Meet the Caretaker of Baby Sharks
The Science Behind Science of Sharks
Set Your Watch for Whales

Members’ Magazine
Volume 50, Number 3 Summer 2017
We’ve been very busy at the Aquarium over the past several months rolling out your new membership options and freshening up our events calendar with new opportunities for you. So far, the feedback has been great. Thank you for continuing to share your thoughts with us.

Membership, of course, is a great way to support the New England Aquarium and help advance our mission to protect the blue planet. But did you know that there are lots of other ways to get involved this summer? Here are just a few.

- What better way to enjoy the gorgeous weather and help the oceans than by getting your hands dirty with the *live blue™* Service Corps? Learn how you can participate in meaningful (and social) one-off volunteer opportunities at neaq.org/volunteer.

- Aquarium educators can often be found at community events, classrooms, festivals, and other locations. See how you can help bring the Aquarium to your neighborhood at neaq.org/learn.

- Want to stay abreast of the Aquarium’s many research, conservation, and educational efforts but don’t have a lot of time? From inside our exhibits to updates from the field, there’s always something happening. Check in at neaq.org/blog.

- The Aquarium’s new young professionals group, The Tide, offers unique opportunities to network with other 21- to 40-year-old ocean stewards, connect with Aquarium scientists and community leaders, and round it all out with fun and fascinating events. Read more and join at neaq.org/thetide.

And that’s just the start! Let membership be your springboard to an ocean-loving summer. As always, thank you for your support. On behalf of all of us at the Aquarium, we look forward to seeing you this summer on Central Wharf!

Deborah Kulich, Director, Membership

Meet your Membership Team, a group of dynamos working to make your member experience amazing. Clockwise from top right: Andrew Royer, Engagement Specialist; Gina Parente, Manager; Kelli James, Coordinator; and Steve Mitchell, Data Administrator.

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New England Aquarium Proudly Recognizes Our Lead Sponsors
The neon pink ocellated frogfish is back on exhibit in the Yawkey Coral Reef Center after a few months of treatment, rest, and relaxation.

The fish, which can change colors to help camouflage itself from prey and predators, hadn’t been feeling well and was taken behind the scenes for a thorough checkup, according to Senior Aquarist Sean Costello.

And how can one tell when the mostly sedentary, bottom-dwelling fish is feeling under the weather or is back to normal?

“Working with them for so long, you can tell when they are a bit off,” said Sean, who observed the frogfish was “not normal” by noting its movements, eating habits, and other signs. “He had a little vacation and started feeling better.”

While the frogfish was off exhibit regaining its health, Sean and other Aquarium aquarists learned the fish was a male and it changed its color to be a little more yellow. But now that it’s back in its tank in the Coral Reef Center, he is a bright pink again.

Maybe next up for the frogfish, which was collected off the coast of Florida a few years ago, is a name. Sean said he is considering a few for one of the superstars of the Yawkey Coral Reef Center.

— Jon Kinson
Sarah Tempesta
Senior Aquarist, Shark Pup Keeper

While her classmates pursued careers outdoors in wildlife biology and conservation, Sarah Tempesta knew she wanted to be more hands-on with animal care. That was five years ago. She got her feet (and hands and pants) wet during a New England Aquarium internship that turned into a career. Since then Sarah has been up to her elbows in animal care at the Aquarium—and definitely hands-on. In fact, those are her fingers cradling a baby shark in the massive picture in our new Science of Sharks exhibit.

“My main responsibilities are to care for the baby sharks and rays that are born here at the Aquarium,” she explained. As she spoke, she leaned over the shark pup tank behind the scenes of the new exhibit, sprinkling tiny bits of fish into the water. Within seconds, the 6-inch coral catshark and epaulette shark pups erupted from beneath the exhibit’s rocks and started snacking. These are her babies.

Sarah is the primary aquarist charged with incubating shark and ray egg cases that are laid in the new exhibit or at The Trust Family Foundation Shark and Ray Touch Tank—and there are quite a few. Once those eggs hatch, Sarah leads the efforts to nurture the newborn pups through their juvenile stages and into adulthood. These days, she spends much of her time on the fifth floor of the Aquarium, across from the cascading filtration system for the Giant Ocean Tank, minding several large tanks filled with elasmobranchs, or sharks and rays, including baby epaulette and coral catsharks at all stages of development.

“It can be challenging to care for the tiny pups, but it is all worth it when I can see them through to adulthood.”
At any given point there might be more than 20 young sharks behind the scenes!

With the new exhibit, visitors are able to get an up-close look at all stages of development, too. They can watch developing sharks wriggling in their egg cases. While the newborns are too tiny to be in the pup tank, Sarah cares for them behind the scenes until they're large enough to go into the shark pup tank for visitors to admire. The sharks eventually outgrow the pup tank. So it's back behind the scenes, where Sarah tends to the juvenile sharks and sees them into adulthood when they're ready for their new homes in the Science of Sharks exhibit or the shark ray touch tank.

“Raising these sharks is incredibly rewarding,” said Sarah. “It can be challenging to care for the tiny pups, but it is all worth it when I can see them through to adulthood.”

Now everyone can share in part of this special experience, observing Sarah’s charges from egg cases through adorable pup stage to adulthood. “Not all sharks are 20 feet long,” added Sarah. “I hope visitors to this exhibit can learn to appreciate these smaller sharks, too.”

Earlier this year, over several months, Aquarium educator Lisbeth Bornhofft brightened the feeds of her Facebook community with Aquarium animals. One early-morning post featured a captivating close-up of Pandora the box turtle, another morning started with a video of pulsing gill slits on an otherwise-motionless chain catshark. Each post engendered appreciation and awe for the animal, whether it was a perennial favorite or an oft-overlooked creature.

That’s just what Lisbeth has been doing for Aquarium visitors over the past 23 years—inspiring awe and appreciation for our blue planet. April 28 marked Lisbeth’s last day as a full-time educator at the Aquarium.

As an interpreter of marine science, she was the helpful uniformed person answering questions at the tidepool touch tank or pointing out the small but incredible animal scuttling across the Living Corals exhibit. Her job was about more than explaining what happens in our exhibits, it was about connecting these exhibits to the wider experience of life on our blue planet and especially in the context of global climate change.

Lisbeth’s impact on the Aquarium community goes beyond those personal interactions with thousands of visitors. Her colleagues will remember her for that tidbit of knowledge shared in the blue light of an exhibit, or the rigid lobster molt carefully preserved for show and tell. It was Lisbeth who, using her skills as an art teacher, created those biological artifacts, which she coined biofacts. Those biofacts will continue to intrigue visitors for years to come.

Fortunately, Lisbeth expects to come back to Central Wharf as a volunteer. We certainly hope so, she is a remarkable advocate for our blue planet.

— Emily Bauernfeind
Despite pop culture’s fascination with sharks, little is known about the approximate 500 species. What researchers do know is concerning: about 100 million to 200 million sharks are killed each year, largely due to the shark fin trade. This puts not only sharks, but all ocean ecosystems at risk.

Scientists at the Anderson Cabot Center for Ocean Life at the New England Aquarium, Aquarium colleagues, and their partners are applying the latest in technological advances—as well as the good old-fashioned scientific method—to learn more about shark behavior and how human activity impacts them. Gaining this valuable knowledge will enable societies to implement science-based solutions to conservation efforts to better protect all sharks and their ecosystems.

We’re so excited about the cutting-edge marine research they’re doing, we’ve included the work in our most recent exhibit, Science of Sharks.

Learn More
To learn more about what’s waiting for you at Science of Sharks, see page 8.
Barbara Bailey  
*Curator of Husbandry and Sustainability*  
*New England Aquarium*

Sharks are highly adaptable animals—it’s why they have been around for about 450 million years. It’s that characteristic that has allowed Barbara Bailey and her colleagues at the Aquarium to actually train sharks. Using feeding sticks and targets, Bailey has trained primarily bonnethead and blacknose sharks to touch a target and then receive food. According to Bailey, it takes only a week for some species to adapt to this feeding method because they’re very motivated by food.

Bailey and her team are also teaching sharks to swim onto a stretcher so researchers and the husbandry team can conduct overall health assessments on individual sharks. The vinyl stretcher attaches to the side of the tank, and the shark swims onto it when lured by the target. It makes for safe handling, for both the sharks and trainers.

Said Bailey, “The more research we do on sharks, the better we understand their behaviors and needs, the more we can apply that research to protect them and ocean ecosystems.”

Jeff Kneebone, Ph.D.  
*Associate Research Scientist*  
*Anderson Cabot Center for Ocean Life*

Jeff Kneebone’s passion for sand tiger sharks started in the summer of 2008, when he was a graduate student. He began tracking the vulnerable species using a newer technology called acoustic telemetry, what Kneebone likens to an E-ZPass® for sharks.

He and his colleagues tagged sharks between 1 to 2 years old found in Duxbury Bay. After a shark is tagged, it is released, and a receiver logs the transmissions from that specific tag—each one has a unique signal. The battery lasts years, providing up to a decade’s worth of data.

“The most important thing we found in Duxbury is it’s serving as a seasonal nursery for sand tiger sharks,” said Kneebone. “Protecting the next generation of sharks is essential to the species’ survival considering they don’t reach sexual maturity until 7 for males, 8 for females.”

What Kneebone is learning from his decade’s worth of research may lead to better protections for threatened species and strategies for mitigating human impacts on all sharks.

Carolyn Wheeler  
*Doctoral Student*  
*University of Massachusetts Boston*

Even though she’s still a student, Carolyn Wheeler has already conducted hours of fieldwork studying sharks in their home environments. Now, under the guidance of John Mandelman, Ph.D., Vice President, Anderson Cabot Center for Ocean Life, Wheeler is researching the effects of climate change on shark reproduction at the Aquarium’s Animal Care Center in Quincy.

Using tools as simple as thermometers and rulers to observe shark egg cases (many of which were laid in Aquarium exhibits), Wheeler notes growth, egg yolk size, and tail beats in various water temperatures. Knowing how climate change can affect shark reproduction is vital to healthy oceans.

“If young sharks don’t survive, that’s a generation marked by a decrease in reproduction,” said Wheeler. “And as with all sharks, we believe their numbers are rapidly declining in the wild.”

Sand tiger shark (*Carcharias taurus*)
The new *Science of Sharks* exhibit includes several species of small but mighty sharks, inspiring videos, and an assortment of displays that show how these fascinating animals have adapted to gain an edge in the water. But the exhibit also features several unfamiliar words, such as benthic, pelagic, countershading, and oviparity. You’ve heard of Seek and Find, now try Define and Find! We’ll help you understand these words, and your job is to find them in our new exhibit.

*(Answers: see opposite page)*

**Countershading (noun):**
a method of hiding from prey and predators in which an animal’s coloration is darker on the upper side of the body (so as to blend in with the dark bottom or deeper water when seen from above) and lighter on the underside (so as to blend in with the top portion of the water column and sky when viewed from below)
Pelagic (adj.): relating to or living in the open sea

Benthic (adj.): refers to anything found, living, or belonging at the bottom of a body of water

Oviparity (noun): a form of shark reproduction where the female lays egg cases

Whale sharks (Rhincodon typus) are the largest fish in the ocean.

Benthic:
- shark sculptures key in upstairs West Wing
- interactive shark bubble IDs
- New England sharks poster
- diversity poster

Oviparity:
- How do sharks reproduce? poster
- interactive shark bubble IDs

Pelagic:
- shark display under tiger shark model
- shark display: shark skin display under tiger shark model

Answers:
- Countershading: shark skin display under tiger shark model
- Pelagic: shark sculptures key in upstairs West Wing; interactive shark bubble IDs
- Benthic: diversity poster
- Oviparity: How do sharks reproduce? poster; interactive shark bubble IDs
Forget school, forget textbooks, forget pop quizzes. It’s summer vacation, after all! But just because school is on recess doesn’t mean the learning has to stop. Our new *Science of Sharks* exhibit is swimming with shark facts so engaging that kids—and, yes, adults—won’t even realize class is in session.

Let’s begin the day’s lesson at the ever-popular Trust Family Foundation Shark and Ray Touch Tank. As a lithe coral catshark slinks beneath outstretched fingertips, visitors might notice the texture of its skin—why is it so scratchy? Or an educator may have pointed out a yellow-brown epaulette shark egg case wound around the mangrove root sculptures—wait, sharks lay eggs?

With interest piqued, visitors can get answers to these questions and others by following the elegant shark sculptures suspended from the ceiling down the stairs into the new *Science of Sharks* exhibit, which opened in April. Some folks might be surprised to notice that nearly all those life-size sharks models are on the small side. That’s because most sharks are actually 4 feet long or less.

Left: A young visitor takes a long, close look at a shark egg case.

And just like that, visitors have learned something new about sharks!

There are nuggets of information like this mingled with fascinating live animals, engaging videos, and hands-on displays throughout the exhibit. At the foot of the stairs, a cold-water display introduces some sharks from around the world, like the California swell shark. A tiger shark model dominates the middle of the room, where future shark scientists can compare wildly different kinds of shark teeth. Lift the flap and they can find out what kind of prey those teeth have evolved to eat. Animated screens on the other side of the model delve into shark anatomy, where people can find the answer to that question about the scratchy shark skin (Hint: It has to do with microscopic teeth called dermal denticles).
It’s hard to ignore the mesmerizing photographs by New England Aquarium Explorer-in-Residence and National Geographic photographer Brian Skerry, which are projected on a triptych of screens on one side of the room. Visitors gravitate to these super-sized screens to be dazzled by close-ups of reef sharks and stare into the mouths of tiger sharks as they glide across all three screens. Nearby, visitors can select interviews to watch featuring scientists from the Aquarium and Anderson Cabot Center for Ocean Life at the New England Aquarium. Topics range from tagging to training sharks.

But it’s the life cycle display that gets most of the oohs and aahs. Baby sharks can do that. (Learn more about caring for these baby sharks in the Cool Jobs section on page 3.) Watch silhouettes of shark pups developing and flitting in their egg cases, observe 6-inch pups just a few months old dart around their domed display, and find out why Halmahera walking sharks are so named as they crawl over the corals in their bright replica reef.

This new exhibit has been open since April, but there’s a good chance visitors will learn something new every time they visit. So dust off your learning cap this summer and come prepared to fill your brain with piles of information about sharks. The Science of Sharks is ready to be discovered!
Spring Roundup

Making the Marsh Marvelous

Thanks to everyone who rolled up their sleeves on Park Serve Day with the Aquarium’s live blue™ Service Corp on April 29. Starting at Neponset Landing Pier in Quincy, the group picked up all manner of debris to help clean up one of greater Boston’s waterways.

Learn more about upcoming live blue™ Service Corp activities and how you can get involved at neaq.org/volunteer.

A Whale of a Cruise!

We thank all who joined us on May 19 for our first-ever, member-exclusive New England Aquarium Whale Watch. With the setting sun as our backdrop, we boarded Boston Harbor Cruises’ vessel Cetacea and set off for Stellwagen Bank. Although the whales decided to keep to their own schedule this evening, we had a great time out on the open water. We hope everyone aboard uses their rain checks for another whale watch this season!

Check out slides from the evening at neaq.org/memberevents.

Hop aboard a New England Aquarium Whale Watch on Central Wharf and get transported to a world of whales that offers both variety and sameness. How can that be?

According to Laura Howes, director of marine education and conservation for Boston Harbor Cruises, every day can be different when it comes to the trips out to the Stellwagen Bank National Marine Sanctuary. Whale Watch participants have a good chance to see several species of large whales, including humpback, finback, and minke whales. Sharks, seals, dolphins, seabirds, and other marine life may also make an appearance.

And some things stay the same each trip—most notably, there are whale sightings. If not, visitors get a free ticket for a future trip (BTW, more than 95 percent of watches sight a whale, according to Howes).

On the trips to one of the world’s best feeding areas for whales, New England Aquarium-trained naturalists will share their knowledge of...
During July, August, and September, several species of large whales and other marine mammals can be seen on New England Aquarium Whale Watches, including:

**Whales**

**Humpback whale:** It can be 40 to 50 feet in length and weigh 60,000 to 80,000 pounds and is known for its distinct body shape with long pectoral fins and lumpy head; its breaches can be breathtaking. Population estimated at 60,000.

**Fin whale:** This slim whale is the second-largest animal after the blue whale and can grow to more than 80 feet in length and weigh 80 tons. Population estimated at 50,000 to 60,000.

**Minke whale:** A smaller whale that grows to about 30 feet and weighs 8 tons. It has a white band on each flipper. Population estimated at at least 500,000, but the actual population worldwide is not known.

Watchers also might also see North Atlantic right whales and sei whales.

**Other Marine Animals**

**Atlantic white-sided dolphin:** It is slightly larger than most ocean dolphins as it grows to 8 to 9 feet in length and weighs 400 to 500 pounds. This very social animal has a white and yellow patch behind its dorsal fins.

**Harbor seal (pictured):** Can grow to 6 feet in length and weigh 250 pounds.

**Grey seal:** A large seal, as males can weigh up to 600 pounds and females 400. Differs from harbor seals by its straight head and fewer spots. This species is making a comeback in waters off the Boston area and Cape Cod.

**Basking shark:** Second-largest living fish that can grow to 20 to 28 feet in length in waters off New England; it eats plankton usually at water’s surface.

Watchers also could see common dolphins, harbor porpoises, ocean sunfish (mola mola), and, rarely, sea turtles.

**Seabirds**

**Northern gannet:** Has distinct white body with black wingtips, long pointed bill and tail.

**Great shearwater:** Common seabird off the Atlantic Coast that seldom comes close to shore. It often forages in flocks around fishing boats.

Other birds that may be sighted include gulls (greater black-backed, herring, laughing), common terns, roseate terns, Wilson’s storm petrel, shearwaters (greater, sooty, manx), double-crested cormorants, scoters (surf, white-winged, black), common eider, warblers (song birds), red-necked phalarope, Northern fulmar, common loon, common murre, kitiwake, Bonaparte’s gull, and jaegers.

Don’t Forget! Members get a discount on New England Aquarium Whale Watch trips, so bring your membership card when you come to Central Wharf.

*Photos: Boston Harbor Cruises*
July

**7/12**

**Dive In!**

**Member-exclusive evening**

6:30 p.m. – 9:00 p.m.

Enjoy a summer evening at the Aquarium without the crowds. Take advantage of a night for you, our members, to see the small but mighty sharks in our new *Science of Sharks* exhibit or any of your other favorite marine animals. While no reservations are required for this event, admission is strictly limited to the number permitted with your membership level. neaq.org/memberevents

**8/3**

**Aquarium Lecture**

**African Manatees and Sea Turtles: Conservation Challenges and Successes**

7:00 p.m.

For more than two decades, scientists Lucy Keith-Diagne and Tomas Diagne have been working to study manatees and turtles and to advocate for their protection. neaq.org/lectures

**8/23**

**Fin & Tonic**

**Adults-only, member-exclusive evening**

6:30 p.m. – 9:30 p.m.

Leave the kids at home and celebrate summer with an evening of cocktails, music, and hors d’oeuvres while leisurely viewing our many entertaining and educational exhibits.

Attendees must be 21 or older. Registration required. Ticketing opens for Premium-level members on Monday, July 31, and for Standard-level members on Tuesday, August 1, at noon. neaq.org/memberevents

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**August**

**7/27**

**An Evening with Sy Montgomery**

**Member-priority lecture, book signing**

6:00 p.m. – 8:00 p.m.

Join us to hear about the most recent book by award-winning author Sy Montgomery, *Amazon Adventure: How Tiny Fish Are Saving the World’s Largest Rain Forest*. There will be time after the lecture for book signings. Reservations required.

Registration opens at noon on July 13 for Premium-level members and at noon on July 14 for Standard-level members. neaq.org/memberevents

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**Introduce Your Kids to the Wonders of the Aquatic World!**

Exciting programs with Aquarium educators

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**Sea Squirts**

**Ages 2 – 4**

Learn about the blue planet alongside your young child. Each hour-long play program focuses on developing motor and language skills, encourages early science skills, and includes play, songs, and activities. Classes are held in the Aquarium’s Ocean Center.

**September: Rainbow Ocean Part 1**

**October: Rainbow Ocean Part 2**

**November: Aquarium Celebrities**

FEE PER SERIES: $55 for members, $100 for nonmembers*

* Nonmember fee includes Aquarium admission. A $2 service fee will be added to each reservation for nonmembers.

For class schedules, including new Sunday options, and more information, visit neaq.org/seasquirts, call 617-226-2149, or write to kids.ed@neaq.org.
Films

Amazon Adventure 3D
40 minutes
Escape to the lush forests of the Amazon, where parrots flit and jaguars stealthily stalk their prey in the sun-dappled rainforest. Amazon Adventure takes you back in time to follow a curious scientist in his quest to document the birth of a species. Thrash through thick jungles and float along the sprawling Amazon River as you marvel at the incredible species that call this biodiversity hotspot home. You’ll encounter clumsy sloths swimming through flooded forests, bizarre bugs scurrying on the rainforest floor, and colorful butterflies mimicking their poisonous cousins all in IMAX 3D on the largest screen in New England.

Galapagos 3D: Nature’s Wonderland
39 minutes
Take the trip of a lifetime with Galapagos 3D: Nature’s Wonderland. Watch iguanas claw their way along the seafloor. Swim with tropical penguins. Wallow with grunting giant tortoises. Meet the animals that gave us a greater understanding of life on our blue planet.

Great White Shark 3D
40 minutes
Get ready for a shark’s-eye view as you plunge straight into the underwater world of nature’s most renowned predator. Skip the shark cage; discover the importance of this spectacular species and explore our blue planet.

9/10, 17, 24
September Sundays
Early-morning Aquarium hours for Premium members
8:00 a.m. – 10:00 a.m.

Premium members are invited to our first-ever, early-morning member opportunity! Start your day off right with a special sneak peek at what happens in the Aquarium as the lights come on and our dedicated staff gets animals and exhibits ready for our guests. Free, but reservations are requested, and admission is limited to the number permitted with your Premium-level membership.

neaq.org/memberevents

Coming up
Fish, Fun, and Fright!
Friday, October 27
6:00 p.m. – 9:00 p.m.

The Aquarium’s annual Halloween celebration, complete with costumes, creepy creatures, and spooky fun, always sells out fast. So mark your calendars as tickets go on sale for Premium-level members on Monday, October 2, and for Standard-level members on Tuesday, October 3, at noon.

Learn more at neaq.org/memberevents.
Join us for Weekend Classes for Sea Squirts
See page 12 for details.

Tonight you get to leave the little ones at home!

Join us for our summer

FIN & TONIC
An Adults-Only Event for Members

Wednesday, August 23
6:30 p.m. – 9:30 p.m.
Tickets required. Details, page 13.

Join us for a member-exclusive, family-friendly evening at the Aquarium.

Dive In!

Wednesday, July 12
6:30 p.m. to 9:00 p.m.

Bring your friends and family to discover the Aquarium after the vacation crowds have left for the day.
Details inside.