

OLYMPIC COAST NATIONAL MARINE SANCTUARY

A Report for Sanctuary Advisory Council Members

Reporting Period: July 15 - September 15, 2017

ABOUT THE SANCTUARY

Olympic Coast National Marine Sanctuary spans 3,188 square miles of marine waters off the rugged Olympic Peninsula coastline. The sanctuary extends 25 to 50 miles seaward, covering much of the continental shelf and several major submarine canyons.

The sanctuary protects a productive upwelling zone home to numerous marine mammal and seabird species, diverse populations of kelp and intertidal algae, and thriving invertebrate communities. The sanctuary is also rich in cultural resources, with over 150 documented historical shipwrecks and the vibrant contemporary cultures of the Makah, Quileute, and Hoh Indian Tribes and the Quinault Nation.

OFFICE REPORT

OLYMPIC COAST NATIONAL MARINE SANCTUARY NEWS AND PROGRAM UPDATES

Organized by Olympic Coast National Marine Sanctuary (OCNMS) management plan priority areas.

Table of Contents

Treaty Trust Responsibilities.....	p. 1
Ocean Literacy.....	p. 2
Collaborative Research, Assessments & Monitoring....	p. 5
Conserve Natural Resources.....	p. 6
Cultural, Historical and Socioeconomic.....	p. 7
Permitting.....	p. 8
Natural History.....	p. 9
Regional/ National News.....	p. 9



The Passing of an Olympic Coast Champion

Melvin Moon, Jr. was the director of the natural resources for the Quileute Indian Tribe. His policy forming efforts helped to protect tribal treaty rights and resources. He was an approachable leader who focused on collaborative efforts within the tribe as well as serving on several state and federal committees. Mel was awarded the first Billy Frank Jr. Leadership Award in March 2017 in appreciation for his inspiring communal direction in cooperatively managing natural resources.

TREATY TRUST RESPONSIBILITIES

Chalá'at: People of the Hoh River watershed camp

July 11 through July 15, 2017, Olympic Coast National Marine Sanctuary education staff, in partnership with Hoh Tribe Natural Resources and Hoh Tribe Youth Programming conducted the third annual Hoh Watershed Adventure Camp. Twenty-six Hoh Tribal youth and 18 Hoh Tribal adults participated in the five-day camp exploring the usual and accustomed (U&A) area of the Hoh Watershed and its significance to the Hoh people. Tribal elders provided historical context to the natural/cultural resources significant to the tribe, while sanctuary staff and camp leaders discussed western science resource management techniques and equipment used to manage the resources today.



The five-day camp commenced at Hoh Rainforest in Olympic National Park and ended at the mouth of the Hoh River and Olympic Coast National Marine Sanctuary. The camp focused on connecting Hoh Tribal participants with their culture, treaty rights, traditional resources, and harvesting, as well as ocean acidification and climate change and its effects on their resource sustainability. For more information contact nicole.harris@noaa.gov or jacqueline.laverdure@noaa.gov



Olympic Coast National Marine Sanctuary staff celebrates Makah Days

Olympic Coast National Marine Sanctuary education team participated in the 93rd Annual Makah Days, held in Neah Bay, Washington, August 24-26, 2017. The event brought thousands of people out to celebrate the cultural and maritime history of the Makah Tribe. Makah Days activities included traditional dancing and singing, as well as canoe races, a street fair, and a parade. Sanctuary staff provided hands on activities and information encouraging ocean literacy. For more information nicole.harris@noaa.gov or chris.butler-minor@noaa.gov



IMPROVE OCEAN LITERACY

Junior Oceanographers discover Olympic Coast and Marine Life Center

Olympic Coast National Marine Sanctuary Hollings Scholar, Hannah MacDonald, developed and led a four-day summer camp for children, ages 10-12 and one for ages 13-15, in partnership with Feiro Marine Life Center in Port Angeles, Washington. In the 10-12 age camp, the students learned about different types of marine species and ecosystems as well as the threats they are under. The camp focused on marine stewardship through inquiry-based and hands-on learning that included a microplastic experiment, reusable t-shirt bags, marine debris Family Feud, and a beach cleanup. Each day the students conducted a lunch audit to recognize the amount of single use plastics thrown away. Through innovative packaging, the students reduced their lunch waste by 51% throughout the camp. At the end of every day, students were given time to create solutions to some of the most pressing ocean issues, marine debris, ocean acidification, and overfishing. Students developed filters for sinks to stop microplastics, cruise ship vacuums to suck out debris, and creative campaigns about ocean acidification to present to the governor as some of their stewardship solutions. The older students learned about different types of marine technology and ecosystems, as well as the threats they are under. The camp focused on marine technology through inquiry-based and hands-on learning that included a building and using a remotely operated vehicle, creating a do-it-yourself plankton net and secchi disk, creating a seafloor map and partaking in a remotely operated vehicle competition. Students were able to communicate with the E/V *Nautilus* for an interactive ship to shore experience. Students also learned about the various forms of careers and research objectives through the Olympic Coast National Marine Sanctuary Careers board game. The final remotely operated vehicle competition allowed the students to showcase their robots, newly developed piloting skills, and teamwork capabilities to their friends and family at the Port Angeles City Pool.



Olympic Coast campers become ROV pilots and connect to E/V *Nautilus*

Olympic Coast National Marine Sanctuary Hollings Scholar Megan Boice planned and implemented *Underwater Robotics Camp* for 10 through 12 year olds in partnership with Feiro Marine Life Center in Port Angeles, Washington. On the first day of camp, campers learned about seafloor features and the challenges of working in the deep sea, including pressure and lack of light. After investigating buoyancy and balance, they built their remotely operated vehicles (ROVs) and practiced maneuvering to pick up objects. A highlight for the students was a ship to shore event with the E/V *Nautilus* Corps of Exploration Team where campers enjoyed asking questions about the ship's ROV capabilities. To connect with the biology of the sanctuary, campers became deep sea coral biologists and analyzed two transects. They also explored deep sea animal camouflage with activities about bioluminescence and coloration. On the final day of camp, teams completed two missions: one focused on whale falls and the unique organisms found on them and the second focused on Olympic Coast shipwrecks. This camp emphasized how underwater robotics can help us understand and explore the ocean.



Olympic Coast teachers engineer solutions for a changing environment

Thirteen formal educators along Olympic Coast participated in the annual Ocean Science teacher professional development workshop hosted in partnership with Olympic Coast National Marine Sanctuary and Pacific Education Institute (PEI), exploring ocean acidification and its potential impacts to the marine environment and coastal communities. Over the three-day workshop, participants walked through the steps of PEI's Problem Based Learning Model, while investigating the intertidal areas of Ruby Beach in OCNMS. Teachers spent time describing the ecosystem, defining the problem (ocean acidification), researching the problem, understanding stakeholders, determining solutions, and developing a plan for their classroom, while enjoying field journal sketching lessons, classroom activities demonstrating ocean acidification, and hearing from local specialists. Following the workshop, teachers are more prepared to introduce the global challenge of ocean acidification while focusing on local impacts and community based solutions that their students can engage in. For more information, contact nicole.harris@noaa.gov.



Omaha teachers study human impacts on the environment through marine debris studies in Olympic Coast

Olympic Coast National Marine Sanctuary educators met with 23 teachers from Omaha, Nebraska to introduce them to national marine sanctuaries, ocean conservation, and marine debris. As part of an inquiry-based immersion teacher professional development, the Omaha public school teachers spent a week exploring the environments of the Olympic Peninsula, from mountaintop to shoreline. Following an overview of OCNMS and marine debris, the teachers split into groups to conduct marine debris surveys, categorizing the debris characteristics, while planning ways that students from Omaha can be part of the solution in creating trash-free seas. Following the field investigation and exploration of Second Beach, the teachers went through John Anderson's BeachCombers museum, where 40 years of beachcombing has led to an amazing display and story of our consumer habits, and disposable lifestyle. Forty years ago the most common item found on the beach was a glass float or bottle; today, it is single-use plastic water bottles. Participating teachers will be looking to connect with sanctuaries through the upcoming school year to share the plastic reducing efforts of their students. For more information contact nicole.harris@noaa.gov.

Junior Oceanographers explore marine food chains



Olympic Coast National Marine Sanctuary Hollings Scholar Megan Boice implemented her final Junior Oceanographer Camp for summer 2017 in partnership with Feiro Marine Life Center in Port Angeles, Washington. This camp for five and six year olds focused on two marine food chains important in the sanctuary. Plankton, salmon, and resident orcas make up one chain, while kelp, sea urchins, and otters comprise the other. They took a plankton tow from the local pier and looked at the samples under a microscope, talked about kelp forests, and fed some of Feiro’s urchins. Campers became orca researchers and worked on orca identification and echolocation with Southern Resident pods. They also talked about how otters stay cozy in our kelp forests and make sea otter puppets. To round out the camp they talked about decomposers on the final day of camp by making “hagfish slime” and talking about energy in the deep sea. This camp emphasized how sanctuary

organisms live and eat, a topic even the smallest scientist can understand.

Olympic Coast audiences connect to Exploration Vessel *Nautilus* with ship to shore opportunities

Seventy-five community members from Port Angeles, Forks, and Clallam Bay, Washington participated in ship to shore presentations at their local libraries, hosted by Olympic Coast National Marine Sanctuary education staff. While Exploration Vessel *Nautilus* conducts remotely operated vehicle (ROV) and autonomous underwater vehicle (AUV) missions exploring the deep sea and collecting ocean chemistry data in OCNMS, land-based audiences took advantage of the telepresence of *Nautilus*, connecting directly with scientists onboard the ship to ask questions and hear about the missions first hand. Each presentation was followed by hands-on ROV activities where participants could try their hand at building and flying a student ROV made from PVC and bilge pump motor kits. The library events were part of several ship to shore presentations over the last two weeks connecting classrooms and summer camps as well as private and public audiences to the waters of Olympic Coast and the world of ocean exploration. For more information contact nicole.harris@noaa.gov

Olympic Study Club studies Olympic Coast National Marine Sanctuary

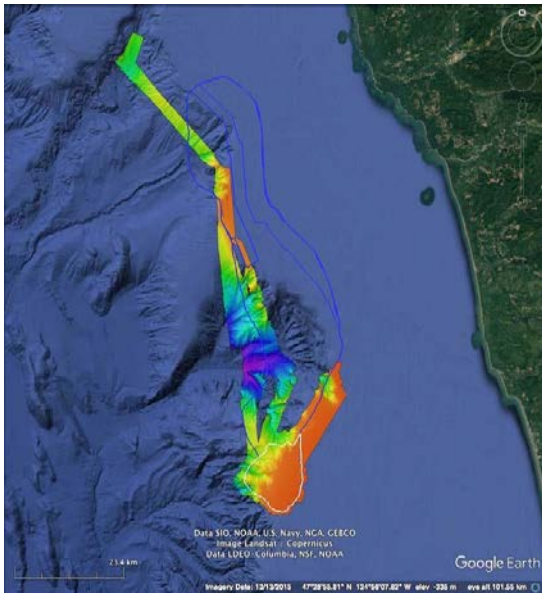
Olympic Coast National Marine Sanctuary education staff provided a presentation to 22 members of the Olympic Study Club on our nation’s marine protected areas, and the national marine sanctuary in their backyard. The engaged and well-informed group was eager to hear about the current research and education in OCNMS, as well as enjoying the highlights of the E/V *Nautilus* exploration cruise to catch a glimpse of what lies beneath the surface of our coastal waters.

For more information contact nicole.harris@noaa.gov

Olympic Coast National Marine Sanctuary early player in planning of the 2018 North American Association of Environmental Education annual conference

Olympic Coast National Marine Sanctuary staff met with partners around Washington State for early conversations planning the 2018 North American Association of Environmental Education (NAAEE) annual conference to be held in Spokane, Washington. Educators for the Environment, Equity and the Economy (E3) Washington and NAAEE brought together the collaboration of organizations representing informal and formal educators to discuss the themes and topic threads that will bring hundreds of participants from around the world to participate in this annual conference. Water and community resiliency will be dominant themes, providing opportunities for NOAA, including the National Marine Sanctuary System, BWET (Bay-Watershed Education and Training), and National Marine Fisheries, to be highlighted throughout this gathering of educators, students, and researchers. For more information contact nicole.harris@noaa.gov

CONDUCT COLLABORATIVE RESEARCH, ASSESSMENTS, AND MONITORING TO INFORM ECOSYSTEM-BASED MANAGEMENT



E/V *Nautilus* maps sections of Quinault Canyon in Olympic Coast National Marine Sanctuary

At the end of June, the E/V *Nautilus* spent a day and a half conducting multibeam surveys of a priority area along the southern rim of Quinault Canyon on behalf of Olympic Coast National Marine Sanctuary. The area forms part of an offshore priority mapping gap identified by many partners through a spatial prioritization process conducted for Washington State in 2015. The area of interest was also targeted to help with site selection and dive planning for remotely operated vehicles (ROVs) and an autonomous underwater vehicle during the submarine canyon and deep sea habitats expedition from August 18 to September 4.

For more information contact jenny.waddell@noaa.gov.

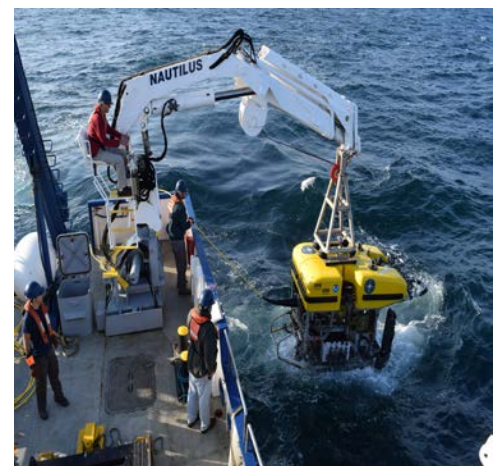
Olympic Coast completes 16-day research expedition on the E/V *Nautilus* to study submarine canyons and deep sea habitats

On Labor Day, Olympic Coast National Marine Sanctuary staff completed a 16-day research expedition to explore three of the four prominent submarine canyons of the Olympic Coast. The expedition was conducted from the E/V *Nautilus*, a research vessel operated by Ocean Exploration Trust that has been equipped with advanced telepresence technology that allows the ship to livestream a video feed originating from sophisticated robots at the bottom of the ocean. In this way, the expedition was shared with thousands of people around the world, as well as through live events and interactions with people throughout the United States.



Using remotely operated vehicles (ROVs) and an autonomous underwater vehicle (AUV) to explore Quinault, Quileute, and Juan de Fuca Canyons, the team encountered a dazzling variety of interesting deep sea species including corals, sponges, fish, octopuses, and other invertebrates. Other highlights included the recovery of critical ocean observing assets belonging to NANOOS and University of Washington, and a visit to the USS *Bugara*, a WWII-era submarine that served our country through three wars before sinking while under tow off Cape Flattery in 1971. Thanks to close partnership with Coastal Treaty Tribes, tribal perspectives on Olympic Coast resources were shared throughout the dive narrations, significantly enhancing the viewer experience.

For more information contact jenny.waddell@noaa.gov.



CONSERVE NATURAL RESOURCES IN THE SANCTUARY



West Coast Marine Mammal Stranding Network responds to live stranding

On August 16, 2017, an Olympic National Park (ONP) visitor reported a live whale stranded in the Kalaloch area on a beach co-managed by ONP and Olympic Coast National Marine Sanctuary. Staff from ONP, National Marine Fisheries Service, Washington State Department of Fish and Wildlife, and Cascadia Research Collective were on site providing supportive care, keeping the animal cool, moist, protected from the sun, and free of scavengers. The animal was stranded on the remote beach for about three days. Plans to attempt to free the 24-foot whale succeeded during the high tides on August 19, 2017. Media attention to the incident was significant. Sanctuary staff monitored the situation and consulted with agency partners on response

activities. For additional information contact carol.bernthal@noaa.gov.



Observant Vacationer identifies Invasive Species

On August 20th, a member of the public, on vacation on the Makah Reservation, observed what they suspected was a green crab. They reported the observation to the Washington Sea Grant [Crab Team](#), who confirmed that it was the highly invasive European green crab (*Carcinus maenas*). Resource agencies and the Makah Tribe have been notified and are currently discussing how to respond. While this animal has recently been observed in Washington's inland waters, we believe this is the first sighting on the Olympic Coast.

UNDERSTANDING THE SANCTUARY'S CULTURAL, HISTORICAL AND SOCIOECONOMIC SIGNIFICANCE

Seattle Fleet Week Stewardship Symposium

Olympic Coast National Marine Sanctuary attended the Inaugural Seattle Fleet Week Stewardship Symposium. Seafair has hosted Fleet Week on the Seattle waterfront since 1950 in celebration of the men and women who serve our country. This is an opportunity for the maritime services to interact with the community. This year the Naval Region Northwest added an event for partner-agency representatives to discuss the Navy's current mission, review environmental and compatibility initiatives of the Navy in the Pacific Northwest, and seek ways to improve relationships with our stewardship partners. For information contact george.galasso@noaa.gov

Olympic Coast makes a splash for Get Into Your Sanctuary Day



Olympic Coast National Marine Sanctuary made a splash for Get Into Your Sanctuary Day showcasing tidepools, art, games – and even whales! Approximately 75 people joined in discovery and fun at Kalaloch area beaches. Sanctuary staff led a morning tidepool and beach walk. Afternoon activities included a beach picnic, ocean themed costume making and face painting, games, and an interactive beach sand mural. The culminating event was a Sanctuary Splash where a hardy crew plunged into the cold sanctuary surf. The main attraction was a pod of gray whales playing in the surf nearby throughout the day.

For more information contact jacqueline.laverdure@noaa.gov.

Sanctuary Staff Highlight Sanctuary Work to Senator Cantwell

At the request of Nicole Teutschel, senior staff for Senator Maria Cantwell, sanctuary staff provided an update on key initiatives underway at Olympic Coast National Marine Sanctuary. Updates included progress on establishing a sentinel site for ocean acidification, Pacific Northwest Bay Watershed Education Program, efforts to establish a marine discovery center in Port Angeles, and the E/V *Nautilus* expedition to document the sanctuary's canyon habitat, collect ocean acidification information, and exploration of the WWII era submarine, *Bugara*. For more information, contact carol.bernthal@noaa.gov.

Office of National Marine Sanctuaries Maritime Heritage Program collaborates on USS *Bugara* Survey

It was on June 1, 1971 when the *Bugara* sunk while undertow to participate in a live warhead evaluation of the Mark 48 torpedo as a target vessel. It now lies within, and is protected by, NOAA's Olympic Coast National Marine Sanctuary in about 800 feet of water. No one was aboard the submarine when it went down. On Friday, Aug. 25, the public and submarine veterans were invited to the U.S. Naval Undersea Museum, Kitsap, Washington to watch live the first archaeological survey of the wreck of the USS *Bugara* (SS 331). The *Bugara* is a U.S. Navy submarine that received three battle stars for its service in World War II, and continued to serve the country during the Korean and Vietnam conflicts.

As part of Exploration Vessel *Nautilus*'s mission to Olympic Coast National Marine Sanctuary, a team of archaeologists from NOAA and the U.S. Navy, supported by subject matter experts, collaborated on an archaeological survey of the WWII era submarine USS *Bugara*. The objective of the dive was to assess the site's general condition, document deterioration, and any human impacts, in addition to characterizing the marine environment including marine organisms and physical oceanographic parameters. Through the power of telepresence-enabled exploration, the dive was directed from NOAA's Silver Spring Exploration Command Center, by NOAA's Maritime Heritage Program's Frank Cantelas, Naval History and Heritage Command's Dr. Robert S. Neyland, and SEARCH2O's Dr. James Delgado. These archaeologists were joined by 96-year-old Ed Ettner, USS *Bugara*'s Commanding Officer in 1957-1958, who shared his intimate knowledge of the submarine. An additional four crewmembers viewed the dive live from the U.S. Naval Undersea Museum, Keyport, Washington.

The mission was broadcast live on <http://www.nautiluslive.org/> reaching approximately 16,000 unique viewers worldwide. For more information contact george.galasso@noaa.gov or https://nmssanctuaries.blob.core.windows.net/sanctuaries-prod/media/shipwrecks/bugara/uss_bugara_fact_sheet.pdf



Sanctuary Permitting

Issued Permits and Authorizations

OCNMS-2017-005 – Van Helker, NOAA/NMFS/AFSC/MML

Project Title: Aerial surveys of Olympic Coast National Marine Sanctuary Steller sea lion sites with an unmanned aircraft

Permitted Activity: Low altitude overflights with a unmanned aerial system (APH-22) in the vicinity of Carroll Island and Sea Lion Rocks

Project Location: Surface to 400 feet above ground level and within 0.5 nm of Carroll Island (48.0003 N 124.7200 W) and Sea Lion Rock (47.9900 N 124.7233 W)

Permit Duration: The 20 days between and including 7/10/2017 to 7/30/2017

Comment: This permit is valid for use of the APH-22 hexacopter described in the permit application. Coordination of overflights with UAS and manned aircraft is necessary for both safety and scientific reasons. During field operations with the UAS, the permittee shall observe wildlife, including pinnipeds, Common Murres, and Tufted Puffins, and other seabirds on Carroll Island to evaluate response to UAS operation.

OCNMS-2012-006-A1 – Dr. Simone Alin, Pacific Marine Environmental Laboratory

Project Title: Wave Glider in Support of Ocean Acidification Research

Permitted Activity: Discharge to sanctuary waters, by an autonomous surface vehicle referred to as a wave glider

Project Location: Proposed discharge sites are Cape Flattery, Cape Alava, and Second or Third Beach

Permit Duration: Originally a five-year permit, it will be extended by 3 months

Comment: This permit needs to be amended to extend the time period through the end of this field season.

OCNMS-2017-009 – Dr. Brad Hanson, NOAA/NMFS

Project Title: Determining the distribution of killer whales and other cetaceans in the coastal waters of the U.S. using acoustic recorders

Permitted Activity: Deployment of bottom-anchored moorings of an acoustic recorders within sanctuary waters

Project Location: 48 28.588 N 124 40.484 W, 48 09.985 N 125 37.143 W, 47 52.818 N 124 40.856 W

Permit Duration: Three years

Comment: Site assessment for potential maritime heritage targets must be completed at each buoy location. Anchors that will be deployed and abandoned in OCNMS will have a “trawl friendly” design. At the time of deployment or within one week after return to port following deployment, the permittee will submit a Local Notice to Mariners (LNM) to the U.S. Coast Guard District 13 regarding the deployed location of the moorings, depth of subsurface floats, and the expected duration of their placement.

Pending Permit Requests

OCNMS-2016-010 – Chris Morgan, NatureBridge

Project Title: NatureBridge Drift-Card Citizen Science Project

Permitted Activity: Discharge to sanctuary waters, specifically discharge of biodegradable (thin plywood) drift cards from shoreline locations

Project Location: Proposed discharge sites are Cape Flattery, Cape Alava, and Second or Third Beach

Permit Duration: One year requested; multi-year permit may be considered

Comment: This permit supports continuation of a NatureBridge field science program to engage students in education of marine currents and ocean stewardship. Approval from Olympic National Park and tribal landowners will be required to support sanctuary permit issuance.

LEARN ABOUT YOUR SANCTUARY / NATURAL HISTORY

Olympic Coast Researchers Identify Members of Gray Whales Pacific Coast Feeding Group

Gray whales that spend June 1 through November 30 feeding in coastal waters of northern California to northern British Columbia are known as the “Pacific Coast Feeding Group” (PCFG). Early in September, Washington Department of Fish & Wildlife along with Cascadia Research Collective scientists used tagging and photography to identify 25 PCFGs frequenting the waters off Kalaloch Beach of Washington. Boat surveys from Queets to Ruby Beach helped observers estimate close to 50 gray whales are currently feeding in OCNMS.

REGIONAL / NATIONAL MARINE SANCTUARY SYSTEM NEWS

Harmful Algal Bloom (HAB) Identified in Lake Erie

Center for Operational Oceanographic Products and Services (CO-OPS) identified a developing HAB in Lake Erie based on water samples collected by its regional partner, NOAA's Great Lakes Environmental Research Laboratory. While bloom concentrations were detectable in satellite imagery of the lake, the water samples indicated low levels of toxin. CO-OPS recently began to issue twice-weekly [Lake Erie HAB Forecasts](#).

Toxic Bloom Testing at Kachemak Bay National Estuarine Research Reserve (NERR)

Office for Coastal Management (OCM) reports that as ocean temperatures rise, harmful algal blooms are occurring more frequently and with less predictability—and Alaska's Kachemak Bay is currently undergoing one. To assist state regulators and local harvesters, the NERR's Harmful Species Program monitors toxin-producing algae and shellfish toxin levels in the bay. By routinely collecting phytoplankton, testing tissues, and reporting results, the monitoring network serves as an early warning system and helps prevent shellfish poisoning among local residents. The program is providing the Alaska Department of Health and Social Services with relevant information for public service announcements.

Research Links Land Use, Shoreline Hardening, and Species Abundance

Recent National Centers for Coastal Ocean Science (NCCOS) research provides solid evidence that reduced aquatic species abundance in the Northeast is linked with increased agricultural land use and hardened shorelines. The project evaluated 587 sites, 39 sub-estuaries, and 15 fish and crustacean taxa in the Chesapeake Bay and Maryland and Delaware coastal bays. The results, published in the September issue of [Estuaries and Coasts](#), provide empirical evidence of links among fish and crustacean abundance, watershed land cover, and cumulative shoreline conditions. Growing coastal populations may increase shoreline hardening, especially as people seek to protect coastal property from sea level rise. Coordinated management efforts will be necessary to address the threat.

Sanctuaries Research Vessel Used for Hydrographic Surveys Following Harvey

The Office of Coast Survey and the Office of National Marine Sanctuaries coordinated efforts to rapidly outfit the sanctuary vessel, R/V *Manta* to conduct hydrographic surveys that were a critical component of the multi-agency effort to re-open the port of Houston. The R/V *Manta* is based at the Flower Garden Banks National Marine Sanctuary offices in Galveston, Texas. Coast Survey technicians and the crew of the *Manta* executed object detection surveys of the Houston Ship Channel. Their identification of potential dangers allowed for efficient and safe removal of navigation hazards located throughout the channel that were blocking open passage to vessels headed to Houston.

Sanctuaries Provide Opportunity for Research and Ingenuity

Stellwagen Bank National Marine Sanctuary supported groundbreaking research from Harvard University's [Wyss Institute for Biologically Inspired Engineering](#) on a nontoxic, lubricant-infused coating that prevents mussels, other animals, and plants from biofouling underwater surfaces. The Slippery Liquid-Infused Porous Surfaces (SLIPS) technology—inspired by the slick lip of a carnivorous pitcher plant that sends insects sliding down to their doom—repels marine organisms' attempts to attach to surfaces. Biofouling organisms have economic costs and cause environmental problems such as the transport of invasive species. Mussels, for example, with their specialized muscular feet, can accumulate in large and detrimental numbers on ships' hulls. These invasive "hitchhikers" can collectively add approximately 1,700 pounds per square foot to the hull of a ship! The additional weight and mass result in drag, and, consequently, slower speeds, which can increase fuel expenses.

OCNMS ONLINE

Visit our website at: <http://olympiccoast.noaa.gov/>.

Follow us on Facebook and Twitter!

<https://www.facebook.com/usolympiccoastgov>

<https://twitter.com/olympiccoast>

Please take a few moments to peruse the site. Your feedback is greatly appreciated.

*Comments and suggestions can be sent to:
jacqueline.laverdure@noaa.gov.*

OCEAN-RELATED WEBSITES

National Oceanic and Atmospheric Administration

<http://www.noaa.gov/>

National Ocean Service

<http://oceanservice.noaa.gov/>

Office of National Marine Sanctuaries

<http://sanctuaries.noaa.gov/>

NOAA Marine Debris Program

<http://marinedebris.noaa.gov/>

NOAA Online Media Library

<http://sanctuaries.noaa.gov/photos>

Encyclopedia of National Marine Sanctuaries

<http://www8.nos.noaa.gov/onms/park/>

NOAA Ocean Explorer

<http://oceanexplorer.noaa.gov/>

National Data Buoy Center

<http://www.ndbc.noaa.gov/rmd.shtml>

Washington's Ocean Resources

<http://www.ecy.wa.gov/programs/sea/ocean/index.html>

CoastWatch – West Coast Regional Node

<http://coastwatch.pfel.noaa.gov/>

Northwest Association of Networked Ocean Observing Systems

<http://www.nanoos.org/>

NOAA's Pacific Marine Environmental Laboratory

<http://www.pmel.noaa.gov/>

OLYMPIC COAST NATIONAL MARINE SANCTUARY

Learn More About Your Sanctuary

The Sanctuary Office Report is produced bi-monthly by Olympic Coast National Marine Sanctuary in conjunction with sanctuary advisory council meetings. To learn more about the sanctuary, please visit our website at:

<http://olympiccoast.noaa.gov/>.

To learn more about the sanctuary advisory council, please visit:

http://olympiccoast.noaa.gov/involved/sac/sac_welcome.html.

Office of National Marine Sanctuaries (ONMS)

Olympic Coast National Marine Sanctuary is one of the marine protected areas in the National Marine Sanctuary System encompassing more than 600,000 square miles of marine and Great Lakes waters from Washington State to the Florida Keys and from Lake Huron to American Samoa. The system includes 13 national marine sanctuaries and Papahānaumokuākea and Rose Atoll marine national monuments. Visit the ONMS website at: <http://sanctuaries.noaa.gov/>.

Get Involved!

To learn how to get involved in the sanctuary visit: <http://olympiccoast.noaa.gov/involved/welcome.html>.

OCNMS Staff

Carol Bernthal – Superintendent

George Galasso – Deputy Superintendent for Policy & Programs

Kevin Grant – Deputy Superintendent for Operations & Administration

Chris Butler-Minor – Community Engagement Specialist

Eric Evans – IT Consultant

Carey Floyd – Graphic and Web Designer

Alisha Friel – NOAA Corps Officer, Vessel Operations Coordinator

Nicole Harris – Education Specialist

Kathy Hough – Survey Technician

Norma Klein – Office Administrator

Jacqueline Laverdure – Education and Outreach Coordinator

Robert Rountree – Visitor Services Specialist

Jenny Waddell – Research Coordinator

Contact Information

Olympic Coast National Marine Sanctuary

115 East Railroad Ave., Suite 301
Port Angeles, WA 98362
Phone (360) 406-2074
Fax (360) 457-8496

