwan Baan, Stephen Wilkes, Jonas Bendiksen, and Paula Bronstein. Some photographs were commissioned by the Annenberg Space for Photography for this show, which was guest-curated by Frances Anderton, architecture writer and host of KCRW's *DnA: Design and Architecture* show. The exhibit also includes a documentary featuring interviews with the photographers.

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*Images from Sink or Swim will be exhibited throughout the Aquarium, and lectures and additional programming on sea level rise will be offered during the summer and fall.*

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The Aquarium will feature sea level rise and extreme weather programming during the exhibit's stay in Long Beach to help visitors learn more about the projected impacts of these phenomena as the Earth's climate continues to undergo change. The frequency and intensity of extreme weather events and vulnerability of coastal cities will continue to increase. Programming will include a live webcast on June 1 with sea level rise expert Dan Cayan and lectures by some of the contributing photographers and architects.



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*PACIFIC CURRENTS* is published for members of the Aquarium of the Pacific. Please send your comments to our editorial staff at [pacificcurrents@lbaop.org](mailto:pacificcurrents@lbaop.org).

**OUR MISSION** | To instill a sense of wonder, respect, and stewardship for the Pacific Ocean, its inhabitants, and ecosystems.

**OUR VISION** | To create an aquarium dedicated to conserving and building natural capital (nature and nature's services) by building social capital (the interactions between and among peoples).

**PACIFIC CURRENTS STAFF** | Editor/Writer: Claire Atkinson | Copy Editor: Cecile Fisher | Designer: Andrew Reitsma | Contributing Writers: Erin English and Lindsay Yates.

**AQUARIUM HOURS** | Open daily from 9:00 a.m.-6:00 p.m. except December 25 and during the Grand Prix of Long Beach.

**MEMBERSHIP OFFICE HOURS**  
8:00 a.m.-5:30 p.m. daily



The Aquarium of the Pacific is a non-profit 501(c)(3) institution. To provide exciting and innovative exhibits and educational programs, we rely heavily on the generous donations of individuals, foundations, and corporations.

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COVER: ROBIN RIGGS



Aquarium Founding Sponsor

# LETTER FROM THE CEO

DEAR MEMBERS,

**T HIS SUMMER** the Aquarium of the Pacific will bring you new exhibits and programs focusing on sea jellies, the otherworldly animals that populate ocean and



freshwater ecosystems around the world. Our curators, life support technicians, and facilities staff members have built new exhibits and collected new jelly species to share with you. I hope you and all our visitors this year will learn more about these animals, which fascinate us perhaps because they bear so little resemblance to humans.

Sea jellies are representative of the gaps that still remain in our understanding of the World Ocean. They can help us better comprehend the ecosystems and changes taking place in the ocean, but we have little historical data on which to base current knowledge of their populations. We should urge policymakers and government representatives to dedicate more funding for ocean exploration, research, and monitoring. This will generate more data that can be transformed into information and knowledge upon which actions can be based. When we know more about where jellies are appearing in the ocean and when, we can better understand the factors that affect their populations. These clues will help inform our actions to better conserve the environment and living resources.

Sea jellies play a critical role in the ocean as a source of food for other ocean animals. Humans also use them as a source of food and in scientific applications. Substances derived from jellies are being studied for pharmaceutical uses as well as in cell and molecular biology research. While sea jellies are simple creatures, with no backbones or central nervous systems, they have complex lifecycles. Also, the variety of jelly species is fascinating. Some jellies and jelly-like creatures are just the size of your thumbnail at full size, while others have tentacles that reach more than 100 feet in length. Some jellies form symbiotic relationships with photosynthetic algae that provide them with food in exchange for a place to live.

I hope you will visit often in 2015 to see the species we have collected for our Jellies exhibits. We will also feature an important exhibit of photographs and video about sea level rise curated by the Annenberg Space for Photography in Los Angeles. I encourage you to look for elements of this exhibit called *Sink or Swim: Designing for a Sea Change* throughout the Aquarium and learn about how people in different regions of the world are using local materials, innovative design, and other community resources to adapt to rising seas.

Thank you for your ongoing support.

Sincerely,

Jerry R. Schubel

## PINECONE FISH ON DISPLAY IN WONDERS OF THE DEEP GALLERY

**P**INECONE FISH are currently on display in the *Wonders of the Deep* gallery. Pinecone fish (*Monocentris japonica*) are native to the waters off the coast of southern Japan and other areas of the Indo-West Pacific. They have bright yellow scales outlined in black. Like their flashlight fish relatives, pinecone fish also

have a photophore beneath their eyes that contains bioluminescent bacteria. Pinecone fish exhibit schooling behavior and also like to hide in little caves or overhangs on rocky reefs. They have dorsal and abdominal spines that they use for defense. When not in use the spines lay flat against the fish's body.



ANDREW BETSMA



ALICE HSEH

## NEW FISH SPECIES IN NORTHERN PACIFIC GALLERY

**S**MOOTH LUMPSUCKERS (*Aptocyclus ventricosus*) are now on view in the *Jewels of the Northern Pacific* exhibits in the Northern Pacific Gallery.

These fish are equipped with a clinging disc that allows them to suction to rocks and other surfaces. They prefer to hide amongst the kelp and rocks in their exhibit. They are called smooth lump suckers because they lack scales. Both smooth and spiny lump suckers

are on view in the exhibit. Aquarists have been displaying Pacific spiny lump suckers and raising their young behind the scenes in recent years. In comparison to the spiny lump suckers, which are small and brownish-yellow in color, smooth lump suckers are nearly twice as large and bluish-gray. They are found in the Northern Pacific Ocean, from Korea to the Bering Sea and British Columbia, Canada.



Amazon milk frog

ROBIN BIGGS

## NEW POISON DART FROGS ON EXHIBIT

**T**HE FROG EXHIBITS in the Tropical Pacific gallery have some new residents, including phantasmal poison dart frogs, an Amazon milk frog, green and black dart frog, splash-backed dart frog, and blue dart frog. While some of these species have previously been on display, they may have been moved to different exhibit enclosures.

These frog species all hail from Central and South America, where they live in rainforest canopies and hunt for insects and sometimes worms. Their bright colors serve as a warning to predators that they are highly toxic, secreting poisonous fluid from their skin when disturbed.



ROBIN BIGGS

## NORTHERN PACIFIC GALLERY HOME TO NEW GIANT PACIFIC OCTOPUS

**A**NEW FEMALE giant Pacific octopus named Grady is on exhibit in the Northern Pacific gallery. The new octopus is about three years old, weighs just over 10 pounds, and seems to prefer mackerel. She typically hides in one of the two caves at the exhibit's floor. The Aquarium staff members who care for Grady say she is quite clever and shoots water at them with her siphon during feedings and tries to remove divers' masks when her tank is being cleaned.

Giant Pacific octopuses can reach 16 feet in width and up to 110 pounds. They live in temperate waters of the Pacific Ocean along the Pacific Rim from Southern California to Japan, feeding on shrimp, clams, fish, and lobsters. They are known to be highly intelligent and able to open containers and solve puzzles. Like other cephalopods, they also have the ability to instantly change the color and texture of their skin.

## ZEBRA SHARK PUPS FIRST TO RESULT FROM ARTIFICIAL INSEMINATION

**I**N JANUARY two female zebra shark pups born via artificial insemination were moved from the behind-the-scenes shark nursery to Shark Lagoon.

The Aquarium of the Pacific is the first to successfully reproduce zebra sharks through artificial insemination. Fern, a twenty-year-old zebra shark who has lived at the Aquarium since 1997, is the mother of the two shark pups.

Fern was inseminated in September 2013, and the pups hatched from the eggs she laid in late March of 2014. Successful births from artificial insemination can further research in helping dwindling shark populations in the wild.

Early this spring one of the zebra shark pups was delivered to another Association of Zoos and Aquariums (AZA) institution as part of the Aquarium's involvement in AZA's Species Survival Plan for zebra sharks. The other pup remains in the Shark Lagoon touch pool.

Zebra sharks, often called leopard sharks in Australia, are found in the Indo-West Pacific. This includes the Red Sea and waters off East



The zebra shark pups were added to the Shark Lagoon touch pool in January.

Africa, New Caledonia, Japan, Australia, and Tonga. This species of shark prefers inshore marine or brackish water. They are 9 feet long on average. These sharks are nocturnal foragers, feeding on snails and bivalves, crabs, shrimp, and small bony fishes.

Zebra sharks can live about twenty-five to thirty years, but face many threats in the wild. This species is listed as vulnerable to extinction under the International Union for Conservation of Nature Red List mainly because of human activities. Overfishing poses a big threat, as these sharks are sold for human consumption or fish meal. Livers are processed for vitamins, and there is a large market for their fins.

## JUVENILE YELLOWTAIL RAISED IN SHOREBIRDS POOL

**A**QUARIUM STAFF MEMBERS have been raising juvenile yellowtail fish in the Shorebird Sanctuary exhibit on the second floor outdoors next to the June Keyes Penguin Habitat. Once they are large enough, they will be moved to the Amber Forest exhibit in the Southern California/Baja gallery.



## PENGUIN BREEDING SEASON UNDER WAY

**A**S SPRING ENDS and summer begins, Magellanic Penguins will be pairing off, building nests, and laying eggs. After two successful breeding years at the Aquarium, staff members expect to have more penguin chicks hatch in 2015. Look for activity around the nest burrows in the exhibit's rock walls surrounding the beach.

City of Long Beach tree trimmers provide palm fronds to the Aquarium to use as penguin nesting material. The palm fronds are sterilized, and then staff members place them in the penguin exhibit. The penguins collect the fronds and take them into their nest burrows to prepare them for females laying eggs.





# SEA JELLIES

MESMERIZING,  
HYPNOTIC,  
FRAGILE, AND  
OTHERWORLDLY—  
SEA JELLIES INSPIRE  
FASCINATION AS  
THEY DRIFT WITH  
THE CURRENTS,  
THEIR DELICATE  
TENTACLES  
FLOATING  
BEHIND  
THEM IN A  
SLOW-MOTION  
UNDERWATER  
DANCE.



With their ghostly, translucent bodies sometimes shot through with brilliant colors, intricate thread-like or ruffled tentacles, and lack of much internal structure, jellies appear alien. Yet these intriguing creatures can be found all over the world, in both saltwater and freshwater, and can appear in massive blooms.



**T**his summer the Aquarium will highlight sea jellies with a variety of new species, exhibits, and programs. Visitors will learn about the wide variety of jellies living throughout the World Ocean.

Sea jellies are found in ocean waters around the planet. They live at all depths, from surface water to deep trenches. Jellies can even survive out in the open ocean far from land, some receiving nutrition via photosynthesis with the help of symbiotic algae living in their tissues.

Jellies play an important role in the ocean as a food source for animals like large fish (including ocean sunfish) and sea turtles, some of which eat jellies exclusively.

## THE JELLY FAMILY AND BEYOND

The ocean is home to many species of gelatinous animals, from sea jellies to comb jellies, as well as some tunicates, gastropods, and worms, which can all have translucent bodies similar to sea jellies.

Sea jellies are members of the phylum *Cnidaria* (pronounced nigh-DARE-ee-uh). Within this phylum is the class *Scyphozoa*, which includes the most familiar types of sea jellies, with bell-shaped bodies and tentacles or oral arms. This includes moon jellies, purple-striped jellies, Pacific sea nettles, and many other species. Other classes of sea jellies in the phylum include:

*Hydrozoa* (small, usually transparent species like umbrella and crystal jellies; this class also includes the Portuguese Man-o-War, which is actually a colony of jellies in their medusa and polyp forms),

*Cubozoa* (box jellies and sea wasps), and

*Staurozoa* (stalked jellies that live attached to rocks and other surfaces).

Together, there are several thousand species of jellies in the Cnidarian branch of the animal family tree.

While they have similarly translucent bodies, live in the same waters, and eat the same kinds of food, the jellies described above are members of a different phylum from comb jellies, or ctenophores. There are at least 100 species in this phylum, *Ctenophora* (Greek for comb-bearers and pronounced teen-o-for-uh). Scientists at one time categorized sea jellies and ctenophores in the same phylum, but the differences between these groups have now been well characterized. The most notable is that instead of tentacles armed with stinging cells, comb jellies have sticky cells called colloblasts that do not sting and eight rows of cilia, or combs, that propel them through the water and produce a flickering rainbow-like appearance with their movements. Both jellies and comb jellies are on display at the Aquarium.

Jellies and comb jellies have lived on Earth for at least 500 million years, making them three times as old as dinosaurs. They are the earliest known animals to have organized tissues and to swim using muscles instead of drifting. These animals vary widely in size, from tiny medusae and comb jellies smaller than a pea to the lion's mane jelly, which occasionally reaches 6 feet in width with tentacles up to 100 feet long.



**COMB JELLY**  
*Mnemiopsis leidyi*

Sea jellies have lived on Earth for at least 500 million years.



**PACIFIC SEA NETTLE**  
*Chrysaora fuscescens*



**UMBRELLA JELLY**  
*Eutonina indicans*



**MOON JELLY**  
*Aurelia aurila*

At the Aquarium, jellyfish are referred to as sea jellies because technically they are not fish.

## SEA JELLY ANATOMY

As Cnidarians, jellies are related to corals and anemones. They all possess stinging cells called nematocysts, or *cnidae*. This word comes from the Greek word *cnidos*, meaning stinging nettle. In addition to nematocysts, Cnidarians have several other characteristics in common, including a similar method of capturing food and an oftentimes complex life cycle.

Sea jellies survive without a heart, brain, or lungs. They are 95 percent water, and their movements are governed by the flow of the water they live in. Although they contract their bells to propel themselves, jellies are planktonic animals, meaning that they drift with currents, being too weak to swim against them.

While they lack organs, Cnidarians have a net of sensory nerve cells, tentacles or oral arms, gonads that produce reproductive cells, and a gastrovascular cavity, where digestion takes place. The cavity opening is also used to expel waste and release reproductive cells.

Jellies have the simplest-known nervous system among multicellular animals. Nerves in the jelly's external layer form a nerve net. The nerves generate pulses that contract the jelly's bell, allowing it to swim. The nerves also detect changes in water chemistry and can sense touch. Jellies in the class Cubozoa even have complex eyes and can respond by swimming toward or away from the light and dark they see. The jelly's circulation system is made up of canals filled with fluid that transports food and distributes nutrients.

Jellies use their stinging cells to capture food, which mostly consists of zooplankton and other sea jellies. These stinging cells are primarily located along feeding tentacles and sometimes on the bell itself. If the food gets stung by the nematocysts, those cells will hold onto and incapacitate the prey with venom. The tentacles then pull the food into the gastrovascular cavity where it is digested.

## REPRODUCTION

While sea jellies have the simplest anatomy of almost any animal, they have complex and varying lifecycles and reproduce both sexually and asexually. Different jelly species reproduce in different ways.

Most adult Scyphozoans release sperm, eggs, or both into the sea. Fertilized eggs develop into a planula, a flattened, free-swimming, larval-stage organism. The planula settles on a suitable surface, such as a rock, shell, dock, or piece of driftwood, and then develops into the polyp stage. A jelly in its polyp stage looks like a tiny sea anemone and feeds in the same way. With adequate food and space to develop, the polyp will divide asexually forming a stack. Suitable water conditions cause the polyps to pulsate and bud off the stacks. They become free-swimming ephyra, the juvenile version of sea jellies. The ephyra drift and eat, soon metamorphosing into the small stages of what is later the sexually mature adult or medusa.

Cubozoans reproduce sexually, with the male passing sperm to the female, who either hosts or releases fertilized eggs as they become larvae. The settled polyps can then reproduce asexually by budding. Hydrozoans and Staurozoans also have both sexual and asexual methods of reproduction.

A jelly bloom occurs when an abundance of nutrients and other conditions allows many jellies to reproduce at once. This often occurs when temperate waters are warmed by sunlight in the spring, leading to an abundance of phytoplankton, or tiny plants in the surface waters. These plants feed tiny animals called zooplankton, triggering an abundance of food for jellies, which provides them the excess energy to grow and reproduce.

Different species reproduce at different times of the year. Small species generally have short lifecycles ranging from as little as an hour or two to perhaps three to four months. Jellies can die because they are eaten by



A Scyphozoan jelly in its polyp stage attaches to a suitable surface and feeds like a tiny sea anemone. It will eventually bud off free-swimming ephyrae.

predators and other jellies; because they are damaged over time by rough waves, boat propellers, or bacteria; or because of lack of food.

Comb jellies have a much simpler reproductive process. Most are hermaphrodites, with individuals carrying both male and female sexual organs. After they grow to a certain size, they release eggs and sperm daily, which drift in the water for minutes to hours until they are able to fertilize and grow into new comb jellies. If conditions become unsuitable for reproduction, for example, due to a lack of food, comb jellies can refrain from releasing these reproductive cells and may shrink in body size until conditions improve.

One jelly species lives for just ten minutes, long enough to swim away from its parent polyp and spawn.

## JELLIES AT THE AQUARIUM

The Aquarium's aquarists have successfully cultured several species of jellies for many years. In protected environments such as aquariums, jellies can live longer than their lifespans in the wild because of the absence of predators and the availability of an adequate food supply. The Aquarium's jellies are fed brine shrimp twice a day. Some of the larger species' diets are supplemented with additional types of food, like krill and tiny crustaceans called copepods. The sea nettles, lion's mane jellies, and egg yolk jellies are also fed young moon jellies, which is a normal part of their diet in the wild.

All the jellies (except for the comb jellies) can sting to some extent. At the Aquarium, the sea nettles are the most likely to produce a sting that is painful to humans. When handling this species, the best line of defense against stings is latex gloves because the stinging cells on the tentacles cannot penetrate the latex. If an aquarist handling the jellies happens to get stung despite precautions, pouring vinegar on the sting will neutralize it and stop the pain. The aquarists also rinse all tools used to clean jelly exhibits with a freshwater hose to knock off any stray tentacles that might be stuck to the tool.

## NEW JELLIES EXHIBITS

Starting May 22 the Aquarium will debut new sea jelly exhibits and programs. New exhibits will be added to each of the Aquarium's indoor galleries, displaying new jelly species in addition to those already on display.

In the Tropical Pacific gallery, learn about lagoon jellies and upside-down jellies, which live in warmer, shallow waters. Both lack tentacles and host symbiotic algae in their tissues that supplement the jellies' diet with nutrition provided via photosynthesis. Look for lagoon jellies in a new exhibit located between the Jewels of the Tropical Pacific and sea snakes exhibits. Upside-down jellies will move into the exhibit across from the frog exhibits.

In the Northern Pacific gallery, home to animals from colder waters, visitors can see the Aquarium's permanent jelly collection as well as a new exhibit explaining the complex lifecycle of sea jellies. Shimmering comb jellies, umbrella jellies, and sea nettles as well as the lion's mane jelly, whose tentacles can get as long as a blue whale, are among the species featured in this gallery. The Southern California/Baja gallery will feature sea jellies found in local waters, including purple-striped jellies, moon jellies, and egg yolk jellies. These exhibits will

be located at the end of the gallery right before the Seals and Sea Lions tunnel.

Visitors to the *Wonders of the Deep* gallery near the Aquarium's entrance will have the opportunity to touch moon jellies at the existing jelly touch station. This gallery will also feature various animals that will change throughout the year. These species, such as tiny thimble jellies, brilliantly colored flame jellies, and bioluminescent jelly species, will be sent in seasonally by researchers in the field.

In addition to live jelly exhibits, short films showing jellies around the world will be projected daily in the Great Hall and Ocean Theater. Kids and families can enjoy a jellies puppet show in the Marine Life Theater outdoors behind Lorikeet Forest. Students and adults will have the opportunity to learn more about jellies by attending evening lectures: Jelly experts Claudia Mills and Rick Brodeur will present lectures on July 30 and September 10, respectively, and Aquarium Assistant Curator Nate Jaros will discuss jelly reproduction and care on August 18.

## CONTRIBUTING EXPERTS

The following experts consulted on the development of the Aquarium's new jelly exhibits and provided assistance with this article.

### CLAUDIA MILLS

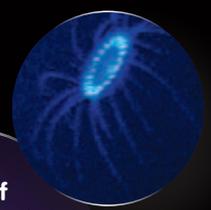
Claudia Mills is an independent research scientist who works at the University of Washington's Friday Harbor Laboratories located on San Juan Island off the coast of Washington state. She studies a community of about seventy-five species of medusae, siphonophores, and ctenophores in the region.

### STEVEN HADDOCK

Steven Haddock is a scientist specializing in bioluminescence and zooplankton at Monterey Bay Aquarium Research Institute. His current research on deep-sea gelatinous zooplankton focuses on bioluminescence, biodiversity, and ecology of deep-sea and open-ocean ctenophores, siphonophores, radiolarians, and medusae.



Sea jellies are 95 percent water.



Many species of jellies and comb jellies have the ability to produce light. Scientists hypothesize that they use bioluminescence for defense.



Some species of nudibranchs eat sea jelly polyps and store the nematocysts. When disturbed, the nudibranch can squeeze out the stinging cells for defense. One species of comb jelly also exhibits this behavior of borrowing stinging cells from the sea jellies it eats.

The Aquarium of the Pacific offers programs and events for all ages and interests. With exclusive events for our members, cultural festivals, a guest speaker series, and educational classes for families and children, there is something for everyone.

# GREAT AQUARIUM ACTIVITIES!

## MEMBER EVENTS

Please join us for one of these select events just for our members and their guests.

### JELLIES MEMBER PREVIEW NIGHT

SUNDAY, MAY 17 | 6:30 p.m.-9:30 p.m.

Members get a sneak peek at the beautiful, mysterious, and breathtaking Jellies exhibits before their public debut. Be one of the first to discover new sea jellies throughout our galleries (including the umbrella, egg yolk, and lion's mane jellies), and delight in learning more with the new Jellies multimedia show in the Great Hall of the Pacific, a fun and interactive puppet show for kids, and the opportunity to talk to the aquarists who care for these majestic creatures. Food and drinks will be available for purchase. It's a night you won't want to miss!

**COST** | Free for members. Member guests receive 20% off general admission.

**RSVP** | (562) 437-FISH (3474) by May 14

### MEMBER PAJAMA PARTY

FRIDAY, AUGUST 14 | 6:30 p.m.-9:30 p.m.

Join us for an evening of family fun for members only. The kids will love visiting the Aquarium in their favorite pajamas, and you'll be able to experience the fun and wonder of the Aquarium without all the crowds. You'll also enjoy fun games for the kids, a family photo station, hands-on crafts, grooving music, and more. Food and drinks will be available for purchase. More information is available on the Aquarium's website.

**COST** | Free for members. Member guests receive 20% off general admission.

**RSVP** | (562) 437-FISH (3474) by August 11

### MEMBER APPRECIATION MONTH

ENTIRE MONTH OF NOVEMBER

November is Member Appreciation Month! We'll be celebrating our members all month long with additional savings throughout the Aquarium, an exclusive members-only party, and an opportunity to win a big prize. It is because of your generous membership support that we are able to continue protecting and preserving the Pacific Ocean. Thank you for all that you do! More information will be coming soon on the Aquarium's website.

**INFO** | (562) 437 FISH (3474)



## SPECIAL EVENTS

The Aquarium of the Pacific hosts a variety of performances, fundraisers, lunches, and other events throughout the year. Check our website for more details and additional events.

### SHARK LAGOON NIGHTS

FRIDAYS, MAY 2-JUNE 13 & SEPT. 5-OCT. 10 | 6:00 P.M.-9:00 P.M.

Shark Lagoon is open for everyone for free after 6:00 p.m. Guests can touch and learn about sharks, purchase snacks and drinks, shop, and enjoy live music on select nights.

**COST** | Free for everyone

**INFO** | (562) 590-3100, ext. 0

### MOTHER'S DAY BRUNCH

SUNDAY, MAY 10 | 10:30 a.m.-1:00 p.m.

Join the Aquarium for its annual Mother's Day Brunch. Attendees can delight in an elegant brunch and explore the wonders of the Pacific Ocean.

**COST** | \$49/member adult, \$15/member child, \$59/non-member adult, \$25/non-member child.

**INFO** | (562) 590-3100, ext. 0

### CONCERT: SOUNDS FROM THE DEEP

SUNDAY, JUNE 7 | 7:30 p.m.-8:30 p.m.

On National Whale Day, the local nonprofit True Brass Choir (TBC) will perform musical selections capturing the ocean's power and mystery, including the world premiere of composer Casey Martin's Symphony No. 1, *Ocean*. Doors will open at 6:30 p.m. for a private talk with TBC's Director Jeff de Seriere included with the price of the concert ticket. The concert will begin at 7:30 p.m.

**COST** | \$10

**RSVP** | <http://truebrasschoir.interticket.com>

### WORLD OCEAN DAY

MONDAY, JUNE 8 | 9:00 a.m.-6:00 p.m.

The Aquarium will celebrate World Ocean Day with special programs and activities. Take pictures with animals at selfie stations throughout the Aquarium, view live video feeds from vessels of exploration on expedition at sea, and attend an evening lecture on ocean and space exploration with Mat Kaplan, host of Planetary Radio.

**COST** | Free for members; members' guests receive 20% off regular admission.

**INFO** | (562) 590-3100, ext. 0

## SPECIAL EVENTS

## BLUE WHALE GALA

SATURDAY, JUNE 13 | 6:30 p.m.-11:00 p.m.

Save the date for the Aquarium's Blue Whale Gala, when Vice Admiral Paul G. Gaffney II, U.S. Navy (Ret.) and Margaret S. Leinen, Ph.D., will be recognized with the Aquarium's Ocean Conservation Award. This elegant black-tie event chaired by Aquarium Trustee Michelle Molina will include an outdoor cocktail reception overlooking Rainbow Harbor and a gourmet dinner in the Great Hall, followed by dessert and dancing under the stars. Proceeds support the Aquarium's education, ocean conservation, and animal care programs.

**COST** | \$500/person**INFO** | Jillian Koehring, jkoehring@lbaop.org or (562) 951-1613

## DISCOUNTED LATE NIGHTS

SUNDAYS, JUN. 14 &amp; 21-AUG. 30 | 5:00 p.m.-8:00 p.m.

On summer Sundays, admission will be just \$14.95 for adults and children after 5:00 p.m., and the Aquarium will remain open until 8:00 p.m. The Aquarium's short films will be shown in the Ocean Theater throughout the evening. Please note: Lorikeet Forest closes at 4:30 p.m.

**COST** | Free for members; \$14.95 for guests**INFO** | (562) 590-3100, ext. 0

## COSTUME CHARACTER BREAKFASTS

JUNE 18, JULY 16 &amp; AUG. 20 | 9:00 a.m.-10:30 a.m.

Join us in Café Scuba for breakfast and photo opps with our beloved mascots! Order special breakfast items with à la carte pricing. No RSVP necessary.

**INFO** | (562) 590-3100, ext. 0

## FATHER'S DAY BBQ

SUNDAY, JUNE 21 | 11:30 a.m.-1:30 p.m.

Celebrate Father's Day with the entire family at the Aquarium's annual picnic. Enjoy lunch and delight in the underwater sea life of the Aquarium.

**COST** | \$49/member adult, \$15/member child, \$59/non-member adult, \$25/non-member child.**INFO** | (562) 590-3100, ext. 0

## NIGHT DIVE

FRIDAY, JUNE 26 | 7:00 p.m.-11:00 p.m.

At the Aquarium's Night Dive for adults ages 18 and up, enjoy live bands and DJs, check out food trucks in the front plaza, and see works of art by local artists.

**COST** | Free for members; \$14.95 for guests.

## SPECIAL EVENTS

## JULY 4TH LATE NIGHT &amp; BBQ

SATURDAY, JULY 4 | 5:00 p.m.-10:00 p.m.

Celebrate Independence Day with a visit to the Aquarium to view the City of Long Beach fireworks display, dig into our annual BBQ at 6:00 p.m., and enjoy special extended hours. General admission after 5:00 p.m. is \$14.95.

**COST** | Free for members; \$14.95/non-member (does not include food). BBQ-Admission Combo: \$49/member adult, \$15/member child, \$59/non-member adult, \$25/non-member child.**INFO** | (562) 590-3100, ext. 0

## VOICES ON THE VERANDA

WEDNESDAYS, JUL. 8-AUG. 26 | 7:00 p.m.-11:00 p.m.

This summer concert series will feature solo acts and bands on the Aquarium's rooftop Veranda, which overlooks Rainbow Harbor. Food and drinks will be available for purchase.

**COST** | \$15/member, \$20/non-member**RSVP** | eventbrite.com

## SHAKESPEARE'S THE TEMPEST

AUGUST 9 &amp; 12 | 7:00 p.m.-9:00 p.m.

The Aquarium will host two free performances of Shakespeare's *The Tempest* produced by Shakespeare by the Sea. Shows will be held on the front lawn. Attendees are encouraged to bring chairs, blankets, and warm clothing.

**COST** | Free**INFO** | shakespearebythesea.org

## FIRST RESPONDERS DAY

FRIDAY, SEPTEMBER 11 | 9:00 a.m.-5:00 p.m.

Police officers, sheriff's deputies, and firefighters receive free admission on September 11. Contact your union or association to purchase discounted tickets for friends and family before coming to the Aquarium.

**COST** | Free for police officers, sheriff's deputies, and firefighters with a current and valid service ID.**INFO** | (562) 590-3100, ext. 0

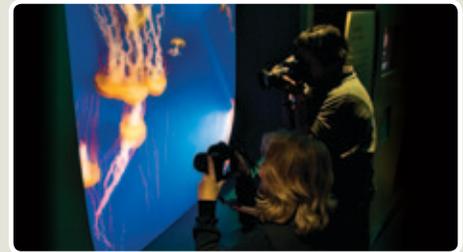
## CALIFORNIA COASTAL CLEAN-UP DAY

SATURDAY, SEPT. 19 | 9:00 a.m.-12:00 p.m.

Help Aquarium staff members protect our ocean and marine life by cleaning Alamitos Beach as part of the statewide Coastal Clean-Up Day. Gloves and bags will be provided. Look for the Aquarium booth to check in. No RSVP necessary.

**COST** | Free**LOCATION** | Alamitos Beach, off of Shoreline and Ocean Blvd. below the Villa Riviera**INFO** | (562) 590-3100, ext. 0 or 1-800-COAST-4U (1-800-262-7848)

## SPECIAL EVENTS



At the Aquarium's annual Photographer's Night, meet vendors, test new equipment, attend workshops, and meet other wildlife photo enthusiasts.

## PHOTOGRAPHERS NIGHT

SUNDAY, OCTOBER 4 | 5:30 p.m.-10:00 p.m.

This is your chance to take the photos you have always wanted at the Aquarium. Professional and amateur photographers are invited to capture the Aquarium's wildlife during exclusive "photographers only" hours. Meet vendors, test new equipment, attend workshops, and meet other wildlife photo enthusiasts.

**COST** | \$28.95**INFO** | (562) 590-3100, ext. 0

## SENIORS DAY

MONDAY, OCTOBER 5 | 8:00 a.m.-1:00 p.m.

The Aquarium will open its doors for free to people ages fifty and above. Special exhibits for seniors will include booth displays by the Aquarium's volunteer services and education staff, and more.

**COST** | FREE to visitors ages 50 and over with a valid photo ID.**INFO** | (562) 590-3100, ext. 0

## 5K AND KIDS FUN RUN

SATURDAY, OCTOBER 10 | 7:00 a.m.-2:00 p.m.

The Aquarium of the Pacific will be partnering once again with the Long Beach Marathon to host the annual one-mile Kids Fun Run at the Aquarium. In addition, this year we will host the event's 5K Run/Walk, which will include the Aquarium in the course. Sign up early as both events are expected to fill up quickly.

**COST** | Kids Fun Run: Free. Please RSVP in advance. See website for 5K details.**INFO** | runlongbeach.com or (562) 427-4606

## SEA FARE FUNDRAISER

SATURDAY, OCTOBER 17 | 7:00 p.m.-11:00 p.m.

Save the date for the Aquarium's twelfth annual Sea Fare fundraiser featuring a silent and live auction, tastes from local restaurants and food and beverage providers, and dancing with the fish. Proceeds will benefit the Aquarium's education, conservation, and animal care programs.

**COST** | \$125 per person, includes an open bar and food and beverage samples**INFO** | (562) 590-3100, ext. 0



ANDREW REITZMA

ROBIN RIGGS

Explore our local ocean during the Aquarium's annual Urban Ocean Festival, May 2 and 3.

May 12: Reproduction at the Aquarium

**FESTIVALS**

**URBAN OCEAN FESTIVAL**

SAT. & SUN., MAY 2-3 | 9:00 a.m.-5:00 p.m.

Explore and celebrate Southern California's coast during the Aquarium's annual Urban Ocean Festival. The event will include art exhibitions, a fashion show and contest for designs using recycled materials, mural painting, poetry readings, and educational activities.

**COST** | Free for members; member's guests receive 20% off regular admission

**INFO** | (562) 590-3100, ext. 0



**PACIFIC ISLANDER FESTIVAL**

SAT. & SUN., JUNE 6-7 | 9:00 a.m.-5:00 p.m.

Discover the rich and diverse cultures of the Pacific Islands through traditional craft demonstrations, ethnic cuisine, educational programs, storytelling, and music and dance performances. The Aquarium's annual Pacific Islander Festival will celebrate various cultures, including Hawaiian, Fijian, Marshallese, Chamoru, Tahitian, Samoan, Tokelau, Tongan, and Maori.

**COST** | Free for members; member's guests receive 20% off regular admission

**INFO** | (562) 590-3100, ext. 0

Event sponsored by:



**FESTIVALS**

**MOOMPETAM NATIVE AMERICAN FESTIVAL**

SAT. & SUN., SEPT. 19-20 | 9:00 a.m.-5:00 p.m.

In celebration of Native American cultures, the Aquarium will host its annual Moompetam Festival. This weekend celebration will feature traditional cultural crafts, storytelling, educational programs, live demonstrations, music, and dance celebrating the indigenous California maritime cultures, including Tongva, Chumash, Acjachemen, Costanoan, Luiseno, and Kumeyaay.

**COST** | Free for members; member's guests receive 20% off regular admission

**INFO** | (562) 590-3100, ext. 0

**BAJA SPLASH CULTURAL FESTIVAL**

SAT. & SUN., SEPT. 26-27 | 9:00 a.m.-5:00 p.m.

Celebrate Hispanic Heritage Month and Mexican Independence Day with live entertainment, crafts, educational programs, ethnic cuisine and more. The diversity of Hispanic cultures will be highlighted through song, dance, art, and cultural displays. Mariachi music, Mexican folkloric and Aztec dance troupes, interactive mural painting, Salvadoran dance, Guatemalan performances, and other special programs are featured.

**COST** | Free for members; member's guests receive 20% off regular admission

**INFO** | (562) 590-3100, ext. 0

**SOUTHEAST ASIA DAY**

SATURDAY, OCTOBER 3 | 9:00 a.m.-5:00 p.m.

The Aquarium will celebrate its annual Southeast Asia Day highlighting the beauty and diversity of the cultures of Cambodia, Thailand, Vietnam, Myanmar, Laos, and Indonesia. Guests will enjoy live performances, including music, dance, and cultural craft demonstrations. Ethnic cuisine will be available for purchase, and children will have the opportunity to partake in arts and crafts.

**COST** | Free for members; member's guests receive 20% off regular admission

**INFO** | (562) 590-3100, ext. 0

**GUEST SPEAKERS**

The Aquarium hosts guest lectures on a variety of topics presented by experts from across the country. Lectures are held in the Ocean Theater.

**PERRY HAMPTON | Reproduction at the Aquarium: The Husbandry Department Tells All**

MONDAY, MAY 12 | 7:00 p.m.-9:00 p.m.

Aquarium Vice President of Husbandry Perry Hampton will discuss animal reproduction at the Aquarium. Many species of marine life reproduce at the Aquarium, from Shelby the harbor seal, who gave birth to pups in 2012 and 2013, to sea jellies, which are cultured behind the scenes by the Aquarium's aquarists. Hampton has been on staff at the Aquarium since before the institution opened its doors to the public in 1998.

**CHRIS LOWE | Using Robots and Drones to Track Sharks**

WEDNESDAY, MAY 27 | 7:00 p.m.-9:00 p.m.

Dr. Chris Lowe runs the Shark Lab at California State University, Long Beach. He will discuss how scientists can use high-tech tools like robots and aerial drones to track sharks in the open ocean so we can learn more about their behavior, habitats, and what we can do to protect them.

**KEVIN LEE | Natural History of Sea Slugs**

WEDNESDAY, JUNE 3 | 7:00 p.m.-9:00 p.m.

SCUBA diver and underwater photographer Kevin Lee will share his images of opisthobranchs, or sea slugs, and explain anatomic and behavioral characteristics of these ocean animals. He will also discuss the diverse sea slugs found in local California waters. Lee has photographed sea slugs off the coast of all seven continents and even collected specimens for scientific research for the Los Angeles Museum of Natural History.



June 3: Natural History of Sea Slugs



June 17: Extinct in the Wild: Partnering to Save the Guam Kingfisher

**GUEST SPEAKERS**

**MAT KAPLAN** | *Planetary Oceans: Exploring Earth's Seas Before We Sail Through Europa's Seawater Plumes*  
**MONDAY, JUNE 8 | 7:00 p.m.-9:00 p.m.**

On World Ocean Day the Aquarium will host a discussion of ocean exploration as it relates to space exploration. Aquarium President and CEO Jerry Schubel will join Planetary Radio host Mat Kaplan for a conversation about the importance of understanding our home planet's ocean as we prepare to explore the seas of other worlds.

**BETH BAHNER** | *Extinct in the Wild: Partnering to Save the Guam Kingfisher*  
**WEDNESDAY, JUNE 17 | 7:00 p.m.-9:00 p.m.**

Beth Bahner, animal collections manager at the Philadelphia Zoo, will give a brief history of the Guam Bird Rescue Project. Critically endangered bird species, including Guam Kingfishers and others, were collected from the island of Guam to prevent their total extinction. The Aquarium is participating in a breeding program for Guam Kingfishers coordinated by Bahner.

**DAN CAYAN** | *Sea Level Rise*  
**WEDNESDAY, JUNE 24 | 7:00 p.m.-9:00 p.m.**

Scientist Dan Cayan will discuss sea level rise and its projected impacts between now and the year 2100. Cayan is a research meteorologist with the Scripps Institution of Oceanography at the University of California, San Diego, and a researcher with the U.S. Geological Survey. He heads the California Nevada Applications Program and the California Climate Change Center

**REINHARD FLICK** | *California King Tides and Sea Level Rise*  
**WEDNESDAY, JULY 1 | 7:00 p.m.-9:00 p.m.**

King tides are the highest tides of the year. Reinhard Flick will discuss how king tides relate to sea level rise, with an emphasis on Southern California. Flick is a scientist at the Scripps Institution of Oceanography.

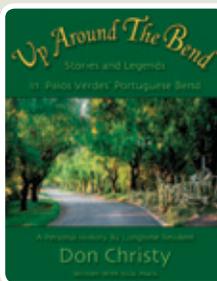
**GUEST SPEAKERS**

**DONALD PROTHERO** | *The Sixth Extinction of the Ocean*  
**THURSDAY, JULY 9 | 7:00 p.m.-9:00 p.m.**

Dr. Donald Prothero will discuss the current crisis in oceanic diversity and impending crash and extinction in marine life. He will compare it to what we know about the greatest mass extinction, which occurred 250 million years ago, when 95 percent of marine species died off. Prothero is a professor in the department of geological sciences at California Polytechnic University, Pomona, and a research associate in vertebrate paleontology at the Los Angeles County Natural History Museum.

**DON CHRISTY & VICKI MACK** | *Up Around the Bend*  
**TUESDAY, JULY 14 | 7:00 p.m.-9:00 p.m.**

Portuguese Bend, located on the Palos Verdes peninsula, has been home to Palos Verdes' founders since the 1910s and to a group of pioneers who came in the 1950s to build family homes and faced many challenges. Don Christy will give an illustrated look at the area's historic past. He will also sign copies of his book, *Up Around the Bend: Stories and Legends of Palos Verdes' Portuguese Bend*. Christy's publishing and production partner Vicki Mack will discuss the book and a TV documentary about Christy's relative Frank Vanderlip, one of the founders of Palos Verdes.



**GUEST SPEAKERS**

**ALAN BLUMBERG** | *Resilience of Coastal Cities to Environmental Threats: The New Frontier*  
**TUESDAY, JULY 21 | 7:00 p.m.-9:00 p.m.**

The modern world is experiencing one of the greatest human migrations in history, as over 50 percent of the world's population has moved to the coasts. Coastal urban resiliency is vital for protection of the population. It integrates the key impacts and vulnerabilities of coastal urban regions with an improved understanding of the dynamics of coastal urban meteorology and oceanography, urban infrastructure networks, and perceptions and responses of affected populations. Alan Blumberg will discuss hydrodynamics, urban design, and modeling to improve coastal resiliency. Blumberg is the George Meade Bond Professor of Ocean Engineering and director of the Davidson Laboratory at Stevens Institute of Technology. He is presently leading several major studies with government officials to predict and assess storm flooding events in New York and New Jersey.

**CLAUDIA MILLS** | *Sea Jellies*  
**THURSDAY, JULY 30 | 7:00 p.m.-9:00 p.m.**

Claudia Mills is an independent research scientist at the University of Washington's Friday Harbor Laboratories located on San Juan Island off the coast of Washington state. She will share her expertise on the seventy-five species of jellies in the region.

**KAREN TUTTLE STEARNS** | *Green Chemistry in the Water Quality Laboratory*  
**TUESDAY, AUGUST 4 | 7:00 p.m.-9:00 p.m.**

Karen Tuttle Stearns is the water quality laboratory manager at the Aquarium. The Water Quality Laboratory is charged with monitoring each exhibit at the Aquarium. Green chemistry is the driving factor for method development and operations of the lab. Tuttle Stearns will discuss the purpose and need for a water quality laboratory and the green chemistry practices employed.



August 4: Green Chemistry in the Water Quality Laboratory, Karen Tuttle Stearns

**GUEST SPEAKERS**

**NATE JAROS | *Sea Jellies***

**TUESDAY, AUGUST 18 | 7:00 p.m.-9:00 p.m.**

Assistant Curator Nate Jaros played a major role in the development, construction, and acquisition of animals for the Aquarium's new sea jellies exhibits opening in May. He will discuss the process of creating new aquarium exhibits, describe how sea jellies are cared for and cultured at the Aquarium, and share his expertise on these otherworldly ocean animals.

**CARL SAFINA | *Beyond Words: How Elephants, Wolves, and Killer Whales Think and Feel***

**TUESDAY, AUGUST 25 | 7:00 p.m.-9:00 p.m.**

Author Carl Safina will discuss the similarities and differences between the ways humans and animals think, including new discoveries about the similarities in our consciousness, self-awareness, empathy, non-verbal communication, imitation, teaching, the roots of aesthetics, including music, and a capacity for grief widespread among elephants, wolves, whales, and even certain birds.

**RICK BRODEUR | *Jelly Blooms***

**THURSDAY, SEPTEMBER 10 | 7:00 p.m.-9:00 p.m.**

Rick Brodeur from the National Oceanic and Atmospheric Administration's Northwest Fisheries Science Center in Newport, Oregon, will discuss jelly blooms and their effects on the ocean, ecosystems, and food webs. Jelly blooms are a sudden explosion in the number of sea jellies in particular area during their reproductive season. Jelly blooms sometimes affect human infrastructure or impact surrounding marine life.

**CARLTON RAY & JERRY MCCORMICK-RAY | *Marine Protected Areas and Marine Spatial Planning in an Age of Change***

**THURSDAY, SEPTEMBER 24 | 7:00 p.m.-9:00 p.m.**

Marine protected areas (MPAs) and marine spatial planning (MSP) are instruments that can be used to satisfy social-economic demands for use and protection of the

**GUEST SPEAKERS**

ocean. Scientists Carlton Ray and Jerry McCormick-Ray will share the history of MPAs and MSP and their roles in a changing environment. They will present scenarios from The Bahamas and oyster sanctuaries in Chesapeake Bay.

**WALKER WELLS | *Green Building and Sustainable Development***

**TUESDAY, SEPTEMBER 29 | 7:00 p.m.-9:00 p.m.**

Walker Wells is one of the contributors to the *Sink or Swim* photography exhibit on display at the Aquarium starting June 1. He is the director of the Green Urbanism Program for Global Green USA and a lecturer in green urbanism and green development at the Claremont Colleges and the UCLA Urban Planning Program.

**KIM THOMPSON | *California's Working Waterfronts and the Future of Seafood***

**WEDNESDAY, OCTOBER 14 | 7:00 p.m.-9:00 p.m.**

Vibrant fisheries and working waterfronts have long been integral parts of California's coastal communities—attracting and serving visitors, driving local and regional economies, and forming an iconic part of each community's heritage. These communities support local, well-managed fisheries and environmentally responsible aquaculture production. Kim Thompson, manager of the Aquarium's Seafood for the Future program, will host a panel discussion on the status of working waterfronts in California and how they contribute to a safe, secure, and responsible food supply.

**COST** | Free for members, teachers, seniors 62+, and students with valid I.D. and advanced reservations. \$5/non-members.

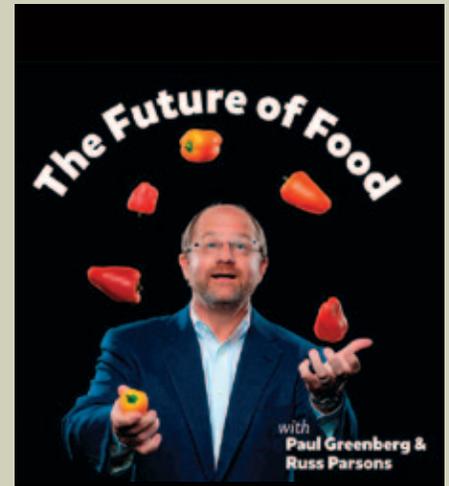
**INFO** | (562) 590-3100, ext. 0

**WEB** | All lectures are streamed live on the Aquarium's website at [aquariumofpacific.org/aquariumlive](http://aquariumofpacific.org/aquariumlive)

Sponsor:



**GUEST SPEAKERS**



**THE FUTURE OF FOOD**

These events are part of an ongoing series hosted by *Los Angeles Times* Food Editor Russ Parsons. Learn about food sustainability and explore the Aquarium after hours. Doors open at 6:30 p.m. to allow attendees to view the Aquarium's exhibits. Lectures begin at 7:00 p.m.

**RUSS PARSONS AND DAVID "MAS" MASUMOTO | *The Future of Food: The Farmer as Artist***

**THURSDAY, MAY 7 | 6:30 p.m.-9:00 p.m.**

In this session farmer and author David "Mas" Masumoto will discuss organic farming. Masumoto is an organic farmer and the author of seven books, including *Four Seasons in Five Senses*, *Epitaph for a Peach*, and *Wisdom of the Last Farmer*. A third generation farmer, Masumoto grows peaches, nectarines, and grapes on an organic 80-acre farm south of Fresno, California. In 2013 Masumoto joined the National Council on the Arts after being appointed by President Obama.

**RUSS PARSONS & MICHAEL CIMARUSTI | *The Future of Food: Eating Well and Doing Good***

**WED., OCTOBER 7 | 6:30 p.m.-9:00 p.m.**

Chef Michael Cimarusti will discuss how the fine dining industry can get involved with sustainable food. After graduating with honors in 1991 from the Culinary Institute of America, Cimarusti got his start in New York City. He went on to become chef de cuisine at the original Spago in Hollywood and executive chef of Water Grill. He is currently owner and chef at Providence Restaurant in Los Angeles.

**COST** | \$10 for the public, \$8 for Aquarium members (includes parking).

**INFO** | (562) 590-3100, ext. 0.

DONORS SHARE



My mother, Ada Penny (pictured above, left), left this world on October 2, 2013, and is greatly missed by me, her husband Gerry (pictured above, right), dog Sammy, many close friends, and extended family. Some of my earliest memories were of trips to the beach, playing in the surf, and running back to the warm towel she always had waiting. Ada was a friend to the ocean and our beautiful Aquarium in Long Beach. Every trip here reminds me of the wonderful memories and years of love; it is like being wrapped in that warm towel from so long ago.

— JOHN PENNY, TRUSTEE OF THE PACIFIC AND CHARTER PACIFIC CIRCLE MEMBER



@marzbruin06



@loveofgrace



@djliithiyum

#AquariumMember Photos

For a chance to be featured, tag your public photos with #AquariumMember on Instagram, or email your favorite photos to MemberServices@lbaop.org.

JOIN US FOR BREAKFAST



and photo opps with our beloved mascots!

JUNE 18, JULY 16, & AUGUST 20

9:00 a.m.-10:30 a.m.

Breakfast with a la carte pricing in Café Scuba.

NO RSVP NECESSARY.

FOR MORE INFORMATION, CALL (562) 590-3100.



## Summer Day Camps AT THE AQUARIUM

**Dive into fun this summer! Whether your child is three years old or entering high school, we have a camp experience perfect for him or her.**

Our camps feature exciting animal interactions, tours, crafts, games, and experiments. Select from Fish Fry Camp for children ages three to four with a parent, Sea Squirt Camp for children ages five and six, Ocean Adventure Day Camp for children ages seven through nine, Junior Biologist Day Camp for ages ten to twelve, and Marine Science Sleepover Camp for teens ages thirteen through fifteen. For pricing and to reserve spaces in any of these day camps, visit the Aquarium's website or call (562) 951-1630.

The Aquarium also offers year-round education programs for children of all ages, including Aqua Tots, Saturday Family Fun, job shadow opportunities, and other adventures. To learn more, visit [aquariumofpacific.org/education/programs](http://aquariumofpacific.org/education/programs).

## AQUARIUM TOURS

**These programs are opportunities to see the Aquarium and its animals in a different light. Call (562) 590-3100, ext. 0, to purchase tickets.**

### BEHIND-THE-SCENES TOURS

See what it takes to maintain a world-class aquarium, from water filtration to animal care and feeding. Children must be age seven or older.

### ANIMAL ENCOUNTERS

Experience a one-on-one feeding and training session with a seal, sea lion, sea otter, shark, or penguin. Please note that penguin encounters will be on hiatus from April 4 to July 8, 2015, for the breeding season.

### DIVE IMMERSION

Certified SCUBA divers can dive in our warm 350,000-gallon Tropical Reef Habitat with more than 1,000 animals. Requires advance reservations.



# EDUCATIONAL OPPORTUNITIES



## Special Programs

### **BIRTHDAY PARTIES** *Available by reservation only*

The Aquarium will supply all the ingredients for your child's next birthday celebration, including a one-hour classroom program featuring animal touch time and a souvenir craft project. Aquarium admission is included. Dates must be reserved at least two weeks in advance by calling (562) 590-3100, ext. 0.

### **AQUARIUM ON WHEELS** *Available by reservation only*

The Aquarium on Wheels is dedicated to developing children's appreciation for the wonders of the ocean environment. Along with an educational presentation, hands-on activities, and environmental message, our outreach educational program provides children the chance to touch sharks, sea stars, anemones, urchins, and other marine inhabitants. This mobile tidepool exhibit is not just for schools—it is also great for display at festivals, fairs, and even birthday parties. For more information, call (562) 951-1630.



## AQUARIUM Sleepovers

**Pack your sleeping bag and toothbrush for a night of adventure at the Aquarium.**

These programs include a pizza dinner, snack, craft, cereal breakfast, and T-shirt. Sleepovers are available for birthdays, youth groups, and more.

## OUTDOOR Adventures

**Go beyond the Aquarium to participate in offsite experiences in the great outdoors. Call (562) 590-3100, ext. 0, to purchase tickets.**

### **HARBOR TOUR**

Tour the Long Beach and Los Angeles Harbors with Harbor Breeze Cruises for a narrated cruise around one of the most active ports in the world. See the downtown shoreline, ocean vistas, ships from around the world, and even sea lions. Tours are offered throughout the day on a daily basis. Tickets may be purchased in advance or at the ticket window upon arrival. Meet fifteen minutes prior to departure at Dock 2. This program is led and staffed by Harbor Breeze Cruises.

### **DOLPHIN AND SEA LIFE CRUISE** *Seasonal*

The Pacific Ocean is home to many wondrous animals year 'round. Join us as we search for dolphins, seals, sea lions, and other marine life on our Dolphin and Sea Life Cruise. This is an experience you and your family will not soon forget!

### **BLUE WHALE WATCHING TRIPS** *Seasonal*

Join naturalists and experts from the Aquarium for an ocean voyage in search of the largest animal on the planet—the blue whale. Embark on an adventure to see these magnificent but endangered marine mammals, and learn what you can do to help. Along the way we will also have the opportunity to spot dolphins, seals, sea lions, and other marine animals on this three-and-a-half-hour cruise. You can find out about recent sightings by following the Aquarium's whale watch blog ([http://www.aquariumofpacific.org/blogs/category/whale\\_watching](http://www.aquariumofpacific.org/blogs/category/whale_watching)) and Twitter feed (@OceanWatchLB).

### **THE URBAN OCEAN: WORLD PORT AND SEA LIFE CRUISE**

*Saturdays, Jun. 13, Jul. 11, Aug. 8 & Sept. 5 | 4:00 p.m.-6:00 p.m.*

Explore one of the most distinctive sections of our coastline—the Southern California urban ocean. In this place of high intensity, massive ships from around the world sail past whales, dolphins, and sea lions in the nation's two biggest ports. Learn from an onboard Aquarium educator how human activity and marine life intersect in this busy portion of the urban ocean.

**COST** | \$26.95/member adult, \$8/member child, \$29.95/non-member adult, \$10/non-member child.

**RSVP** | (562) 590-3100, ext. 0

## KIDS CORNER

# Make Your Own Gelatinous Gak

Sea jellies have very soft, gelatinous bodies without any bones. Make a batch of “gak” to create a jelly-like substance and imagine what it feels like to touch a sea jelly. Then, you can visit the Aquarium and touch the moon jellies in the *Wonders of the Deep* gallery to compare to the real thing!



### WHAT YOU NEED:

- Glue (regular white glue)
- Borax
- Water
- Food coloring
- Two bowls

*Note: Quantities for the glue and water are up to you. The more you use, the more gak you make. The borax mix quantity used below in the instructions makes a very large batch of gak. It can be stored in a zipper-lock plastic bag. Gak washes off hands easily with soap and water.*

### STEPS:



**1. In one bowl, mix equal parts warm water and glue.**



**4. Continue mixing until desired thickness and texture is reached.**



**2. In another bowl, combine ½ cup warm water with ½ teaspoon borax.**



**5. Add a drop or two of food coloring for extra fun!**



**3. Add the borax and water mix to the glue mixture, adding one drop at a time (it will only take a tiny bit of borax mix to achieve gak consistency).**



### SHARE YOUR PHOTOS:

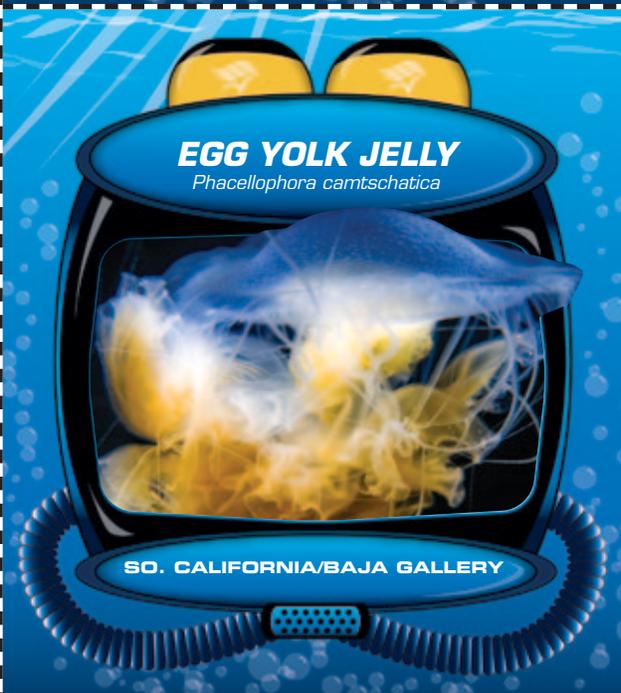
We would love to see photos of you and your gak! Tag your public photos on Instagram with the hashtag #AquariumMember or send them by email to [MemberServices@lbaop.org](mailto:MemberServices@lbaop.org), and we may include your photo in the next issue of Pacific Currents!

## Fishing for KNOWLEDGE! ? ? ?

1. Sea jellies and \_\_\_\_\_ jellies have similar bodies, eat the same kinds of food, and live in the same parts of the ocean, but they are actually not very closely related.
2. All sea jellies have stinging cells called \_\_\_\_\_ that they use to capture food. Some are highly toxic to humans.
3. Sea jellies are found all over the world in the ocean and in \_\_\_\_\_ habitats.

Last Issue's Questions and Answers:

1. In the wild, blue-spotted rays stop at **cleaning** stations where small fish and shrimp remove dead skin, bacteria, and parasites.
2. Magellanic Penguins are native to the coasts of **Chile** and Argentina. They are a temperate penguin species and never see snow or ice.
3. The **blue**-spotted rays's bright markings warn other animals to stay away because these rays are venomous.



## LAGOON JELLY

*Mastigias papua*



### PHYSICAL CHARACTERISTICS

Lagoon jellies, also known as spotted jellies, are about 4 inches wide on average, but can reach up to a foot in diameter.

### DIET

These jellies host symbiotic algae in their tissues that provide food for the jelly via photosynthesis. Lagoon jellies also feed on tiny animals called zooplankton.

### HABITAT

Lagoon jellies live in lagoons and bays in the South Pacific.

### FUN FACT

Lagoon jellies sometimes host small fishes that hide inside the jelly's bell for protection.

## EGG YOLK JELLY

*Phacellophora camtschatica*



### PHYSICAL CHARACTERISTICS

The egg yolk jelly can grow up to 2 feet in diameter with tentacles extending up to 20 feet. This jelly gets its common name from its appearance, with a yellow center and translucent bell.

### DIET

Egg yolk jellies mostly feed on other jellies.

### HABITAT

This jelly is found in temperate waters of the eastern Pacific Ocean, as well as the Atlantic and Mediterranean Oceans.

### FUN FACT

Egg yolk jellies sometimes carry small crabs that hitchhike on top of the jellies' bell.

## UMBRELLA JELLY

*Eutonina indicans*



### PHYSICAL CHARACTERISTICS

The umbrella jelly is a small transparent jelly. Four distinctive tubes called radial canals connect its stomach to the outer edge of its bell.

### DIET

Umbrella jellies feed on the eggs and larvae of ocean invertebrates, tiny crustaceans, and smaller jellies.

### HABITAT

These jellies form dense surface aggregations in the spring and summer months from central California to the Bering Sea.

### FUN FACT

Umbrella jellies only grow to about the size of a quarter.



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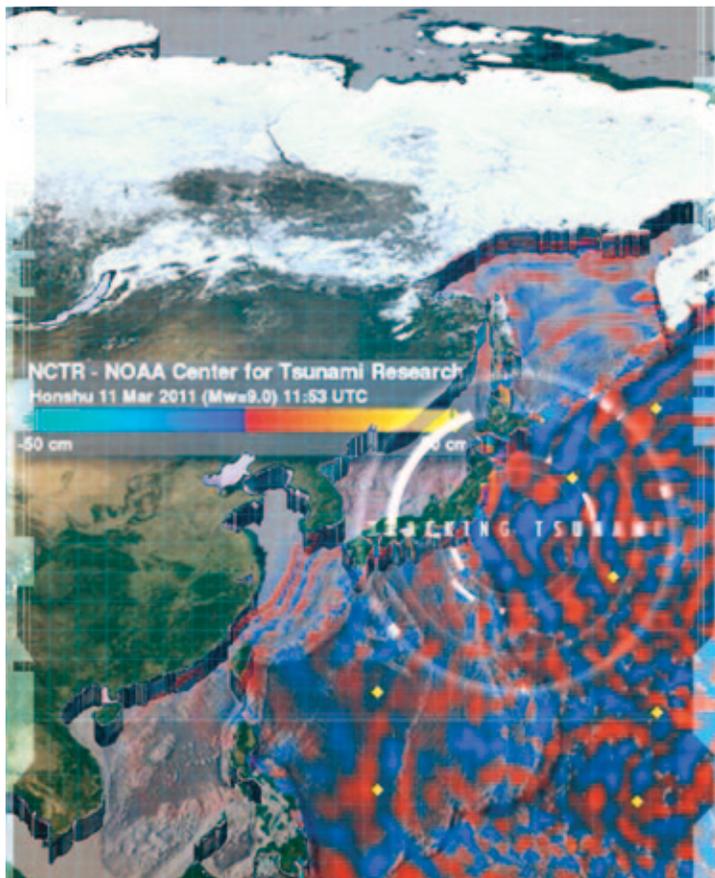
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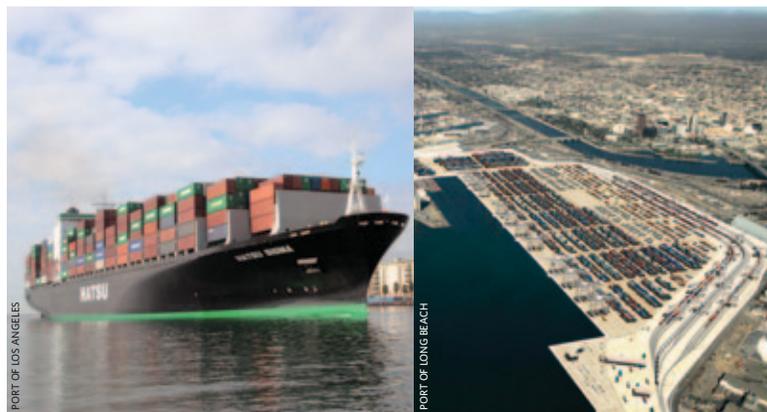
Learn about the impacts of Fukushima and ocean radiation in a new show playing daily in the Ocean Science Center.

## NEW SHOW INVESTIGATES IMPACTS OF FUKUSHIMA AND RADIATION IN THE OCEAN

**O** N MARCH 11, the fourth anniversary of the Japanese earthquake and tsunami, the Aquarium debuted a new show about the Fukushima nuclear accident and its impacts on humans and marine life. The show was developed in collaboration with scientists from the Woods Hole Oceanographic Institution (WHOI) and plays daily in the Aquarium's Ocean Science Center. The show created for the National Oceanic and Atmospheric Administration's Science on a Sphere® aims to educate the public about sources of naturally occurring and man-made radioactivity in the ocean, as well as how much radioactivity was added by the Fukushima accident.

In March 2011 one of the largest earthquakes ever recorded shook Japan for nearly six minutes, creating a devastating tsunami that engulfed more than 200 miles of Japan's coastline. Nearly 16,000 people died. The tsunami also damaged the Fukushima Daiichi nuclear power plant, resulting in the largest accidental release of radioactivity into the ocean in history.

*This collaborative project was funded by a grant to WHOI from the Gordon and Betty Moore Foundation.*



The Port of Long Beach and Port of Los Angeles are the two busiest container ports in the nation, together accounting for 43 percent of the country's imports.

## PORTS OFFICIALS DISCUSSED NEW ENVIRONMENTAL REGULATIONS

**O** N JANUARY 21 the Aquarium hosted a live webcast with officials from Port of Los Angeles (POLA) and Port of Long Beach (POLB) as they discussed new environmental regulations affecting ships entering the ports that are aimed at improving air quality. The Aquarium regularly invites scientists, policymakers, and other experts to address timely ocean, climate, and environmental topics in live webcasts, allowing the public to send in questions and learn the latest information.

Rick Cameron, Port of Long Beach managing director of planning and environmental affairs; Chris Cannon, Port of Los Angeles director of environmental management; and Aquarium President and CEO Dr. Jerry R. Schubel talked about what the ports have done to reduce negative impact on the environment, including improving air quality and reducing maritime impacts on marine wildlife.

*"These new rules complement efforts both ports have made in developing programs and policies to improve air quality, reduce water pollution, and lessen impact of port operations on wildlife," Schubel said.*

POLA and POLB are the two busiest container ports in the nation, together accounting for 43 percent of the country's imports. The new rules under annex VI of the International Convention for the Prevention of Pollution from Ships (MARPOL) went into effect at the start of this year.

The new regulation set by the International Maritime Organization (IMO) increases the area of coverage for compliance by vessels from 24 to 200 nautical miles from the coast. Vessels within 200 nautical miles must now slow down to a speed of 12 knots (previously 20 knots) and must adhere to stricter fuel standards to reduce sulfur oxide and other harmful emissions contributing to poor air quality and climate change. In his remarks Cannon emphasized the benefit to migrating whales—slower vessel speeds reduce whale strikes.



Nonprofit theater company Shakespeare by the Sea is now in its eighteenth season.

## AQUARIUM TO HOST SHAKESPEARE BY THE SEA

**T**HE AQUARIUM will host two free performances of Shakespeare's *The Tempest* on Sunday, August 9, and on Wednesday, August 12, at 7:00 p.m. The performances, produced by the nonprofit Shakespeare by the Sea, will be held on the Aquarium's front lawn. Attendees are encouraged to bring chairs, blankets, and warm clothing.



Aquarium members Jacklyn Williams and Michael Chappelle posed for pictures during Member Prom.

## MEMBERS ENJOYED DRINKS AND DANCING AT MEMBER PROM

**O**N MARCH 26 Aquarium members revisited their high school years, dressing in their finest and dancing the night away in the Great Hall. They voted for their favorite animals to name the prom "king and queen"—Brook the sea otter and Parker the sea lion won the titles—and visited the Aquarium's exhibits.



The Urban Observatory can compare characteristics of cities with the aim of analyzing data and making it useful to policymakers, urban planners, and the public.

## URBAN OBSERVATORY NETWORK ALLOWS VIEWERS TO COMPARE CITIES

**V**ISITORS TO THE AQUARIUM can view a new exhibit at the Ocean Exploration Hub in the Tropical Pacific Gallery. Urban Observatory is a partnership between mapping and GIS services firm Esri and architect Richard Saul Wurman. This program uses smart maps and live data collected around the world to analyze and compare various characteristics of cities.

*Aquarium of the Pacific*

### BEER DINNER

**5-COURSE SUSTAINABLE SEAFOOD AND CRAFT BEERS**

Work up an appetite visiting our 11,000 animals and join us for dinner! Enjoy a blend of sustainable seafood, beautiful harbor views, and craft beer pairings at the Aquarium of the Pacific. Dinner is a delicious 5-course meal each with a different craft beer accompaniment out on our gorgeous Rooftop Veranda.

**August 13, 6-10pm**  
Rooftop Veranda

**\$65/Member, \$75/General Public (21+)**  
Includes Aquarium admission 9am-6pm

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ANDREW REITSMA

The Ray Touchpool is home to bat rays, round rays, California halibut, shovelnose guitarfish, green anemones, and a diamond ray.

## RAY TOUCHPOOL AND TROPICAL PACIFIC PREVIEW EXHIBITS UNDERGO RENOVATIONS

**T**HE RAY TOUCHPOOL located on California Terrace next to the June Keyes Penguin Habitat will be renovated in early summer. The pool is home to bat rays, round rays, California halibut, shovelnose guitarfish, green anemones, and a diamond ray. The renovation aims to improve, beautify, and reconfigure this exhibit. The project will consist of three main components: reconfiguring rockwork and resurfacing the inside walls, providing increased comfort and easier access to the volunteer post, and improving signage. The renovation is expected to be completed in June. Aquarium staff members contributed funding for this project through the Aquarium's Staff Campaign.



The Tropical Pacific Preview exhibit now features live coral.

In addition, the Tropical Pacific Preview, one of the first exhibits visitors encounter upon entering the Aquarium, has been converted into a live coral habitat. Located next to the *Wonders of the Deep* gallery entrance, the exhibit previously featured tropical fish species with an artificial rock wall. Aquarists changed most of the exhibits

light fixtures to LEDs, reducing costs and improving efficiency. The new lighting is also optimized for coral growth. New fish have been added to increase the diversity of species represented and live rock was added for coral habitat. Because corals grow and reproduce relatively slowly, it could be several months before the exhibit reaches its full potential.



## Mother's Day Brunch

*Aquarium of the Pacific*

Join us for a memorable Mother's Day at the Aquarium of the Pacific. Enjoy a delicious alfresco brunch, see more than 11,000 animals, and explore the wonders of the ocean. All day Aquarium admission is included.

**SUNDAY, MAY 10 • 10:30AM - 1:30PM**

**PRICING:**

Includes Aquarium admission

**General Public:**

Adults: \$59 (12+)  
Child: \$25 (3-11)

**Members:**

Adults: \$49  
Child: \$15 (3-11)

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*Aquarium of the Pacific*

## Father's Day BBQ

AT THE AQUARIUM OF THE PACIFIC

Celebrate Fathers Day at the Aquarium of the Pacific! Enjoy a delicious BBQ, views of Rainbow Harbor and experience the new Jellies exhibits with all day admission to the Aquarium included.



**SUNDAY, JUNE 21 • 11:30AM - 1:30PM**

**PRICING:**

Includes Aquarium admission

**General Public:**

Adults: \$59 (12+)  
Child 3-11: \$25

**Members:**

Adults: \$49  
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# FUNDRAISING HIGHLIGHTS

The Aquarium of the Pacific relies on individuals, corporations, foundations, and government partners to support its mission and vision with contributions to the operating budget and a diverse range of projects.

## PACIFIC VISIONS

### ■ Board Director and Family Support Pacific Visions

Aquarium Board Member Jennifer Hagle and her family have made a significant commitment to support the Pacific Visions expansion campaign. The new Pacific Visions wing will elevate the Aquarium's initiatives in environmental conservation and informal education, which are personally significant to the Hagle Family. Jennifer, her husband Bob, and her three children, have been members of the Aquarium since it opened in 1998, and Jennifer has served on the Board of Directors since 2000. Her mother Ivoulou and Jennifer's three children have all worked or volunteered at the Aquarium. About her leadership role at the Aquarium, Jennifer remarks, "To be perfectly honest, I've learned more than I've counseled and received more than I've given, and for that I thank the Aquarium."

### ■ Betty White Ludden Supports Aquarium Expansion

A long-time advocate of species conservation and animal stewardship, Betty White Ludden has continued her support of the Aquarium's Pacific Visions expansion campaign. With Ludden's support over the past fifteen years, the Aquarium has built a state-of-the-art animal hospital, providing care for our six southern sea otters, along with all of the Aquarium's animals, and giving visitors of all ages the opportunity to learn about animal husbandry and marine veterinary medicine.

## OTHER GRANTS AND DONATIONS

### ■ Windsong Trust Supports Student Education

Windsong Trust provided a \$100,000 grant to the Aquarium in December 2014, continuing its support of core education programs for students in kindergarten through twelfth grade. Windsong Trust has been investing in the Aquarium's education programs since 2011. With its support over the past four years, the Aquarium built an interactive videoconferencing program, created science content aligned with the Next Generation Science Standards, and served more than 13,000 underserved students in Los Angeles, Norwalk, Long Beach, Irvine, and Carson, among other cities. Visiting students were able to touch sharks, dissect squid, and learn about unique animal adaptations. After Sycamore Junior High's field trip, which was supported by Windsong Trust, one student wrote "I loved learning about the animals' ways of defending themselves and also about their habitats. I spent a really 'happy day!' It was amazing!"

### ■ Bank of America Supports Skills-Based Volunteer Programs for Students

A founding Aquarium partner, Bank of America has continued its support with a gift of \$40,000. This most recent contribution will provide funding for the Aquarium's education and volunteer programs for middle, high school, and college students. The Aquarium offers a variety of opportunities for students in grades seven through twelve, connecting students to skills, training, and educational opportunities that give them tools to a successful post-secondary and career path.

### ■ Grant for Teacher Professional Development

A \$25,000 grant from the National Marine Sanctuary Foundation will provide unique learning opportunities to approximately 100 Southern California teachers. Facilitated by the National Oceanic and Atmospheric Administration (NOAA) Office of Exploration and Research, four teacher workshops will encourage educators and students to become involved with the voyages and discoveries of the NOAA's vessel of exploration Okeanos Explorer, the United States' first federal ship dedicated to ocean exploration. Teachers will receive a stipend and various curricular materials and resources. The workshops also connect with the Aquarium's ocean exploration-themed gallery, *Wonders of the Deep*.

### ■ Aquarium Supporters Provide Animal Care Funding

Margaret and Peri Urvek, advocates of animal causes across Southern California, have been involved with the Aquarium since 2005. They have gifted \$25,000 to the Animal Care Fund, supporting our efforts to provide vital healthcare to the Aquarium's marine residents, including medical supplies for nearly 500 yearly exams and a husbandry staff of fifty animal caretakers. It also provides for the purchase of toys and tools for the Aquarium's animals for enrichment in their exhibits.



## DONOR HIGHLIGHT



### ■ Longtime Foundation Supporter Advances Education and Pacific Visions Campaign

The Aquarium's oldest foundation supporter, The Kenneth T. and Eileen L. Norris Foundation has contributed over \$500,000 to promote excellence in marine science and ocean conservation since the Aquarium's opening in 1998. Last October the Foundation renewed its annual support of the Aquarium's educational programs with a grant of \$15,000, which will provide funding to the Aquarium's education department that serves over 200,000 students, teachers, and community members each year. In addition, the Foundation recently pledged \$500,000 in support of the Aquarium's Pacific Visions expansion campaign. With this additional capital campaign support, the Aquarium will elevate the educational experience for hundreds of thousands of students and millions of guests using new technology and innovative programming.

Since its founding in 1963 The Kenneth T. and Eileen L. Norris Foundation has cultivated a tradition of giving back to the community in Southern California. The Foundation gives to a broad range of philanthropic priorities including medicine, science and education, arts and culture, youth, and other community initiatives. Today Lisa Hansen leads the Kenneth T. and Eileen L. Norris Foundation as chair of the Board of Directors and remains dedicated and enthusiastic about the growth and reach of the Foundation. The Foundation's continued support of the Aquarium's educational programs and recent pledge to the Aquarium's expansion project, Pacific Visions, will help transform the learning experience for the students, teachers, and other Southern California community members who visit in the future.

## 2014 EDUCATION DONORS

### ■ We wish to extend a special thanks to the following donors for their support of the Aquarium of the Pacific's education initiatives in 2014.

#### \$100,000+

The Ralph M. Parsons Foundation  
Target  
Windsong Trust

#### \$50,000+

BCM Foundation  
Edison International  
The Miller Foundation

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Los Angeles Dodgers Foundation  
The Rudolph J. & Daphne A. Munzer Foundation  
National Marine Sanctuary Foundation

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BNSF Railway Foundation  
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#### \$1,000+

Ella Fitzgerald Charitable Foundation  
Winnick Family Foundation

# AQUARIUM ACCOLADES

The Aquarium presents the Heritage Award in recognition of individuals and organizations and their service to the community.



Pictured: Kathie Nirschl, Aquarium vice president of human resources, and Tommy Hollenstein, Glenn McIntyre Heritage Award honoree.

## Tommy Hollenstein

| Glenn McIntyre Heritage Award

During its twelfth annual Festival of Human Abilities the Aquarium presented the Glenn McIntyre Heritage Award to Tommy Hollenstein for his extensive community service. Hollenstein became quadriplegic after a mountain bike accident thirty years ago left him with a spinal cord injury. While he had a lifelong interest in becoming an artist, he was inspired to start painting with his wheelchair after his injury when he decided to make a painting with his service dog Weaver. Since then he has been creating works of art by coating his wheelchair wheels with paint, and he has worked extensively to share this technique with others. He is regularly invited to schools to teach wheelchair painting classes and speak to students about his experiences. Hollenstein has also been very active in serving the community, serving as a board member, volunteering with, and assisting with fundraising for various nonprofit organizations.



Pictured: Dr. Matthew and Roberta Jenkins, Heritage Award honorees, and Dr. Jerry Schubel, Aquarium president and CEO.

## Dr. Matthew and Roberta Jenkins

| Heritage Award

The Aquarium presented the Heritage Award to Dr. Matthew Jenkins and Roberta Jenkins during its thirteenth annual African-American Festival. For several decades the Jenkins have worked to make advancements in the realms of social justice and equality and provide greater access to higher education. As a veterinary doctor, Matthew played a leading role in creating equal access for minorities in the field of veterinary medicine. Both Matthew and Roberta have dedicated their support and expertise to community organizations. Their interests range from the arts and healthcare to local government and industry, but they have been most involved in supporting education. In 1984 the Jenkins founded the Matthew and Roberta Jenkins Family Foundation, providing scholarships for students, colleges, and institutions.

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# OUR CONNECTIONS TO SEA JELLIES

**Humans have numerous ties to sea jellies.** People in many countries, particularly in Asia, harvest jellies for food. We also use substances derived from jellies in scientific applications and medical research. Human activity on land and in the ocean is affecting jelly populations, and the presence or absence of jellies can indicate changing conditions in the ocean. Learning more about sea jellies and tracking their populations can help us better understand our ocean and preserve it for the benefit of all life on our planet.

## Uses for Jellies

### Food

People from many countries, including Indonesia, China, Japan, Korea, and other Asian countries, harvest sea jellies for food. Jelly fisheries in China date back 1,700 years, and worldwide more than 900 million pounds of jellies are caught each year, according to the Smithsonian Institution. Fishermen are beginning to harvest sea jellies off the coast of the United States for Asian markets. Jellies are often dried for storage and eaten either dried or rehydrated.

### Medicine

The ocean is increasingly seen as a potential source of medicines. While marine life found on coral reefs are the most researched, scientists are also studying biochemicals derived from sea jellies that show some promise in treating various human diseases.

### Science

In 2008 scientists Osamu Shimomura, Martin Chalfie, and Roger Y. Tsien were awarded the Nobel Prize in Chemistry for their work with green fluorescent proteins found in crystal jellies. When exposed to a certain kind of light, the proteins glow bright green, allowing scientists to use them as markers in cell and molecular biology research.

## Jelly Conservation

Humans have found many uses for sea jellies, but human activity is changing ocean ecosystems, affecting jelly reproduction and habitats. Jellies are important for a healthy and balanced ecosystem.

### Jelly Populations

The abundance of jellies is seen by some scientists as a signal that an ocean ecosystem is out of balance. As humans have removed fish from the food web by overfishing certain species, there is less competition for the zooplankton jellies feed on, so their numbers may have grown. Another human activity that may lead to higher numbers of jellies is fertilizers entering the ocean through runoff. Fertilizers cause algae to bloom, which quickly depletes oxygen from the water, creating what are known as dead zones. Some jellies thrive in low-oxygen environments.

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*Learning more about sea jellies can help us better understand our ocean and preserve it for the benefit of all marine life and humans, as well.*

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A changing climate and warming ocean are also likely to affect sea jellies. Those that thrive in warmer waters may increase in number, while those that live in cold-water habitats may diminish. Large jelly blooms can pose problems for ocean swimmers because of the danger of being stung by some species. They can also clog cooling water pumps at coastal power plants, causing regional power outages.

### Ocean Pollution

Pollution and trash in the ocean pose major threats to ocean life. For example, sea turtles and other animals sometimes mistake plastic bags for jellies. If these animals eat the plastic bags they find in the ocean, it can be extremely harmful to them, even deadly.

### Information Gap

Assessing human impacts on jelly populations is difficult because of a lack of available data. Some species seem to have disappeared for several years at a time, but returned later. Some species of jellies were more abundant in San Francisco Bay at a time when waters there were more polluted. Conversely, while the waters around the San Juan Islands in the Pacific Northwest appear to be relatively pristine, jellies populations there have decreased over recent decades. The causes for these changes have yet to be confirmed. In order to best understand sea jellies, the changes to their populations, and our impacts, more research needs to be done.

## What You Can Do

The public can help by preventing pollution and trash from entering the ocean and reporting jelly sightings. At [jellywatch.org](http://jellywatch.org), people can learn about the jellies they see along the coast while providing important scientific data. Jelly blooms are not currently tracked in any permanent record. Citizens can help scientists by reporting their observations.

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SAVE THE DATE

SAVE THE DATE

SATURDAY, JUNE 13, 2015  
6:30 P.M.

AQUARIUM OF THE PACIFIC

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All proceeds support the Aquarium's education, conservation, and animal care programs.