

Superintendent's Quarterly Report

April through June, 2019

California Sanctuaries Recognize Shipping Industry Efforts to Save Endangered Whales

On May 16, to celebrate a partnership between commerce and conservation to protect several endangered whale species – blue, humpback and fin whales - in California sanctuaries, leadership from Cordell Bank, Greater Farallones, and Channel Islands national marine sanctuaries, with representatives from air quality control districts, recognized 22 shipping firms that successfully participated in the Vessel Speed Reduction (VSR) program in 2018. The ceremony took place at the Greater Farallones campus, and received extensive coverage in the New York Times, Washington Post and other media; participating firms value public awareness of their conservation efforts.

The Vessel Speed Reduction program requests commercial vessels over 300 gross registered tons voluntarily slow to 10 knots while in the traffic lanes into and out of San Francisco Bay, as well as around the Channel Islands, during the May through November feeding season. Slowing reduces the risk of injuring or killing them, allowing critical seconds to take avoidance measures. At slower speeds collisions will still occur, but are more survivable. Decreasing vessel speed has the added benefit of reducing air polluting emissions from ships, improving air quality for everyone.

California's marine sanctuary waters are major feeding grounds for several significant populations of endangered whale species still recovering from past whaling impacts. Blue whales are of special concern, as the local "population segment" numbers only 1,647. Of these, only 2.3 blues each year can be "removed" from U.S. waters (i.e., killed by ship strike or other non-natural cause) without impacting their ability to reach an optimal sustainable population level. Experts estimate that only between five and 10% of shipstruck whales are ever detected.



Greater Farallones Superintendent Maria Brown noted, "The endangered whales that benefit from this program are living treasures, deserving of our protection. Through this collaborative partnership of commerce and conservation, we can help ensure that future generations experience their majesty and recognize their importance in the marine ecosystem. Further, they will appreciate the wisdom of our generation in taking action now."

Shipping firms that proudly "braked for whales"

Credit: Paul/GFNMS

MANAGEMENT

Strengthening Biosphere Reserve Partnerships Internationally

NOAA, Office of National Marine Sanctuaries, Greater Farallones, Cordell Bank and Channel Islands National Marine Sanctuaries were represented at EuroMAB 2019, the biennial meeting of 302 North American (U.S. and Canada) and European Biosphere Reserves (BR) in 36 countries. Representing one of eight people as part of the U.S. delegation, we shared U.S. best practices, learned new BR management and conservation methods, improved communication among U.S. biospheres and between potential international collaborators, and demonstrated the United States' continued commitment to actively participate in the UNESCO Man And the Biosphere program.

Sanctuaries are benefiting from outcomes of EuroMAB 2019 by identifying how communications and networking between biosphere reserves can be enhanced, and how biosphere reserves can best collaborate with stakeholders and institutions to address global issues with local actions.

CONSERVATION SCIENCE

Monitoring To Understand Long-Term Trends

Beach Watch

Farallones Beach Watch scientist presents to Pomo Indians on coastal monitoring

At the request of the Kashia Band of Pomo Indians, this spring conservation science staff from Greater Farallones Association (GFA) presented to the Kashia Tribal Council, the on-line Beach Watch portal and database, as an established data management platform. For the past two years,

conservation staff has been working with the tribe's biologists to increase their Stewart's Point Coastal Reserve monitoring program, integrating methods, data management and quality control protocols modeled after Beach Watch. GFA is developing an MOU between the tribe and GFA regarding database sharing and data ownership. This sharing of skills and expertise between tribes, the Greater Farallones Association, and the sanctuary helps to build trust and cooperation, as we collaboratively address resource management information needs to maintain a healthy coastal environment.

Sanctuary Ecosystem Assessment Surveys (SEAS, ACCESS Surveys)

Sanctuaries complete first 2019 ecosystem studies cruise - ACCESS

Conservation science staff from Greater Farallones and Cordell Bank sanctuaries, Point Blue Conservation Science, and Greater Farallones Association began the 16th season May 26 to June 1, 2019 sampling the pelagic ecosystem as part of Applied California Current Ecosystem Studies (ACCESS). Spring upwelling conditions made for rough seas and delays. Good ocean productivity was indicated by abundant zooplankton and whales, with krill in net tows. Scientists collected location data on Dungeness crab pot buoys, a commercial fishery that closed early this year to prevent whale entanglements. ACCESS will provide abandoned buoy data to the Dungeness Crab Fishing Gear Working Group to inform the Risk Assessment and Mitigation Program about risks to humpback whales. Daily updates are posted about the research mission at www.facebook.com/ACCESS.Partnership

ACCESS seeks to understand status and trends of sanctuary resources, ecosystem health, and

response to climate change. This long term monitoring addresses management information needs such as ocean acidification status and monitoring, harmful algal blooms, and fishing gear entanglements, ocean conditions and prey and predator distribution and abundance as indicators of ocean health.

RESOURCE PROTECTION

Protecting Against Oil Spills

Sanctuaries, federal and state offices, oil company stage Bay Area oil spill drill

In June, NOAA's Greater Farallones and Cordell Bank sanctuaries, Office of Restoration, Office of Response and Restoration (ORR) and National Weather Service participated in a San Francisco Bay Area oil spill drill sponsored by BP Shipping, Alaska Tanker Company, and the California Office of Spill Prevention and Response.

A hypothetical container ship and oil tanker "collided" in Greater Farallones National Marine Sanctuary releasing 60,000 barrels (around 2.5 million gallons) of oil. ORR provided scientific support on overall NOAA activities and Environmental Unit actions involving dispersant use, spatial data, a mock press conference, and environmental consequences of different response methods. Responders discussed sensitive resources, exposure pathways and resources of concern for Natural Resource Damage Assessment (NRDA) and developed a sampling plan for ephemeral data collection and other pre-assessment activities.

Collaboration among state and federal agencies for emergency response and damage assessment makes restoration actions more successful, builds trust and cooperation that address management

actions, and restores and maintains a healthy coastal environment.



Photos: Incident Command Post exercise briefing for the San Francisco Offshore Incident drill. Photo by NOAA.

Adapting to a Changing Climate

Farallones Fifth Ocean Climate Summit draws state, national attendance

Greater Farallones National Marine Sanctuary, Greater Farallones Association, and colleagues convened the Fifth Ocean Climate Summit: Learning from the Past, Looking to the Future on April in San Francisco, CA. Building on 10 years of progress since the first summit, it brought together 155 attendees from the region, and also across the nation to identify collective priority actions to further advance climate science, communication, and adaptation in order to better protect the North-central California coast and ocean from the impacts of climate change over the next 10 years. The program featured two plenary panels and four facilitated lightning talks, as well as an informal networking session.

The summit provided an opportunity for individuals and agencies to meet and discuss the great variety of impacts to both ocean and coastal ecosystems due to the impacts of changes in ocean climate. Pooled talents and resources can then be identified, and often result in cooperative ventures to address

these issues. See <https://farallones.org/ocean-climate-summit-2019/>



Supt. Maria Brown, opens the GFNMS Fifth Ocean Climate Summit. PC: Sage Tezak, GFNMS



Francesca Koe, Co-Chair of the Sanctuary Advisory Council's Bull Kelp Recovery Working Group. PC: Jean Alupay, GFNMS

Farallones sanctuary guides development of new climate adaptation course

Greater Farallones National Marine Sanctuary Climate Program Coordinator traveled to the USFWS National Conservation Training Center in West Virginia on June 17-20 to help pilot the first offering of a new four-day climate adaptation course for resource managers. "Planning for Climate Change" provides the foundational training critical to integrating climate considerations into resource management, including scenario planning and

climate vulnerability assessments. The Farallones Climate Program Coordinator participated in a course design team led by NOAA Office of Protected Resources throughout 2019 to design this new course, and will be co-instructing the course in Long Beach in July 2019 for a number of sanctuary staff.

As a "Center of Collaboration" on climate change, the Farallones sanctuary works to increase the capacity of Sanctuaries and other protected areas to integrate climate change into resource management to ensure long-term viability of natural resources.

Protecting Seabird Colonies

Seabird Protection Network partners with the California Department of Fish and Wildlife

Staff from Greater Farallones National Marine Sanctuary's Seabird Protection Network partnered with the California Department of Fish and Wildlife (CDFW) to include a seabird safety message in the 2019 Ocean Sports Recreational and Commercial Fishing Regulations booklet. The message highlighted the importance of seabird safe boating behavior and the locations of Special Closures at the start of saltwater sport fishing season. The booklet was sent to the CDFW Marine Management News email list and paper copies were distributed at CDFW offices and sport fishing businesses.

The annual Ocean Sports Recreational and Commercial Fishing Regulations booklet is widely distributed in the state, reaching boaters from inland areas that are difficult to target with outreach. Partnering with state agencies increases the reach of the program and expands recognition of sanctuaries' efforts to protect sensitive wildlife.

Boat show attendees learn how to protect seabirds

On April 6, staff from Greater Farallones National Marine Sanctuary's Seabird Protection Network partnered with the California Department of Boating and Waterways to co-present 'Clean and Green' boating practices to attendees of the 2019 Pacific Sail & Power Boat Show in Richmond, California. Twenty boat owners learned how boaters can be partners in seabird and marine mammal conservation by keeping their distance from sensitive wildlife and knowing the locations of federal and state marine protected areas.

The Pacific Sail & Power Boat Show is the largest event of its kind in the area, attracting attendees from across central California including inland areas that are difficult to target with outreach.



SPN staff teaches boaters to sail "seabird safe." Credit: Vivian Matuk

Dream Machines pilots learn from Seabird Protection Network to fly "seabird safe"

To prevent seabird disturbance from low flying planes, staff from Greater Farallones National Marine Sanctuary's Seabird Protection Network partnered with organizers of the Pacific Coast Dream Machines fly-in event at the Half Moon Bay Airport on April

28th. The event attracts pilots from across the state, who fly over sensitive seabird colonies en route. Ahead of the event staff sent a mailing and worked with event organizers to post information that emphasized the importance of flying high over the coast and abiding by NOAA Regulated Overflight Zones. On site, staff briefed air show pilots and hosted a table to interact with pilots.



Photo: Pilot Mark Baird pledges to fly over 1000' above the California coast to protect seabirds.

Dream Machines is the largest event of its kind in the area and attracts pilots from across central California, including inland areas that are difficult to target with outreach. Educating pilots increases the likelihood that they will fly above 1000 feet along the California coast and respect the NOAA Regulated Overflight Zones – key goals of the sanctuary.

Protecting White Sharks

National Geographic updates killer whale-white shark documentary with new local research

On April 16, as the Tagging of Pacific Predators (TOPP) research group released their new paper on killer whale and white shark interactions in Greater Farallones. National Geographic interviewed sanctuary staff regarding the first ever recorded attack by killer whales on a white shark, which took place in the sanctuary. The updated original NatGeo program, "The Whale that Ate Jaws: Eyewitness

Account” focused on new research and subsequent changes in public attitudes and protection for white sharks. The new TOPP study is at https://www.nature.com/articles/s41598-019-39356-2?fbclid=IwAR2CTbWITbuHumSnMvnZauN6y75A8ufOo2607fiGU_wQ3gzxpOWCK2Nf69I

Quality nature programming such as National Geographic’s is effective in motivating those living thousands of miles from an ocean to consider it a part of their lives, something to value and protect. It can illustrate some of the methods, including education and research, used in conservation efforts.



Killer whale CA6 holding inert, inverted white shark, Oct. 1997 at GFNMS. Credit: P. Kiddle

Protecting Marine Mammals

Gray Whale Mortality Event on West Coast

On May 31, NOAA’s National Marine Fisheries Service (NMFS) declared an Unusual Mortality Event (UME) concerning the sudden, elevated die-off of gray whales along their entire migration route on the West Coast of North America from Baja Mexico to Alaska. A UME is an unexpected stranding event that involves significant die-off of a marine mammal population, and demands immediate response to determine the cause. From January 1 through July 18, 189 dead grays have been found in the U.S., Canada, and Mexico, the majority in California. Preliminary findings in many show emaciation, while

additional necropsies show vessel strikes in three whales and entanglement in one whale. Greater Farallones National Marine Sanctuary is assisting NMFS with public and media outreach in the region.

Gray whales and other marine mammals are key species in many of our sanctuaries, playing an important role in the ecosystem and providing a unique form of public engagement through wildlife viewing. Public awareness of how environmental conditions impact wildlife is essential to developing an active stewardship. For more information: <https://www.fisheries.noaa.gov/national/marine-life-distress/2019-gray-whale-unusual-mortality-event-along-west-coast>

Reporters from 100 media outlets were invited to participate in the May 31 teleconference on possible causes and response, including NOAA and independent whale researchers. Potential causes discussed included an unprecedented failure of ice to form in the Bering Sea for two consecutive years and consequent disappearance of gray whales’ prey, benthic amphipods. Strategic media outreach is vital to ensuring that accurate, conservation-directed information is conveyed to the public.



Performing necropsy on gray whale in SF Bay. Credit: TMMC

Bay Area boaters advised: steer clear of whales!

On April 3, Greater Farallones National Marine Sanctuary issued a Superintendent's Statement, advising boaters in the San Francisco and Tomales bay areas to avoid whales migrating through, or entering bays and estuaries. Gray whales transiting the sanctuary are at a particularly high risk of collisions with vessels, since they swim near shore. Since mid-February, there has been a sharp increase in grays entering San Francisco Bay from sanctuary waters. To date, three have died; others are foraging in the bay mud.

Even in ordinary years, each spring the sanctuary alerts boaters and water recreationists to use extra caution and maintain 300 feet of separation (a football field's length) from gray whales. From March through May, gray whales make a 6,000 mile return migration to Arctic feeding grounds from Mexican breeding grounds. Gray whale cows with newborn calves swim closest to shore and may pause in the surf and small bays for the calves to rest, nurse, and avoid killer whales.

Ship strike team plans for 2019 whale season

The west coast ship strike team met to review recent progress and set the agenda for the 2019 whale season. Staff from the Greater Farallones, Cordell Bank and Channel Islands national marine sanctuaries met May 1, 2019 in Sausalito. The team reviewed stock assessments, stranding data, a risk assessment analysis, vessel speed reduction cooperation data, and industry communications. The team discussed ideas for a conservation target for the ship strike reduction efforts and identified follow up action items. The 2019 seasonal Voluntary Speed Reduction for the San Francisco Traffic Separation Scheme is in effect May 1 to November 15.

West coast ship strike reduction efforts are aimed at reducing mortality of endangered blue, fin, and humpback whales in national marine sanctuaries.

Greater Farallones assists NMFS in preventing whale strike during SF Bay regatta

At the request of NOAA Fisheries (NMFS) Office of Protected Resources (OPR), Greater Farallones National Marine Sanctuary communications staff provided assistance in helping to prevent whale strike during SailGP's San Francisco Gran Prix regatta. The international competition and associated heats occurred in April and early May when an unprecedented number of gray whales, many in distress, had detoured from sanctuary waters into the bay, some into the race area near the Golden Gate.

NOAA-OPR, in consultation with sanctuary staff, provided a plan to reduce the chance of vessel strike in practice and contest areas, with qualified whale spotters so the race could be suspended if a whale entered a danger zone. Farallones also provided observation platforms for the observers.

Protecting Marine Habitats

Coastal access points mapped to support kelp recovery project

On June 19 to 21, staff from the Greater Farallones Association mapped 47 coastal access points along 100 miles of the northern California coastline. These points are adjacent to locations determined to be priority regions for bull kelp restoration and recovery efforts. Data collected during this excursion will inform kelp canopy mapping efforts in the Fall of 2019. Staff also met with faculty at the UC Davis

Bodega Marine Lab to discuss research priorities for bull kelp restoration and recovery.



Point Arena coastal access, kelp bed. Photo: Rietta Hohman/GFA

Linking Concerns for Kelp Forest Health, Management Actions, Restoration

Conservation science staff represented GFNMS interests and participated as a team member on the State's Red Abalone Fishery Management Planning team. Approximately 60 people attended this first meeting to integrate management strategies, prepare for climate impacts in the kelp forest ecosystem, identify science issues, exchange scientific information, and design a *de minimis* recreation fishery while kelp forest restoration actions continue along the Sonoma and Mendocino county coasts. Participants ranged from recreational fishing advocates, California Department of Fish and Wildlife, Ocean Protection Council, The Nature Conservancy, UC Santa Cruz, and members from the Kashia Band of Pomo Indians tribe.

Sharing skills and expertise among state and federal management agencies, tribes, researchers, and the public make restoration actions more successful, builds trust and cooperation that collaboratively addresses resource management

actions, and restores and maintains a healthy coastal environment.

Greater Farallones Association releases comprehensive kelp restoration/recovery plan

The Greater Farallones Association released a comprehensive Sonoma-Mendocino Bull Kelp Recovery Plan which outlines strategies to address the devastating loss of bull kelp forests along the northern California coast. The plan is prepared for the Greater Farallones National Marine Sanctuary and the California Department of Fish and Wildlife and will be jointly implemented by the Association, the Sanctuary, and community partners.

Since 2014, more than 90% of bull kelp forest canopy extent has been lost along the Sonoma and Mendocino counties' coastline. The Bull Kelp Recovery Plan outlines strategies for active restoration, monitoring, research, and community engagement.



Purple sea urchin "barrens" replace former kelp habitat, which has profoundly changed coastal marine communities. Cr: Katie Sowul, CDFW.

EDUCATION

Inspiring an Ocean Conservation Ethic

National Marine Sanctuary System education and communications staff convene, strategize

Education and communication staff from across the National Marine Sanctuary System (NMSS) met in Newport News, Virginia at the end of April for a week, to learn about national initiatives, receive training and provide input on how to improve and evolve education and communication programs. Monitor National Marine Sanctuary hosted the meeting at the Mariners Museum. Session topics included: The role of education in resource protection; the Earth is Blue outreach campaign; the recreation and tourism initiative of 'Get Into Your Sanctuary'; virtual reality possibilities and the National Marine Sanctuary Foundation update on their new strategies. Training sessions were held on creating infographics and using sanctuary branding. A half-day workshop on how to be relevant and inclusive to reach diverse audiences was provided by Youth Outside. Education coordinators from across the NMSS meet annually at a different sanctuary site, this is the first meeting that included communication and additional education staff to further improve and grow education and outreach across the NMSS.

Farallones Education staff set objectives for innovative programming, communications

On June 11, 2019, the Farallones education team spent the day reviewing, refining, changing, updating and planning education and communication strategies for the year ahead. Some highlights include: developing a stronger scholarship fund to ensure diverse participation in sanctuary programs; further incorporating climate messaging and actions into select programs; and, growing our education volunteer program to exponentially increase

sanctuary ocean and climate literacy and stewardship initiatives.

Since education and outreach are among the national marine sanctuaries' most powerful resource protection tools, it is important to periodically assess, improve and grow our education and communication program initiatives to further build strong constituencies for the National Marine Sanctuary System.

Visitor Center

The Farallones Sanctuary Visitor Center serves ocean enthusiasts of all ages, from the San Francisco Bay Area and all over the world. It welcomes drop-in visitors, as well as structured programs for various ages and interests.

Visitor centers promote ocean literacy as well as other sanctuary education programs, through naturalists and exhibits.

School programs include plankton netting for view under a microscope, searching for shore crabs and activities in the Visitor Center to learn about animal adaptations. Students take part in indoor as well as outdoor activities on Crissy Field Beach in the Golden Gate National Recreation Area.



Visitor Center programs serve Bay Area students. Credit: Justin Holl/NOAA

Located in a historic Coast Guard station in San Francisco's Presidio, the center educates diverse audiences through exhibits and hands-on activities. Here you can find a silky sea otter pelt, serrated shark's teeth, blue whale baleen, live local intertidal creatures, and informed staff and volunteers that help foster connections between the public and our neighboring sea. The center is free to the public and attracts families, tourists, and locals Wednesday through Sunday, 10 am to 4 pm. Special programs and workshops are also offered on a regular basis, to join or to sponsor as private events. This quarter 4,124 people stopped by to "explore" our sanctuary virtually.

Visitor Center Field Trips: These programs promote ocean literacy and provide standards-based interactive programs inside the center and in the field for kindergarten through high school. Visitor Center field trips served 839 students this quarter.

Weekend Family Workshops

Weekend Family Workshops are held every month at Greater Farallones National Marine Sanctuary facilities. These programs foster connections within the sanctuary community and provide ocean education to children between ages four and ten. Family workshop programs are particularly engaging for young and curious ocean enthusiasts - and their parents - interested in learning about marine creatures. This quarter 424 people participated.

Squid, sand and turtles featured in workshops

The month of March (not previously reported) was a busy time for the education staff who hosted three family workshops with 68 attendees in total. The first workshop of the month took place on Saturday,

March 16, titled "Sand Scientists." Class participants examine different types of sand using microscopes.

On Saturday, March 23, the team hosted the highly popular "Squid for Squirts" program. This program draws large interest because it allows participants to dissect California market squid and for most attendees, it is their first time doing a dissection.

The third workshop, "Life as a Leatherback," took place on Sunday, March 31. During this class, participants learn about this endangered species and get to assemble a life-sized leatherback turtle model.

Families learn the "ins and outs" of a salmon

Farallones education staff taught a weekend family workshop with 31 attending on Saturday, April 6, titled "Dissecting Salmon." This workshop allows participants to learn about the anatomy of a hatchery Chinook salmon, through a participatory, naturalist-led dissection – from teeth to tail. Presentations include adaptations and survival strategies.



Salmon dissection demonstrates anatomy and adaptations.

Credit: Courtney Buel/GFA

On May 19, we hosted a combined squid dissection and crab fishing program for a birthday party with 25 attendees. Participants dissected squids in the Farallones Pier Classroom to learn squid anatomy. They used dissected materials to feed animals in the visitor center aquaria, demonstrating feeding techniques. Following that, to learn about crab diversity and anatomy, the group fished for crabs off the GFNMS campus pier. On May 25, Greater Farallones hosted another "Fish for Crabs" program for a birthday party with 50 attendees. Participants learned about crab diversity and anatomy before trying their hand at catching crabs off the GFNMS pier.

In June, the education staff conducted four education programs on June 1, 7, and 9. Each class had around 25 total attendees (parents and children). The families learned about the crabs in our sanctuary and their anatomy, by fishing for crabs off the pier using individual snares. Crabs that were caught were immediately released after participants had identified key anatomical features and determined gender.

The Greater Farallones Visitor Center hosted three June education programs. On June 15, we taught a new program where 35 attendees learned about the importance of a sandy habitat, how to be a sand scientist, and create sand art.

For Father's Day, June 16, staff taught a crab family workshop with 43 eager attendees. Families learned about the diversity of crabs in the sanctuary and their anatomy by fishing for crabs off the GFNMS pier.

On June 22, we held an event for 25 attendees to learn about the deep sea and build their own Remotely Operated Vehicles (ROV) which they drove in the waters off the GFNMS pier.

By providing thematic programs for family workshops and private events like birthday parties at GFNMS

facilities, we foster connections within the sanctuary community and provide ocean education to children between ages four and 10.

Families celebrate birthdays with wildlife theme

Greater Farallones hosted two weekend programs for private events. On May 4th, the Visitor Center hosted a combined Bioblitz and squid dissection for a Girl Scout group of 25 attendees. Participants began a blitz, using binoculars, on Crissy Field beach outside the Greater Farallones National Marine Sanctuary Headquarters (GFNMS), recording all the species they observed. Later, the group dissected squids in the GFNMS pier building to understand the squid's anatomy in comparison to our own.

On May 11th, the Visitor Center hosted a "Fish for Crabs" program for a birthday party totaling 50 attendees. Participants learned about crab diversity and anatomy before trying their hand at catching crabs off the GFNMS pier.

Oceans after School Programs

Taking marine science into classrooms

Using the endless appeal of our local marine wildlife and habitats, the Sanctuary Education Team offers 16 hours of fun, hands-on, lively marine science learning in after-school programs that cover topics such as sharks, salmon, seabirds, whales, squid, and plankton. These enrichment programs are dynamic, interactive, and integrated into state standards. Sanctuary marine science educators deliver the programs during a nine-week window and primarily serve low-income, under-served students. Two hundred eighteen students completed the program this quarter.

Funding from the City of San Francisco enables the sanctuary to align the program curriculum to the Next Generation Science Standards, to provide hands-on workshops at the sanctuary visitor center to families of Oceans After School participants. The program supports multiple objectives of the Office of National Marine Sanctuaries' Education Strategic Plan.

Oceans after School at 7 Tepees youth program

From March 29 to the end of May 2019 GFNMS educators visited Seven Tepees Youth Program and taught nine after-school programs to 12 middle school students, furthering the sanctuary's mission to improve ocean literacy, understanding of marine sanctuaries, and marine science education. Students learned about the GFNMS through hour-long programs including salmon dissections, live crab studies, and plankton studies. The final day involved a field trip to Heron's Head Park to birdwatch and do catch and release crab fishing. Seven Tepees serves mainly Hispanic youth in San Francisco's Mission District.

At Your School Programs

The At Your School (AYS) programs serve schools throughout the San Francisco Bay area and beyond, primarily during the school term. The AYS program has reached tens of thousands of students with programs such as the Crab Cab, Seabird Shuttle, Sharkmobile and Ocean Acidification. AYS is an outreach program of Greater Farallones National Marine Sanctuary designed to promote environmental literacy and increase students' awareness and knowledge of coastal and marine life. It includes standards-based interactive classroom programs for kindergarten through twelfth grade.

Greater Farallones brings 3,782 students marine science education in 2018-19 school year

From October 2018 through June of 2019, instructors for the Greater Farallones at Your School Program taught 160 marine science outreach programs in seven separate counties. A total of 3,782 students in pre-Kindergarten up through 12th grade participated of these, 1,787 this quarter (April through June) alone. Programs focused on plankton, crabs, seabirds, sharks, leatherback turtles, deep sea coral communities and the impacts of ocean acidification. Program elements included games, hands-on activities, scientific observations and lively discussions surrounding stewardship and conservation of ocean resources.

The AYS program brings specimens, live animals and engaging activities into the classrooms of the San Francisco Bay Area and Northern California coastline with the goal of connecting students with their National Marine Sanctuaries and increasing ocean literacy through hands-on learning.

Sanctuary Exploration Series

The Farallones Sanctuary Exploration Series provides monthly opportunities for the public to get into our national marine sanctuaries. Building a strong public sanctuary constituency as well as inspiring ocean literacy, conservation ethics and wildlife etiquette through experiential learning are the goals for the series. Ninety-two people took part this quarter.

Visiting Alcatraz "jailbirds"

Alcatraz Island, infamous for its federal prison, supports the only nesting colonies of Brandt's and Pelagic Cormorants in San Francisco Bay. They "commute" into sanctuary waters to provision their

chicks. Nineteen participants from the Sanctuary Explorations program joined the Alcatraz docent coordinator and sanctuary staff for a thought-provoking walk through the rookeries to learn about their ecology and conservation status on May 26. They learned about Pigeon Guillemots, Black-crowned Night Herons, Snowy Egrets, and others. Participants on the excursion learned about the impacts of human disturbance and efforts to protect them in this highly urbanized location and elsewhere. They were fortunate to see birds in breeding plumage and some were actively attending nests with eggs or newly hatched chicks.



Brandt's Cormorants nesting and chick-tending at Alcatraz. Credit: Sara Heintzelman, GFNMS/NOAA

Farallones "Earth Day" coastal wildlife cruise encounters whales, Steller's sea lions

Greater Farallones National Marine Sanctuary education staff partnered with the Oceanic Society to provide an opportunity to watch the gray whale migration on Saturday, April 27. Forty-four participants from the Greater Farallones Sanctuary Explorations program had a great day of sightings including several gray whales on their northward migration, a Steller's sea lion, California sea lions, and many seabirds including phalaropes, Brown Pelicans, Common Murres, Western Grebes and many types of gulls.

Participants not only learned about the natural history of gray whales and the conservation efforts to protect

this amazing species, but they also about good whale watching practices and etiquette. All enjoyed celebrating Earth Day, marveling at some of the ocean's extraordinarily adapted creatures.



Steller's sea lion "recalibrates" blood chemistry during post-dive haulouts. Credit: Sara Heintzelman/NOAA-GFNMS

Greater Farallones World Ocean Day celebrates life between the tides

Greater Farallones National Marine Sanctuary education staff and docents celebrated World Oceans Day and provided a tidepool adventure for Sanctuary Exploration participants at Duxbury Reef on Saturday, June 8, 2019. Twenty-one participants explored the intertidal habitat at the edge of the sea while learning how the animals and algae survive under ever-changing conditions. Participants found chitons, anemones, urchins, nudibranchs, many species of algae and spotted whelk eggs.

Excursions also teach participants proper tidepool etiquette to explore and view intertidal marine life in a respectful, safe manner.



Sea anemone, NOAA Photo Library



Nudibranch, or sea slug, stretches its pale blue sensory tentacles. Photos: Sara Heintzelman, NOAA/GFNMS

LiMPETS – Long-term Monitoring Program & Experiential Training for Students

The Long-term Monitoring Program and Experiential Training for Students – LiMPETS – is a statewide national marine sanctuary program that trains teachers and students to become involved in real scientific investigations and become ocean stewards. It is a citizen science program that monitors the coastal ecosystems of California and helps youth develop a scientific understanding of the ocean. LiMPETS monitors the biology in rocky intertidal and sandy beach ecosystems and aims to provide publicly accessible, scientifically sound, long term data to inform marine resource management and the scientific community. This quarter, 684 students and teachers from various schools and partners in the Bay Area carried out LiMPETS shore surveys. This

included in-class trainings and individual monitoring events at different monitoring sites. For details on LiMPETS, see www.limpets.org

LiMPETS students help track sea star wasting syndrome

The Greater Farallones LiMPETS team presented at Greater Farallones National Marine Sanctuary's Advisory Council Meeting on May 22, 2019. LiMPETS provided updates on recent modifications to the protocols that strengthen the scientific efficacy and value of LiMPETS student-collected data. Among these improvements was the adoption of size measurements and identification of sea star wasting syndrome (SSWS) infections in ochre stars reported at LiMPETS rocky intertidal sites statewide. By tracking sea star abundances and signs of SSWS on our coast students can help scientists and resource managers to track ochre star recovery and the presence of SSWS in our coastal ecosystems. Student-collected ochre star counts decreased dramatically at several northern California sites following the onset of SSWS in 2013 and Warm Blob ocean conditions in 2014. Students will continue to monitor size and abundance of ochre stars to track size frequencies, abundances, and infection rates.

LiMPETS Network Enhances Scientific Credibility

The LiMPETS network, including staff from the NOAA Office of National Marine Sanctuaries, Greater Farallones Association, and the Pacific Grove Museum of Natural History hosted a webinar with several invited scientists and California state resource managers who serve on the LiMPETS Science Advisory Panel. The purpose of the webinar was to review improvements to the LiMPETS training materials and database, and to discuss recent modifications to the sandy beach monitoring protocols. The group also reviewed potential

collaborations with researchers tracking the impacts of sea star wasting disease on west coast ochre star populations.

These quarterly webinars are aimed to enhance LiMPETS' ability, as a citizen science program, to address the science needs and resource protection issues of the national marine sanctuaries involved. LiMPETS reaches over 6,000 students annually statewide, exposing them to California's sanctuaries and engaging them as ocean stewards.

Partner Events

Celebrating 50 years of stewardship at Fitzgerald Marine Reserve

Greater Farallones education staff have been celebrating with San Mateo County Parks their 50th Anniversary of protecting Fitzgerald Marine Reserve. The first celebration was on March 16th and celebrated three aspects of Reserve history – geologic, natural and human, with a series of lecture stations throughout the reserve with Rangers and Friends of Fitzgerald Marine Reserve docents interacting with visitors. Sanctuary staff assisted with the natural history station at the Reserve. The main event was on May 11th which recognized over a dozen partner agencies and individuals that have contributed to the stewardship efforts at the Reserve. Over 250 visitors interacted with staff at the Greater Farallones National Marine Sanctuary exhibit, which showcased education, LiMPETS and Beach Watch programs at the Reserve. Collectively, these various agencies and individuals have ensured protection of this special part of the sanctuary through education, research and stewardship.

Greater Farallones Association attends "We All Need a Little Kelp" Earth Day EcoFest

On April 27, Greater Farallones Association (GFA) took part in the Pacific Beach Coalition Earth Day EcoFest celebration in Pacifica. The theme was "We All Need a Little Kelp" with a focus on kelp forest habitats and their conservation along the California coast. GFA staff and volunteers taught the public about giant and bull kelp, about marine life that depend on kelp forests, issues surrounding kelp loss in North-central California, and how GFA and GFNMS are contributing to recovery efforts.

Engaging with and educating the public about marine life and habitats in our sanctuary is important to build an informed community of stewards. This event helped us extend our reach and bring awareness of the sanctuary to the South Bay Area.



Photo: Attendees learn about kelp habitats and make kelp art! Credit: Alayne Chappell/GFA

2019 Calendar Updates

July

20 Bolinas Lagoon Kent Island restoration

August

2-4 Get Into Your Sanctuary days! Watch our website for details. See <https://Farallones.noaa.gov/events>

- 15 Joint meeting GFNMS/MBNMS advisory councils, Half Moon Bay CA
- 17 Kent Island/Bolinas Lagoon restoration public workdays: kbimrose@farallones.org

September

- 6 & 21 Kent Island/Bolinas Lagoon habitat restoration community days. See kbimrose@farallones.org
- 7 & 15 Invasive green crab removal, Seadrift. See kate.bimrose@noaa.gov
- 28 SharktoberFest! GFNMS Campus, San Francisco Presidio. Free! See <https://farallones.noaa.gov> for details.

October

- 4 & 19 Kent Island/Bolinas Lagoon habitat restoration community days. Contact kbimrose@farallones.org

November

- 16 Seaweed Soiree: Adult evening of art and science with Dr. Karina Nielsen, EOS/SFSU, and talk and exhibits by marinelife artist Josie Iselin. See www.farallones.noaa.gov/events

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## Ongoing Public Programs

### Exploring Greater Farallones Sanctuary!

Year-round, the Sanctuary Explorations Series provides monthly opportunities to connect with and experience the sanctuary and surrounding waters. Excursions include bioluminescence paddling, whale and wildlife cruises, coastal hikes and tidepooling. Join one of our seasonal programs!

Visit <http://farallones.noaa.gov/visit/exploration-program.html>

### Greater Farallones Visitor Center

The Visitor Center in the San Francisco Presidio offers special Weekend Family Workshops about sharks, squid, salmon, octopuses, plankton, ROVs and sea otters! These programs can also be booked for your exclusive birthday parties or special event. To book programs for individuals, or special events, contact [Justin.Holl@noaa.gov](mailto:Justin.Holl@noaa.gov). Wednesdays through Sundays, 10 a.m. to 4 p.m., our VC naturalists can introduce you to our aquarium critters. Drop in!

### Bolinas Lagoon/Kent Island Restoration

From April to October, teams remove invasive plants on Kent Island to restore native plants and wildlife in Bolinas Lagoon and restore the normal flow of tidewater. Friday and Saturday programs – free! Contact Kate Bimrose at [kbimrose@farallones.org](mailto:kbimrose@farallones.org), <https://farallones.noaa.gov/eco/bolinas/kentisland.html>

### Sanctuary Soirées

Sanctuary soirées are held twice yearly, and are sophisticated evenings celebrating science, art and culture. They feature top-of-the-line scientist presentations blended with arts, music and crafts for an adult (16+ yrs.) audience. These events are held each spring and late fall. Keep posted through our website at <http://farallones.noaa.gov/> and our nonprofit association at <http://farallones.org>

## GET INVOLVED, AND STAY INFORMED!

Visit the Greater Farallones Association website for updates, details and registration for sanctuary expeditions: [www.farallones.org](http://www.farallones.org), as well as the

Association Facebook page. The Farallones sanctuary Facebook is also now up and running at [Facebook.com/the Farallones sanctuary](https://www.facebook.com/theFarallonesSanctuary).

To learn how you can become involved in the sanctuary visit: <http://Farallones.noaa.gov>; or to subscribe to Upwelling, the Farallones Marine Sanctuary Association newsletter: visit <http://www.Farallones.org>.

Learn more about the Sanctuary Advisory Council: [http://Farallones.noaa.gov/manage/SanctuaryAdvisory Council.htm](http://Farallones.noaa.gov/manage/SanctuaryAdvisoryCouncil.htm)

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### Superintendent's Quarterly Report

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