

Oregon Ocean Policy Advisory Council
Draft Meeting Agenda*
October 16, 2014

*Please note that this agenda is an attempt to give notice of the intended sequence of events at the meeting. Time or topics may change up to the last minute. The Chair will try to make sure that there is an opportunity for public comment prior to OPAC making major decisions. The most recently updated draft agenda will be posted at www.oregon.gov/LCD/OPAC and www.oregonocean.info.

Regular OPAC Meeting
The Best Western Agate Beach Hotel | 3019 North Coast Highway | Newport, OR | 97365

- 9:00 am Member Introductions – *Scott McMullen* (OPAC Chair)
- 9:15 am Review and Approval of Minutes of June 5th, 2014 OPAC Meeting (15 min) – *Scott McMullen* (OPAC Chair), *Council Members*
- 9:30 am OPAC Member Orientation (30 min) – *DLCD Agency Staff*
- 10:00 am Marine Reserves Update on Redfish Rocks (60 min) – *ODFW Agency Staff*
*Other marine reserves will be discussed at future meetings.
- 11:00 am National Ocean Policy Implementation Update (60 min) – *John Hansen* will provide an update on the establishment of the West Coast Regional Planning Body. (Presentation with 15-30 minutes for discussion.)
- 12:00 pm ** Working Lunch (45 min) ** Presentation of the Ocean Health Index by *OHI staff member*.
- 12:45 pm Newport USCG Air Station Closure Discussion (15 min) –*Jennifer Stevenson* and *Ginny Goblirsch* will provide an update on the decision to close the Newport USCG station.
- 1:00 pm Public Comment (30 min) – *Scott McMullen* (OPAC Chair) – will coordinate the public comment period.
- 1:30 pm Marine Sanctuary Program presentation and Discussion (60 min) – *Bill Douros* of the NOAA Marine Sanctuaries Program Office will provide a presentation on the process for nomination, designation, and implementation of National Marine Sanctuaries.
- 2:30 pm Break (15 min)
- 2:45 pm Planning the OPAC Marine Sanctuary Forum (90 min) – The *OPAC Executive Committee* will lead a discussion on the planning of a forum on National Marine Sanctuaries (Spring 2015).
- 4:30 pm Adjourn

** Provided only for OPAC Members, Invited Guests, and Staff.
The public is welcome to bring a sack lunch if they desire.**

Oregon Ocean Policy Advisory Council

Meeting Summary – June 5th, 2014
The Florence Events Center | 715 Quince St | Florence, OR 97439

Issues Decided/Positions Taken

- The Draft Meeting Summary of the October 3rd, 2013 Ocean Policy Advisory Council (OPAC) was approved by consensus with 1 revision noted.
- A consensus motion was approved by the council to write recently retired former members a letter acknowledging their terms of service on the council.

Presentations

- *Francis Chan* and *Burke Hales* of Oregon State University gave a presentation on the recent science of Ocean Acidification and Hypoxia on Oregon's continental shelf.
- *Paul Klarin* provided updates on the Territorial Sea Plan, and Oregon's Geographic Location Description application process.
- *Mike Morrow* provided an update on the M3 Wave Energy Device application process.
- *Dan Hellin* provided an update on the Pacific Marine Energy Center's South Energy Test Site application process.

OPAC Members Attendance

Members Present (voting): **Scott McMullen** (North Coast Commercial Fisheries, OPAC Chair); **David Allen** (Coastal City Official), OPAC vice-chair); **Jim Pex** (South Coast Charter, Sport or Recreational Fisheries); **Jena Carter** (Statewide Conservation or Environmental Organization); **Robin Hartmann** (Coastal Conservation or Environmental Organization); **Walter Chuck** (Ports, Marine Transportation, Navigation); **Terry Thompson** (North Coastal County Commissioner); **Frank Warrens** (North Coast Charter, Sport or Recreational Fisheries); **Susan Morgan** (South Coastal County Commissioner). [9/14]

Members Present (ex officio): **Gabriela Goldfarb** (Office of the Governor); **Loren Goddard** (Oregon Coastal Zone Management Association); **Patty Snow** (Department of Land Conservation & Development); **Rich Holdren** (Oregon Sea Grant); **Chris Castelli** (Department of State Lands); **Caren Braby** (Oregon Department of Fish & Wildlife); **Vicki McConnell** (DOGAMI); **Laurel Hillmann** (OPRD) [8/10]
Absent: **Mary Abrams** (Department of State Lands); **Kris Wall** (NOAA Fisheries).

Members Absent: **Brad Pettinger** (South Coast Commercial Fisheries); **Robert Kentta** (Oregon Coastal Indian Tribes); **Fred Sickler** (Coastal Non-Fishing Recreation); **Dalton Hobbs** (Dept of Agriculture) [4]

Staff: **Paul Klarin** (DLCD); **Andy Lanier** (DLCD, OPAC Staff); **Steve Shipsey** (DOJ) Bridgette Lohrman (US EPA); Meg Gardner (DLCD)

Public Comment and Attendance

Public Comment speakers (with affiliation if provided): **Brett Webb** (Port Orford Commissioner); **James Jennings** (Port Orford Reorganized Fishermen's Association); **Gina Dearth** (Port of Bandon); **Gus Gates** (Surfrider); **Onno Husing** (Lincoln County); **Mike Kosro** (OSU); **John Schaad** (BPA); **Wolfgang Rain** (TE Subcom);

Others in Attendance (with affiliation if provided):

Charmaine Vitek (Port of Umpqua); **Dale Beasely** (CRCFA); **Nancy Rickard** (Port of Siuslaw); **Jason Robison** (Coquille Indian Tribe); **Susan Chambers (WCSPA)**; **Kathy Enghorn** (Congressman Peter Defazio); Mathew Wagnun; Debbie Collins (Port of Gold Beach); **Hugh Link** (Oregon Dungeness Crab Commission); **Nancy Fitzgerald** (Oregon Salmon & Albacore Commission);

Acronyms and Initials:

DLCD-Department of Land Conservation and Development; DOGAMI- Oregon Department of Geology and Mineral Industries; DSL- Department of State Lands; OMD – Oregon Military Department; ODFW-Oregon Department of Fish and Wildlife; OPRD-Oregon Department of Parks and Recreation; DOJ – Department of Justice; CRCFA- Columbia River Crab Fisherman Association; FACT-Fishermen's Advisory Committee of Tillamook, TSPWG – Territorial Sea Plan Working Group (an OPAC Subcommittee), NNMREC – Northwest National Marine Renewable Energy Center; PEV- Pacific Energy Ventures; WCGA – West Coast Governors Alliance; BPA- Bonneville Power Administration; USCG- United State Coast Guard; TNC – The Nature Conservancy; WCSPA - West Coast Seafood Processors Association;

Distributed Materials

1. OPAC October 3rd, 2013 - Draft Meeting Summary
2. OPAC Member Roster, 2014
3. ODFW Marine Reserves Update 2-pager.
4. OPAC Marine Sanctuary Report, 2006
5. TSP Part 5 Appendix Map B, 2014
6. OPT Surrender of License
7. DSL Letter to OPT regarding surrender of license
8. OPT Letter of Response to DSL
9. Federal Register Notice of BOEM Action
10. BOEM Press Release for Windfloat Project.

Additional Resources

1. [Department of Land Conservation and Development Website](http://www.oregon.gov/lcd/) (<http://www.oregon.gov/lcd/>)
2. [OPAC Website](http://www.oregon.gov/LCD/OPAC): (<http://www.oregon.gov/LCD/OPAC>)
3. Oregon MarineMap: (<http://Oregon.MarineMap.org>)
4. Oregon Ocean Information Website: <Http://www.OregonOcean.info>

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For a copy of the video record of this meeting, please contact Andy Lanier at the contact information listed below, and complete a public records request available online at:

http://www.oregon.gov/LCD/docs/publications/DO_110.02_PublicAccessstoDLCDRecords_RequestForm.pdf

Andy.Lanier@state.or.us

(503) 373-0050 x246

**Ocean Policy Advisory Council
Disclosure of Conflict of Interest Form**

I, _____, announce that I have a(n) **actual*** /
 potential** conflict of interest due to pecuniary benefit or detriment to
 me / **my relative***** / **a business with which I am or my relative
is associated** that will or could arise from my action, decision or
recommendation.

*An **actual** conflict of interest occurs when any action, decision or recommendation **will** cause pecuniary benefit or detriment to you, your relative or any business with which you or a relative is associated.

A **potential conflict of interest occurs when any action, decision or recommendation **could** cause pecuniary benefit or detriment to you, your relative or any business with which you or a relative is associated.

***For purposes of disclosing conflicts of interest, **relative** means your spouse, domestic partner, children and your spouse's children, siblings and your siblings' spouses, parents and your spouse's parents, anyone for whom you have a legal support obligation, and anyone for whom you provide benefits from your public employment or from whom you receive benefits.

Human Dimensions Science in Oregon's Marine Reserves

OPAC Meeting – October 16, 2014

Human Dimensions scientific research conducted during the marine reserves evaluation period is to provide data and information on: coastal communities; ocean users; the coastal economy; interactions between the economy, marine environment, and communities; and the different effects that each marine reserve site has on each of these, over time.

Human Dimensions scientific research draws from multiple social sciences including economics, sociology, geography, and psychology. In some instances the information produced is quantitative, in others it is qualitative or descriptive. Each of these sciences has established protocols or research tools for collecting information and drawing conclusions from that information.

The intent of ODFW employing a suite of Human Dimensions tools is to paint a picture, to understand the variety of changes that occur in response to a specific activity. In this case, the activity is to cease fishing in a certain area. We draw upon multiple research tools to conduct studies in order to paint different aspects of the picture. Some studies paint the background or “back story” of the communities, to help us understand the context of the effects we might see over time. Other studies allow us to estimate or observe any changes that do in fact occur over time.

The information derived from one study may not always be directly comparable to another (think apples to oranges). But, by looking across the variety of studies, over time we will be able to paint the full picture – to see the unique characteristics that are in play, the different types of effects observed, and how those unique characteristics contribute to different types of effects observed.

For the state’s re-evaluation of the Marine Reserves Program in 2023, we will have five paintings to learn from – one from each of the uniquely different marine reserve sites.

Below we have outlined the current Human Dimensions studies that are completed or planned, as of 2014. In many instances the research is being conducted for ODFW by social scientists at universities or in the private sector. The research tools we decide to use are likely to evolve over time, based on what we learn, and new studies will likely be added in the future.

Studies that are completed or in process:

General social and economic characterization of the area

1. *Socioeconomic Community Profiles* - Descriptive existing data (history, demographics, economic and census data) used to characterize the local community.

Status: Ongoing
Researcher: Shannon Davis, The Research Group

2. *"Long form" Fishing Community Profiles* – Ethnographic profiles of communities derived from qualitative interviews.
 Status: Ongoing. This study has recently been revised to include more comprehensive community profiles, beyond just a focus on the fishing industry (occupational) community, using interviews of residents across a broad cross section of community interests and stakeholders.
 Researchers: ODFW

3. *Business Community Interviews* – Brief assessment of the business community's awareness of marine reserves, knowledge, and expectations concerning visitation and business.
 Status: Ongoing. Survey instrument was revised for surveys conducted in 2014.
 Researchers: ODFW

4. *Community Resilience, Adaptation, and Communication - Pilot Case Study*
 How resilient/adaptive are Oregon coastal communities to external stressors (e.g. marine reserve implementation, natural disaster, national economic downturn)? Collect preliminary data on characteristics of community resilience, adaptation and communication.
 Status: Planned
 Researchers: ODFW
 Paige Fischer, University of Michigan
 Karma Norman, NOAA Northwest Fisheries Science Center, advisory role (this work is complementary to the NOAA community resilience research)

5. *Coastal Community Subjective Well-being – Pilot Survey* – A pilot project using survey research to assess a range of social and psychological variables that relate to individual adaptive response to socioeconomic stress within their coastal community.
 Status: Planned
 Researchers: ODFW
 Kreg Lindberg, Christopher Wolsko and Elizabeth Marino, OSU Cascades

Direct use of the area

6. *Visitor Counts* – Counts of reserve and beach users (pressure counts) to obtain basic data on visitor characteristics and behaviors.
 Status: Ongoing
 Researchers: ODFW

7. *Visitor Surveys* – Interviews of visitors to obtain more detailed information on demographics, trip purpose, party characteristics, expenditures, knowledge of reserves.
 Status: Ongoing. Survey instrument was revised for surveys conducted in 2014.
 Researchers: ODFW

8. *Modeling the Economic Impacts of Marine Reserve Fishing Restrictions* – A regional economic impact analysis of potential economic displacement of fishing effort due to marine reserve designation at each site and across the entire marine reserve system using fisheries economic data, ORBS data, logbooks, and habitat mapping.
 Status: Ongoing. Replication to include new model inputs.
 Researchers: Shannon Davis, The Research Group
 Jim Golden, Golden Marine Consulting

9. *Economic Contribution from Ocean Research Activities at Port Orford* – A regional economic impact analysis of all ocean research, planning and management activities conducted in Port Orford. Interview survey was used to collect data from a census of participants who conducted such projects anytime between 2008 to 2012.

Status: Completed. To be repeated in future (replication not planned near term).

Researchers: Shannon Davis, The Research Group
Hilary Polis, sub-contractor

10. *Fishing Effort Shift* – An analysis of how fishermen adapt to marine protected area implementation.

Status: Early planning and design stages

Researchers: Gil Sylvia, COMES
David Kling and Susan Capalbo, OSU Department of Applied Economics
Shannon Davis, The Research Group
Preliminary field work and project development will occur this fall as a capstone project for an OSU student working with Selina Heppell, OSU

Attitude and perception of implementation and management

11. *Residents' Attitudes and Perceptions Mail Survey* – A representative mail survey to understand residents' knowledge, attitudes and perceptions concerning marine reserves over time.

Status: Ongoing. Coastal residents survey completed, more in-depth analysis planned. Mail survey for residents along I-5 corridor planned.

Researchers: Mark Needham and Lori Cramer, OSU

Assessment of the non-market values of the area

12. *Value of Ecosystem Services to Stakeholders* – Stakeholder focus group exercise to determine what stakeholders' perceive as services provided by the marine environment and order of importance. Model is then used to quantify a value for ranked services. Bio-indicators identified for different services, that could then be monitored in marine reserve sites.

Status: Ongoing

Researchers: Michael Harte, OSU
Peter Freeman, OSU Graduate Student, Drs. Randall Rosenberger, Gil Sylvia and Selina Heppell, OSU (during pilot study)



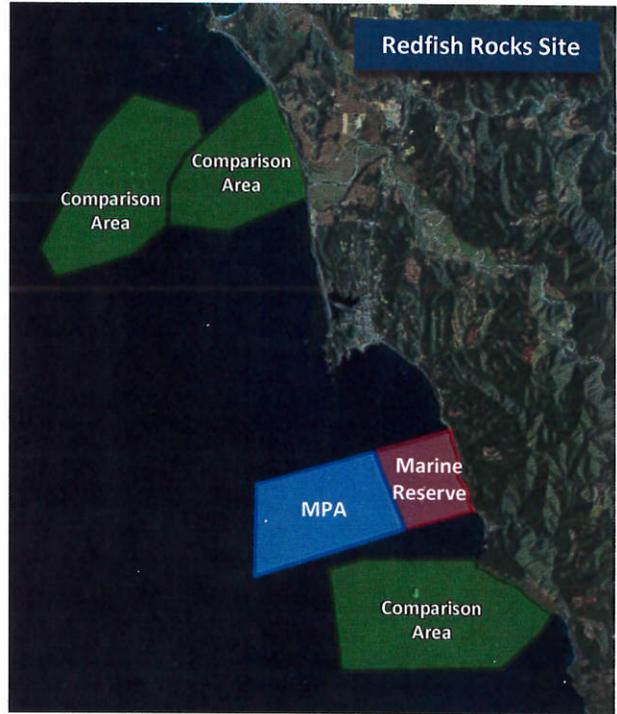
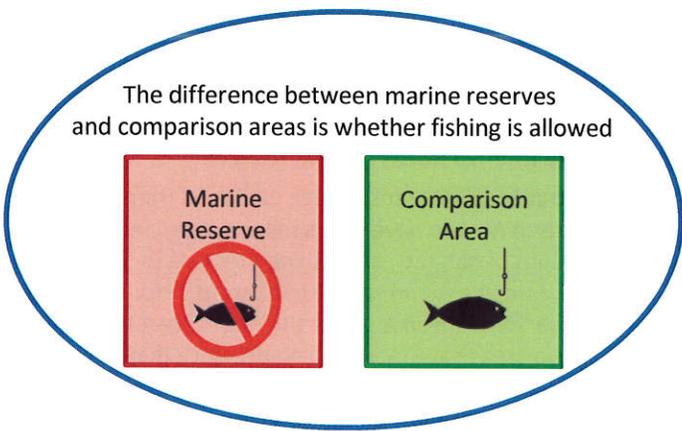
ODFW Marine Reserves Program

Comparison Areas – tools for understanding changes over time

In 2012, Oregon completed designation of five marine reserve sites within its state waters to advance scientific research and conserve habitats and biodiversity. Oregon Department of Fish & Wildlife is responsible for overseeing the management and monitoring of Oregon’s marine reserves.

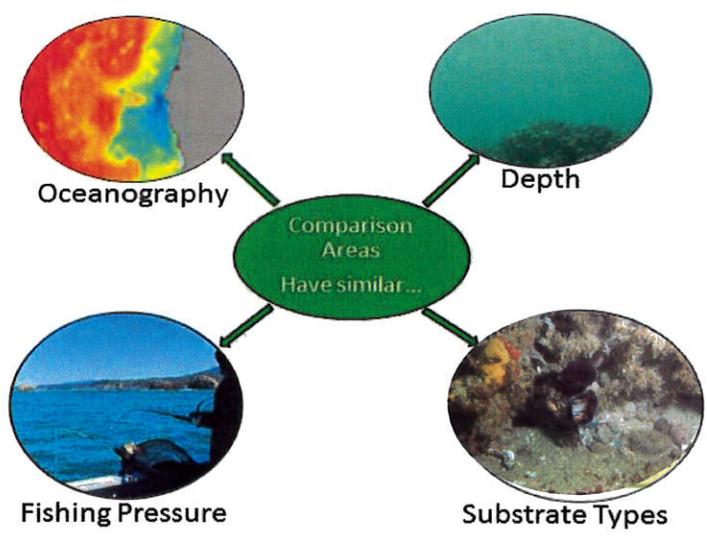
What are Comparison Areas?

Comparison areas are monitoring sites, in close proximity to the marine reserve, that remain open to fishing. Long-term monitoring will be conducted identically in both the reserve and comparison areas so that we can understand whether the changes we are seeing in the marine community (fish and invertebrate species) are from environmental variation or from the marine reserve protections.



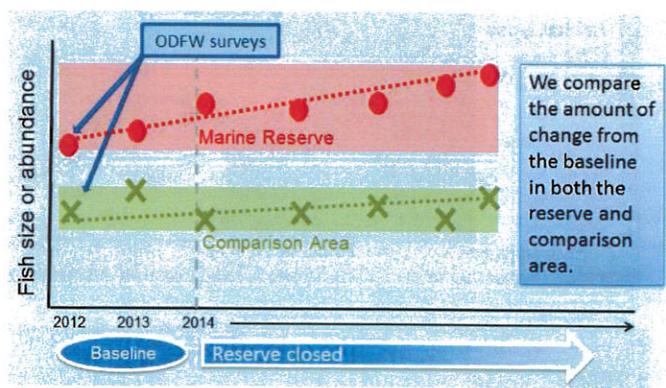
How do we choose Comparison Areas?

Ideally, a comparison area would be identical to the marine reserve in all ways except that it remains open to fishing. In reality, it is impossible to find two areas that are perfectly identical. Instead, we find areas as similar as possible and select more than one comparison area per reserve. We look to find comparison areas that have similar ocean conditions, habitats, and fishing pressure as the marine reserve.



Where do we start? Baseline ...

Prior to the prohibition of fishing, we sample in the reserve (red) and the comparison areas (green) to quantify the initial conditions of these areas. This allows us to identify differences that already exist between the areas.



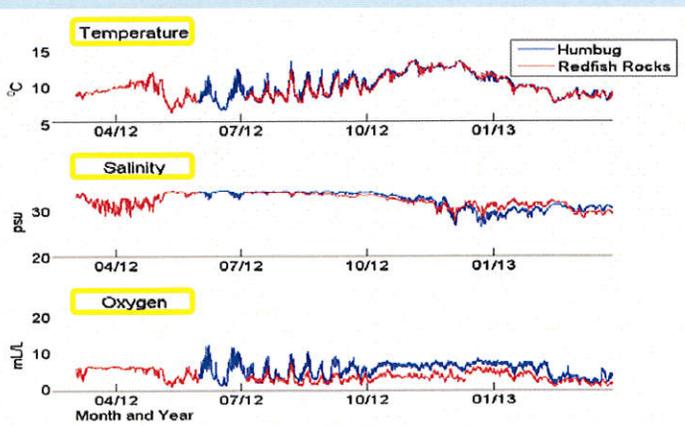
What's next? Understanding changes over time ...

From our baseline, we are now tracking the changes occurring in the reserve and in the comparison areas over time. This allows us to isolate reserve effects from natural variations. We are looking for changes in species composition, size, and abundance.

Do the comparison areas have similar ocean conditions as the marine reserve?



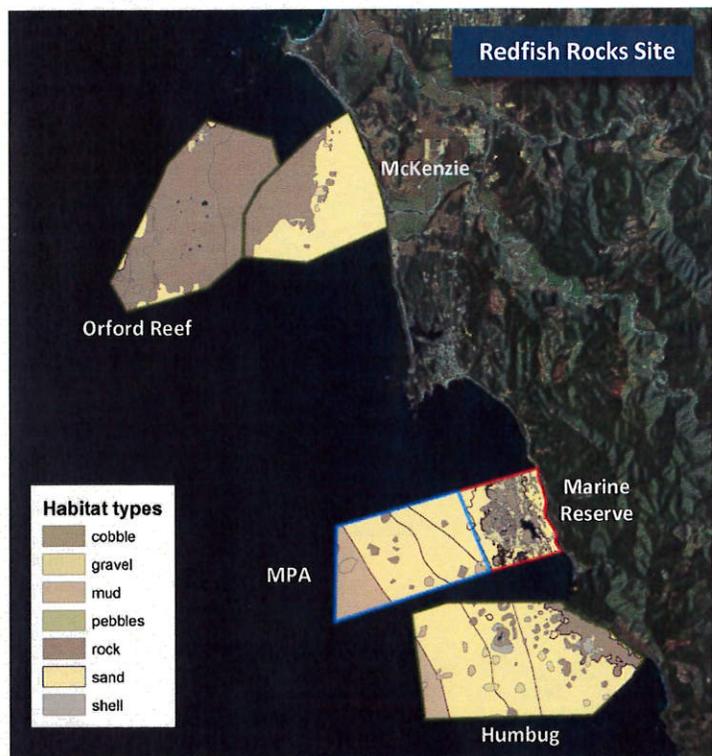
Oceanographic instrument (CTD) bolted to the ocean floor collecting data at Redfish Rocks.



Temperature, salinity, and oxygen measured April 2012 - January 2013. Marine reserve in red; comparison area in blue.

Ocean conditions were very similar between the marine reserve and the comparison area suggesting that Humbug is a good comparison area to the reserve.

Do the comparison areas have similar habitat and fishing pressure as the Redfish Rocks marine reserve?



During our baseline assessments, we found Humbug Comparison Area to have very similar ocean conditions, proportions of habitats, and fishing pressure to the marine reserve. Also, we found similar habitats at Orford Reef and McKenzie Comparison Areas to the marine reserve. However, these two areas have more fishing pressure than the reserve experienced prior to protection. We therefore are using Humbug as our primary comparison area and Orford Reef and McKenzie as secondary comparison areas.

Comparison Areas: Facts and Myths

✗ MYTH: Comparison areas are meant to catch fish that swim out of the reserve

Actually, comparison areas are meant only to be a scientific control to detect change over time.

✓ FACT: A reserve can have more than one comparison area

Yes, since no area is a perfect match to the marine reserve, more than one comparison area is usually selected.

✗ MYTH: Comparison areas are meant to catch larval fish that originated from the reserve

Actually, comparison areas are meant only to be a scientific control to detect change over time.

✓ FACT: Fishing is allowed in comparison areas

Yes, be sure to consult all current fishing regulations before fishing in a comparison area.

For more information from ODFW

Website:
www.oregonocean.info/marinereserves
 E-mail us:
odfw.marinereserves@state.or.us

Join our email list and receive updates:
<http://listsmart.osl.state.or.us/mailman/listinfo/odfwmarinereserves>

ODFW Marine Reserves Program

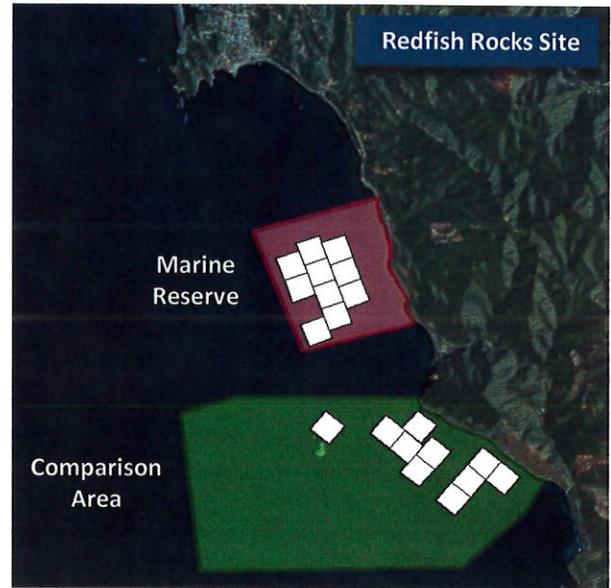
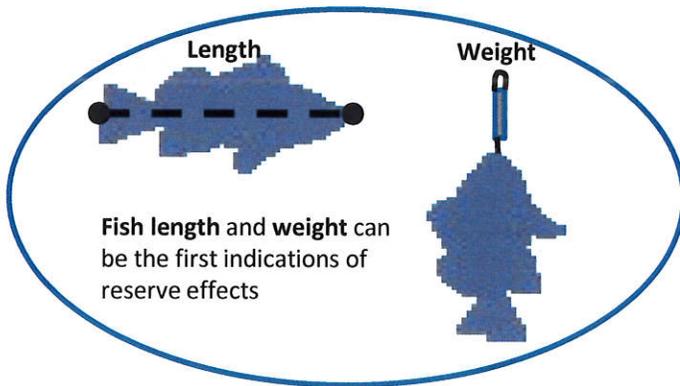
Hook-and-Line Survey – Fishing for Science



In 2012, Oregon completed designation of five marine reserve sites within its state waters to advance scientific research and conserve habitats and biodiversity. Oregon Department of Fish & Wildlife is responsible for overseeing the management and monitoring of Oregon's marine reserves.

What is the hook-and-line survey?

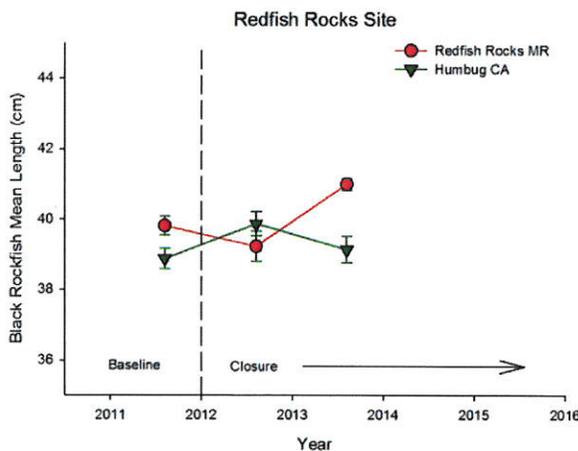
Fishing for Science: We collect data on fish by bringing citizen scientists (volunteer anglers) out on chartered fishing boats to **catch and release** fish. Hook-and-line surveys are a good way to get fish in hand in order to take accurate length and weight measurements. Changes in fish length and weight are one of the first early signs of potential effects from marine reserve protections.



White squares indicate fishing grid cells.

Detecting changes in fish over time.

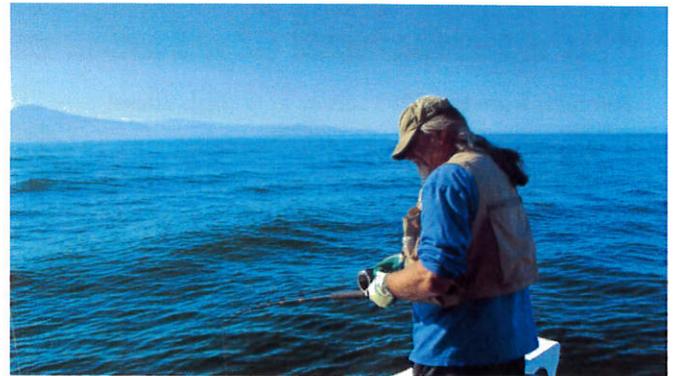
We look at differences in average fish length and weight **before** and **after** the reserve is closed to fishing. Also, we sample both **inside** the reserve and **outside** in the comparison areas (monitoring sites open to fishing). By sampling over time, we can determine whether fish sizes are changing due to cessation of fishing.



In this graph, we see the average (mean) length of black rockfish (\pm standard error) in the marine reserve (red) and comparison area (green) for our first three years of sampling. You can see the up and down caused by the natural variation of measurements from year to year. To tease out this natural variation from an actual effect of the reserve protections, we need long term monitoring. With time, we will determine if the **amount of change** in the average length of fishes inside the reserve is different than outside the reserve.

How do we sample?

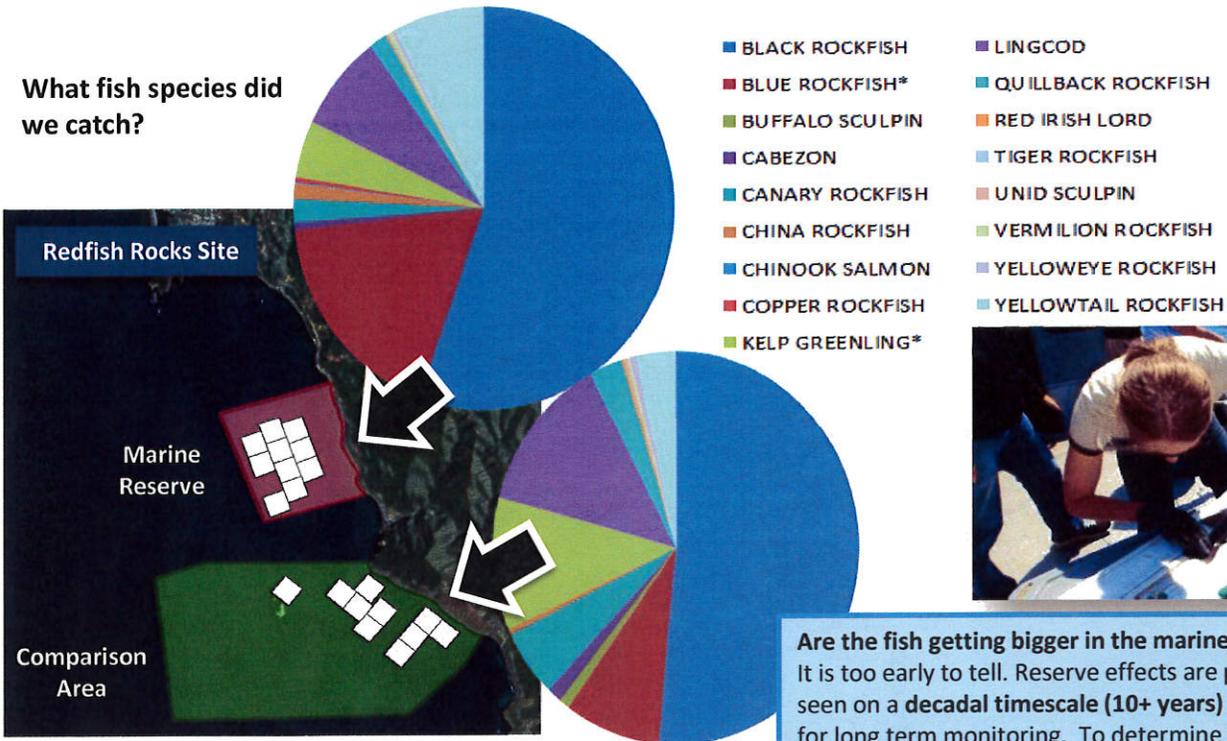
We place fishing grid cells (500m x 500m areas) in rocky reef habitats. Local fishing knowledge helps ensure cells are placed in locations where fish are commonly caught. On a survey day, five cells are randomly selected. Each cell is fished for approximately 45 minutes by 5 volunteer anglers. All caught fish are measured and then released.



Sampling effort at Redfish Rocks site 2011-13.

- Surveys occurred once a month from July -October.
- One 8 hour day was spent fishing in the marine reserve followed by one day in the comparison area.
- We fished in five 500m x 500m cells per day, using 5 volunteer anglers to **catch and release** fish.
- Gear was standardized to a 6 ounce diamond jig for all anglers.

What fish species did we catch?



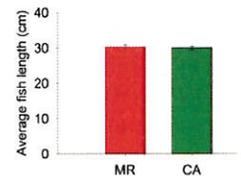
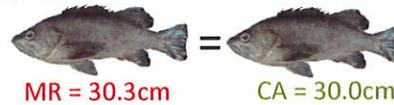
Are the fish getting bigger in the marine reserve?

It is too early to tell. Reserve effects are projected to be seen on a **decadal timescale (10+ years)** creating a need for long term monitoring. To determine whether average fish sizes are getting bigger in the reserve, we need to continue hook-and-line surveys annually over the years to come.

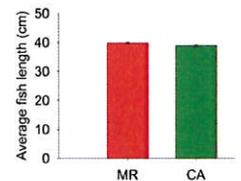
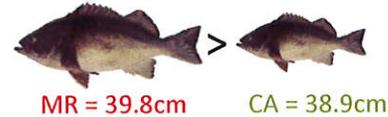
These pie charts show the fish species caught (color) and their proportions (size of pie wedge) in the marine reserve and in the comparison area during our 2013 survey. Our monitoring is tracking changes in abundance, length, and weight of fishes over time. To do this we need comparison areas with similar species to the reserve in order to compare.



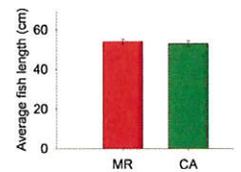
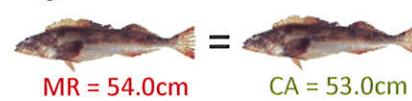
Blue Rockfish



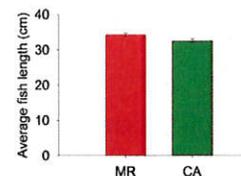
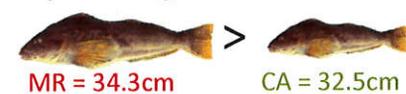
Black Rockfish



Lingcod



Kelp Greenling



Fun facts from the 2013 survey at Redfish Rocks!

- We sampled a total of **1,197 fish** representing **17 different species** from the marine reserve and the comparison area.
- We had 24 volunteers join us for 8 days of fishing for science! Our average catch was 133 fish per day.
- The biggest fish caught was a 38 inch (20 lbs) lingcod and the smallest fish was a 1 inch sculpin (pictured above right).

For more information from ODFW

Website:
www.oregonocean.info/marinereserves
 E-mail us:
odfw.marinereserves@state.or.us



Join our email list and receive updates:
<http://lists.smart.osl.state.or.us/mailman/listinfo/odfwmarinereserves>

Above are comparisons of fish length for the four most commonly caught species in Redfish Rocks. We see that for some species, we are starting with larger fish in the reserve. Knowing these initial baseline differences will help us determine the **amount of change** in fish sizes over time.

Oregon Marine Reserve Program

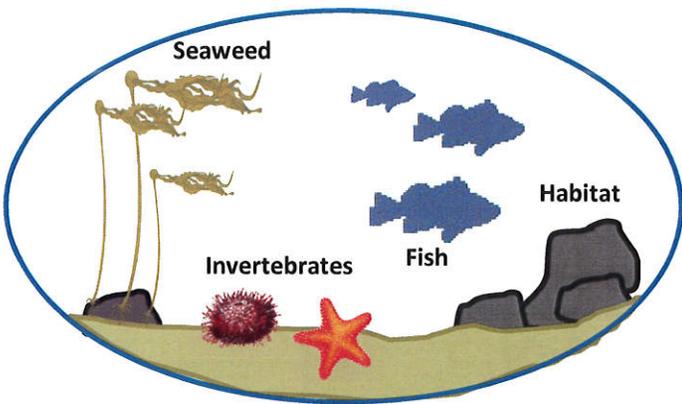
SCUBA Survey - What's underneath?



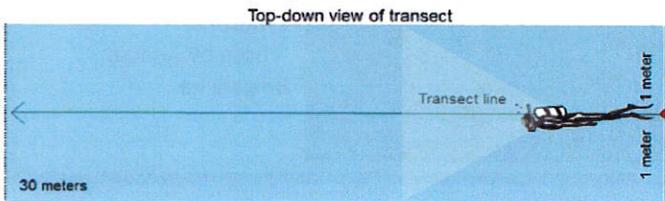
In 2012, Oregon completed designation of five marine reserve sites within its state waters to advance scientific research and conserve habitats and biodiversity. Oregon Department of Fish & Wildlife is responsible for overseeing the management and monitoring of Oregon's marine reserves.

What do we measure in SCUBA surveys?

We use SCUBA to identify and count seaweed, invertebrate, and fish communities. Divers survey a transect underwater counting observed organisms and noting the type of habitat encountered. These surveys will be done periodically (every 3-4 years) to assess and compare any change to the biological communities in both the no-take marine reserves and fished comparison areas.



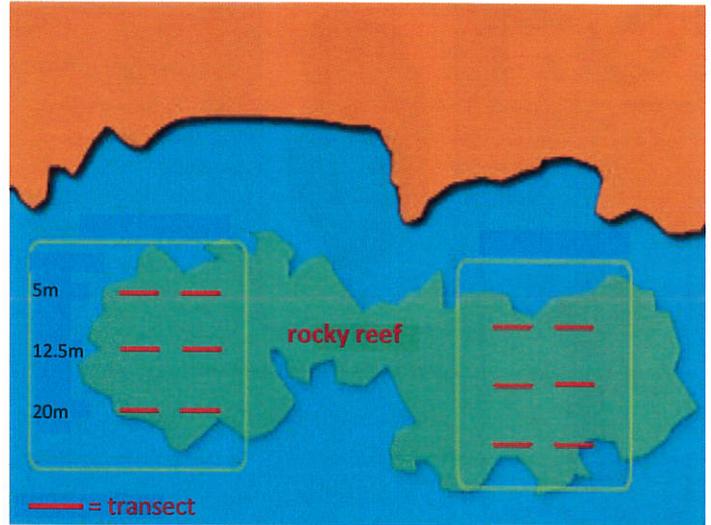
What is a transect anyway?



A transect is a straight line through a natural feature. In our case, the transect is 30m long, 2m wide and 2m high. The graphic above shows the field of view in light blue that the diver surveys counting fishes, seaweeds, and invertebrates.

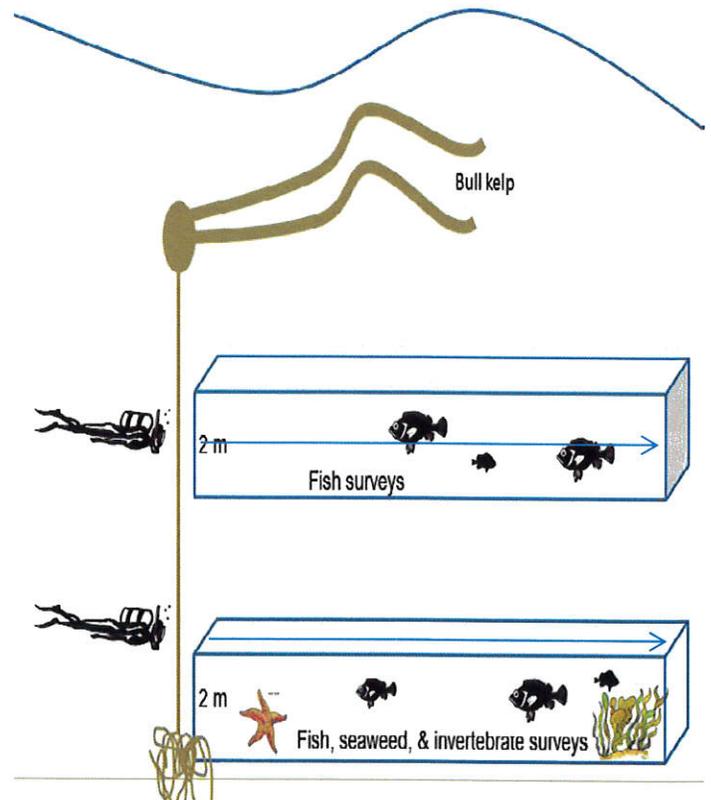


Diver conducting fish surveys in Redfish Rocks Marine Reserve. Photo by Anouar BÉlganche



Where are the surveys done?

SCUBA divers conduct surveys in rocky reef kelp habitats at depths of 5m, 12.5m and 20m. Divers work in pairs for safety. Fish transects occur both along the bottom and mid-way up in the water column. Invertebrate and seaweed surveys occur along the bottom only.



Seaweeds: New Oregon Records for Redfish Rocks

The 3 species of brown algae below were found by divers in Redfish Rocks Marine Reserve and had not previously been observed in Oregon!



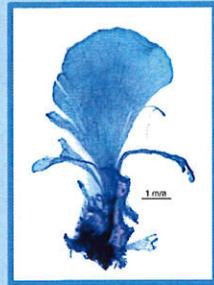
Laminaria longipes

The subtidal form with 6 blades forming from a single holdfast



Desmarestia foliacea

A young specimen of this thin papery acid weed



Syringoderma phinneyi

A stained specimen of this tiny rare monostromatic blade

Photos by Dr. Gayle Hansen

Fishes: How did diversity compare between the reserve and comparison areas?

Redfish Rocks Reserve is characterized by high numbers of blue and black rockfish followed by lower densities of kelp greenling. 23 different fish species in total were seen at the sites.



Large school of Black Rockfish observed during fish surveys in Redfish Rocks Marine Reserve. Photo by Anouar Béganiche

Invertebrate community: Understanding the baseline

SCUBA surveys revealed differences in the invertebrate community between the reserve and comparison areas. For examples, red urchins in the reserve were smaller yet more abundant than their counterparts in the two comparison areas. Knowing these different baselines for the urchin population will be crucial to accurately assessing how these populations change as a result of marine reserve protection.



Red sea urchins in Redfish Rocks. Photo by Scott Groth, ODFW

Sea Star Wasting Syndrome Update: What are we seeing and how are we monitoring?

Sea star wasting syndrome is a general description of a set of symptoms that are found in sea stars. Typically the symptoms follow a quick progression where first lesions form, then the tissue decays around the lesions, which leads to detachment of arms and eventually death. Scientists are still determining the cause of the syndrome.



A detached arm from an giant pink star (*Pisaster brevispinus*) suffering from sea star wasting syndrome. Photo by Anouar Béganiche

In subtidal habitats, the sunflower star (*Pycnopodia helianthoides*) is the typically the first species to show signs of wasting disease. However, it is also common in the rainbow star (*Orthasterias koehleri*), giant pink star (*Pisaster brevispinus*), giant star (*Pisaster giganteus*), ochre star (*Pisaster ochraceus*), and sun star (*Solaster*).

We will monitor healthy sea stars as well as those that have been affected by this syndrome during our 2014 SCUBA surveys.

Healthy sun star (*Solaster*) observed during invertebrate SCUBA surveys. Photo by Anouar Béganiche



For more information

Oregon Department of Fish & Wildlife
Marine Reserve Program:
www.oregonocean.info/marinereserves

For more information e-mail:
odfw.marinereserves@state.or.us

Sign up for the listserv at:

<http://listsmart.osl.state.or.us/mailman/listinfo/odfwmarinereserves>

ODFW Marine Reserves Program

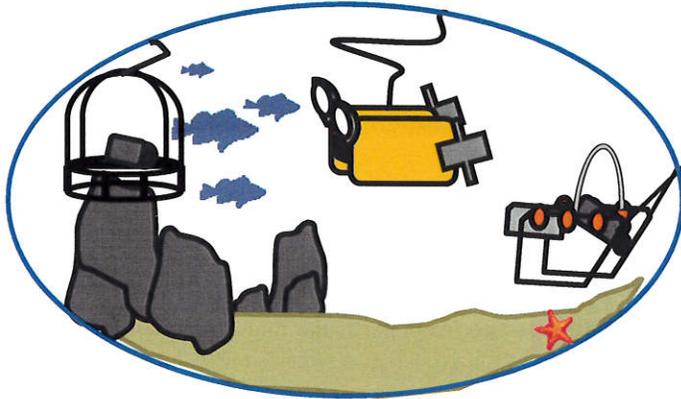
Underwater Video Surveys – Ongoing in the Deep



In 2012, Oregon completed designation of five marine reserve sites within its state waters to advance scientific research and conserve habitats and biodiversity. Oregon Department of Fish & Wildlife is responsible for overseeing the management and monitoring of Oregon's marine reserves.

Marine reserves contain a variety of habitats and depth ranges. To assess the animals and their habitats at these sites, we need a variety of tools. Scuba divers can only survey areas in depths up to about 75 feet. We use underwater video as our eyes for getting into the vast remainder of places where divers can't go. Video survey tools can collect information on animal behaviors and life history stages unable to be captured by extractive methods, and allow us to watch animals in their native habitats. Video surveys are also non-lethal, an important consideration for monitoring marine reserves.

Lander, Sled, and ROV: 3 types of tools – 3 places



Video Lander

The **video lander** is a camera that can be dropped anywhere. Typically used in rocky habitats, this high-definition camera and frame is built to withstand the abuse of being dropped into the unknown and survive the trip. Left on the bottom for up to 5 minutes, the lander gives us a "snapshot" of fish, algae, invertebrates, and the habitat in places too deep for divers and too shallow for the Remotely Operated Vehicle (ROV).



Video Sled

Our **video sled** lets us "skim the bottom" in broad areas of sand and mud habitat. This camera system uses a time-clock synced to the vessel's GPS to record where it is each second, allowing us to accurately determine the location of habitat changes, fish observations, and any other "events" seen on the video. From the video recorded by the sled, we count fish and invertebrates. We also compare our observations with habitat maps, created using high-resolution multibeam sonar, for accuracy.

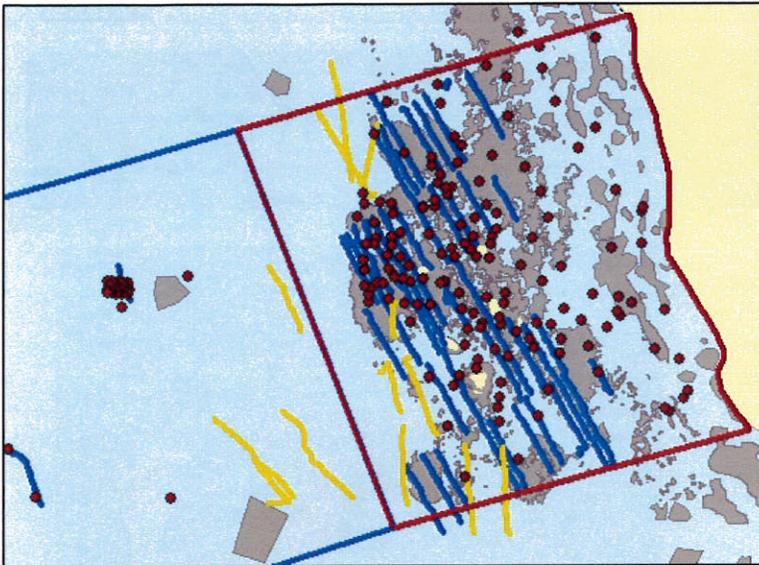


Remotely Operated Vehicle (ROV)

The **ROV** is our most complex video tool. It is "flown" by a person on the surface, controlled via an umbilical cable. The ROV can swim up, down, and around obstacles and follow along a transect line, like a SCUBA diver. The high-definition video is later analyzed for fish, invertebrates, and habitat. The ROV is perfect for surveying rocky habitats all the way out to the deepest parts of the reserves (and well beyond!).

Where do we use video survey tools?

 Sled
  ROV
  Lander



Map of surveys conducted in 2010-11 at Redfish Rocks Marine Reserve. The shoreline is on the right. Red denotes the reserve boundary; blue, the MPA boundary. Rock habitat is in grey.

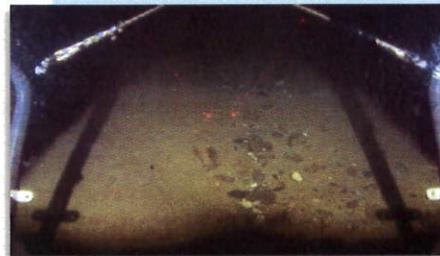
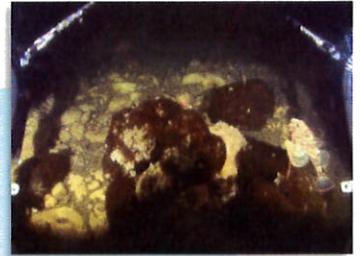
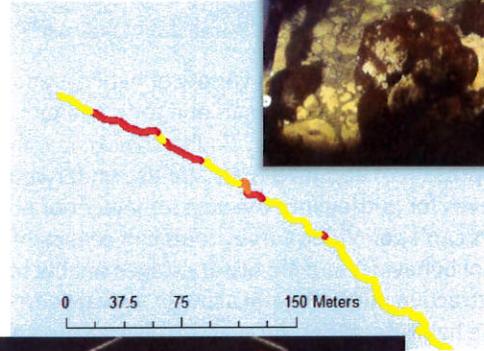
What does the lander see?

Top, we see a school of black rockfish above hard, rocky bottom covered with sponges and algae. Bottom, canary rockfish hover over a soft sandy bottom. Lander video gives us data on the community of species and the type of habitat they live in.



Encountering different habitat types

Below is a track that was surveyed by the video sled. The colors change as the substrate changes from sand (yellow) to rock (red and orange). The sled can detect detailed changes in habitat, finding rock where sonar seafloor surveys did not.



ROV Surveys

Unlike the sled or lander, the ROV has the ability to swim, stop, and look around. Investigations of a particular species or intensive surveys at a specific area too deep for divers becomes possible. Below is a yelloweye rockfish among slabs of bedrock, a species of particular management interest. On the right is a China rockfish, a species difficult to sample due to its cryptic nature.



For more information from ODFW

Website:
www.oregonocean.info/marinereserves

E-mail us:
odfw.marinereserves@state.or.us

Join our email list and receive updates:
<http://lists.smart.osl.state.or.us/mailman/listinfo/odfwmarinereserves>



October 8, 2014

To: The Ocean Policy Advisory Council

Dear Chair McMullen and Council Members:

The Oregon Marine Reserves Partnership is a coalition of organizations that formed in July of 2014 to leverage common resources and interests to address key needs and gaps associated with implementing Oregon's marine reserves and protected areas. Our founding member organizations are the Audubon Society of Portland, Surfrider Foundation, Ocean Shores Conservation Coalition, Oceana, The Nature Conservancy, and Coast Range Association. We are also working with other contributing and partner organizations, such as the US Fish and Wildlife Service Oregon Coast National Wildlife Refuge Complex. During the coming year, we seek to expand the membership of our partnership to include organizations and agencies that share interest in our highest priorities—awareness and outreach, planning and implementation, and scientific research associated with Oregon's marine reserves and protected areas.

The OMRP is dedicated to working together on behalf of Oregonians to support the state's marine reserves and protected areas through scientific research, community engagement, and communications. As part of our new strategic framework (attached), we crafted a set of guiding principles for how we conduct business and seek to create a respectful, inclusive, transparent environment during the implementation phase of Oregon's marine reserves and protected areas.

Thank you to each of you who took the time to read and comment on an earlier iteration of our strategic framework. We considered every suggested edit in the hopes that the current version of the framework (attached) would have a basic level of support through the informed consent process we have used to engage with interested parties since July. The few edits that have not been incorporated are edits that recommended support or reference to a particular industry or set of stakeholders or were not in alignment with our mission, vision, guiding principles, or other elements of our strategic framework.

We consider our strategic framework to be a living, breathing document that will be updated on a regular basis (reviewed twice annually) to ensure our partnership evolves as we gain new information and as the environment in which marine reserves and protected areas are managed evolves. Therefore, if you have proposed edits or concerns, please don't hesitate to send them to me at any time.

I serve on contract to provide coordination support to the member organizations dedicated to helping Oregonians interested in learning about or participating (e.g., volunteering as a citizen scientist) in Oregon's marine reserves and protected areas to access the desired information quickly and easily. If any of you are interested in learning about our work or would like to be connected to any of the activities of our member organizations, I can certainly assist you in making those connections. Please feel free to use me as a resource at any time.

Although I will be out of state during your October meeting, three of our members have seats on OPAC, and will be available to answer any questions you may have. If you would like the OMRP to provide you with a presentation on our activities during your spring 2015 meeting, I would be pleased to coordinate the development of the presentation so that we can share with you examples of the types of work we are engaging in to help meet Oregon's goals for its marine reserves and protected areas.

Please feel free to contact me at any time if you have questions or recommendations for our coalition. I can be reached at lisad@createstrat.com or (503) 704-2884. Thank you.

Lisa A. DeBruyckere, Coordinator
Oregon Marine Reserves Partnership

OREGON

MARINE RESERVES PARTNERSHIP

STRATEGIC FRAMEWORK 2015–2019



Cape Falcon



Cascade Head



Otter Rock



Cape Perpetua



Redfish Rocks



Oregon Marine Reserves
Partnership

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BACKGROUND

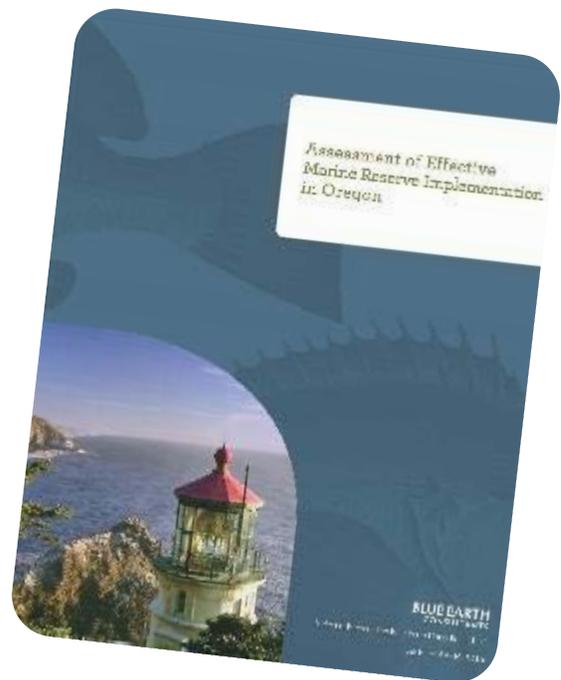
In 2012, Oregon designated a total of five marine reserve sites (Cape Falcon, Cascade Head, Otter Rock, Cape Perpetua, Redfish Rocks) and nine associated marine protected areas (all have one or more protected areas associated with them except for Otter Rock). The marine reserves and protected areas were established as part of an overall strategy to manage Oregon’s marine waters and submerged lands using an ecosystem-based approach. The Ocean Policy Advisory Council (OPAC) stated in 2008 that the purpose of these areas is to provide additional tools to help protect, sustain, and restore the nearshore marine ecosystem, its habitats, and species for the values they provide to present and future generations

In early 2012, two of the five marine reserve sites—Redfish Rocks and Otter Rocks—completed baseline monitoring and began implementing harvest restrictions, however, a complete understanding of status and needs of key elements for effective marine reserve implementation was lacking.

In 2013, Blue Earth Consultants, LLC, a consulting company, was funded by the David and Lucile Packard Foundation to conduct an “Assessment of Effective Marine Reserve Implementation in Oregon.” The report, released in September of 2013, described the status and needs of five key elements for effective marine reserve implementation in Oregon, including:

- Legal framework
 - Eliminate legal loopholes
 - Make available information from monitoring data to inform decision making
 - Integrate marine reserves into Oregon’s Territorial Sea Plan framework.

- Strong management plan
 - A system-wide vision for what success and effectiveness looks like, including monitoring and evaluation needed to define progress and changes
 - Funding and human resources to implement the plan at the state and site scale in partnership with communities, NGOs, etc.
 - Implementation plan for each site that defines roles and responsibilities



- Operational capacity
 - Surveillance and enforcement—improve surveillance technological capacity, produce a realistic assessment of enforcement needs for the entire system, and obtain support from citizen watch groups
 - Monitoring and evaluation—system-wide precise monitoring measures/indicators, additional human resources for monitoring and evaluation, improved collaboration for monitoring and science
 - Outreach and education—improve collaboration and coordination and consistent messaging of regulations
 - Develop materials that translate science to resource users and the public
 - Support the creation of the Oregon Ocean Science Trust

- Social capital—stakeholder trust, support, and engagement
 - Build trust to build a constituency that supports marine reserves
 - Build capacity to address deficiencies in outreach
 - Develop opportunities for engagement and ownership

- Long-term financial stability
 - Conduct a costing study to determine long-term implementation costs
 - Develop a financial plan for the reserves

In addition, the report recommended linking marine reserves to other ocean and coastal policies and programs, such as fisheries management, climate change adaptation, coastal and marine spatial planning and water quality assessment and remediation.

The Oregon Marine Reserves Partnership is a coalition of organizations that formed in July of 2014 to leverage common resources and interests to address key needs and gaps associated with implementing Oregon’s marine reserves and protected areas.

Oregon Marine Reserves

-  Marine Reserves
-  Marine Protected Areas

OTTER ROCK



CAPE PERPETUA



REDFISH ROCKS



CAPE FALCON



CASCADE HEAD



Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors

Oregon Marine Reserves Partnership Strategic Framework 2015–2019

Working together to support Oregon’s marine reserves and protected areas through scientific research, community engagement, and communications

Vision, Mission and Guiding Principles

Vision

Our vision is a durable and ecologically sustainable system of marine reserves and protected areas for the Oregon coast.

Mission

The Oregon Marine Reserves Partnership (OMRP) is a consortium of organizations dedicated to implementing and maintaining Oregon’s marine reserves and protected area system for all Oregonians by supporting scientific research, community engagement, and effective communications among all stakeholders.

Guiding Principles

- We share information about Oregon’s marine reserve and protected area system.
- We promote coordination and cooperation to leverage the strengths, interests and values of Oregonians.
- We seek to foster a collaborative, respectful environment within which to advance the goals and long-term sustainability of marine reserves and protected areas.
- We recognize marine reserves and protected areas as additional tools for biodiversity conservation, ecosystem-based management, and the resilience of coastal communities.
- We advocate and support the use of science and cooperative research as the basis to inform policy and management decisions associated with the implementation of marine reserves and protected areas.
- We engage community members and all Oregonians in the implementation, evaluation and sustainability of marine reserves and protected areas.
- We advocate for needed financial and human resources to implement marine reserves and protected areas.

Our Institutional Philosophy

The Oregon Marine Reserves Partnership seeks to administer the operations of the organization using an adaptive management approach. In so doing, we are committed to:

- Tracking the performance and evaluating the effectiveness of our organization.
- Hiring a policy strategist to monitor, communicate and advocate for the elements of this strategic framework.
- Tracking and participating in relevant agenda items of the Ocean Policy Advisory Committee, Department of Lands and Conservation Development, Oregon Department of Fish and Wildlife, Oregon Parks and Recreation Department, and Ocean Science Trust meetings, and share the process and milestones with stakeholders.
- Revisiting, on an annual basis, the highest priority outreach, education, research, coordination and funding needs for marine reserves and protected areas by hosting an annual two-day retreat with organizational members.
- Expanding the members of our organization by an additional 6–10 member groups to plug existing representative gaps.

AWARENESS APPRECIATION UNDERSTANDING

“Education is the most powerful
weapon which you can use to
change the world.”

~ *Nelson Mandela*

I. Raise awareness, support, and appreciation of Oregon’s system of marine reserves and protected areas through engaging, informative, and effective outreach and education initiatives.

a. Develop and maintain OMRP’s website (<http://www.oregonmarinereserves.org>), and use traditional media venues (radio, local newspaper), social media and other tools to share information about marine reserves.

b. Create opportunities for Oregonians to understand marine reserve/MPA conservation concepts, and capitalize on opportunities that exist to participate in marine reserve activities.

- Work with a variety of media outlets to promote marine reserves and protected areas.
- In partnership with federal, state, and local governments, host an Oregon ocean awareness campaign (e.g., “Thank you, Ocean”) in 2016, highlighting the benefits of marine reserves and protected areas.

c. Improve collaboration, coordination and consistent messaging concerning marine reserves and protected areas through outreach.

- Interpret and synthesize science and information about marine reserves and protected areas to resource users and the public in an understandable and effective way – that creates a new identity and helps to manage public expectation.
 - Reach out to coastal media and offer to provide (in partnership with members of coastal community teams) one article every other month that showcases marine reserve science and research and community member activities at the local level.



Photo credit: Jena Carter.

- Develop a marine reserve science Speakers Bureau comprised of key marine scientists and researchers along the Oregon Coast and work with partnership members to schedule speakers in marine reserve communities.

d. Develop and install marine reserve and protected area interpretive displays.

- Design one set of marine reserve backlit displays for Interstate-5 rest stop areas.
- Work with local communities and other entities to post marine reserve/MPA

informational displays at 10 highway 101 rest stops.

- Work with ODFW and OR Parks to develop and install signs on Beach Access signboards on Oregon coast.

e. Participate in at least 25 events annually to showcase marine reserves and protected areas.

f. Promote citizen volunteer opportunities, building a sense of community and social investment in marine reserves and protected areas.

g. Work with coastal community groups to ensure consistency in key messages about marine reserves and protected areas at both the site and system level.

- Using the website as a networking tool, compile and connect science, monitoring activities, volunteer opportunities, research, and

other activities and information, to share with Oregonians.

- Connect the local community groups on a regular basis so that they can share experiences and lessons learned.
- Develop a set of key messages that raise awareness and increase understanding of OMRP's mission, goals, and guiding principles.

h. Host an annual Oregon Marine Reserves Photo Contest to highlight marine reserves and protected areas, and solicit sponsors to support the event.

i. Lay the groundwork toward 2023 for the development of an ecologically significant system of marine reserves and protected areas along the Oregon coast.

PLANNING

IMPLEMENTING

“There’s a difference between interest and commitment. When you’re interested in doing something, you do it only when circumstances permit. When you’re committed to something, you accept no excuses, only results.”

~ *Art Turick*

II. Participate in all aspects of planning and implementation for each of the marine reserves and protected areas.

a. Build lasting capacity and partnerships within coastal community groups and work with key community leaders and others to expand support for implementation of marine reserves and protected areas via cultivation and engagement.

- Attend coastal meetings and events related to the marine reserves and protected areas.
- Seek funding annually to add capacity to each of the coastal community-led efforts.
- Offer the opportunity for each coastal community group associated with marine reserves and protected areas to have their own page of the OMRP website.
- As more coastal community groups are formed, take steps to identify one fiscal sponsor willing

to administer the finances of the groups, if needed.

b. Convene a workshop to address desired and comprehensive human dimensions outcomes, then chart a course for achieving those deliverables through 2023.

c. Host a marine reserves summit every two years to provide updates and progress on the implementation of marine reserves and protected areas and address key gaps and lessons learned.

d. Support the development and compilation of community engagement strategies to strengthen implementation of marine reserves, including participating in the development of an implementation plan for each marine reserve and protected area that defines roles and responsibilities for entities involved.



Photo credit: visittheoregoncoast.com.

e. Ensure Oregon's system of marine reserves and protected areas are financially sustainable.

- Lead the scoping of and then implementation of a study/gap analysis to identify the financial and human resources needed to implement marine reserves long-term at the site as well as statewide scale, then advocate for long-term sustainable funding sources for marine reserve and protected area implementation.
- Support the development of the Oregon Department of Fish and Wildlife Marine Program budget each biennium.
- Support the development, implementation, and success of the Oregon Ocean Science Trust.

RESEARCH

“The future is in the hands of those who explore . . . and from all the beauty they discover while crossing perpetually receding frontiers, they develop for nature and for humankind an infinite love.”

~ Jacques Cousteau

III. Build capacity for focused research that addresses key science and data needs to inform the implementation and management of marine reserves and protected areas.

a. Promote ecological studies comparing use of marine reserves with reference areas for taxa not currently included in ODFW marine reserve planning (i.e., birds, marine mammals, etc.).

b. Explore opportunities to incorporate traditional and scientific knowledge and data by reaching out to Oregon coastal tribal sovereign nations whose geographic scopes encompass marine reserves and protected areas, and engage with Oregon tribes throughout marine reserve implementation.

c. Connect with potential researchers at universities and institutions to promote marine reserves and MPAs as foci for studies. Connect funders to projects to support the identified work. Help stakeholders identify important research and monitoring questions.

d. Work with ODFW to convene the Scientific and Technical Advisory Committee (STAC) and others on the West Coast with experience conducting research associated with marine reserves and protected areas to participate in a

scientific panel to discuss key priorities for ecological research and identify key ecological monitoring gaps as well as standardized protocols. Revisit the monitoring measures/indicators (review STAC II report) that address socioeconomic, ecological, and management activities for each site.

e. Support efforts that inform outcomes by sharing existing datasets and studies, seeking resources to add capacity for seasonal staff hires, and sharing with the data and information with Oregonians.

f. Resolve small fisher (day boats) insurance issues that prevent fisher participation in citizen science and reserve monitoring.



Photo credit: Oregon State University.



© Ron LeValley

U.S. WEST COAST REGIONAL ASSESSMENT REPORT

General Introduction to the Global Ocean Health Index

The Ocean Health Index is the first assessment tool that scientifically compares and combines key elements from all dimensions of the ocean’s health – biological, physical, economic and social—to measure how sustainably people are using the ocean. Using the definition **“A healthy ocean sustainably delivers a range of benefits to people now and in the future,”** the Index assesses and tracks a portfolio of ten goals (shown in Table 1) that people have for a healthy ocean and their associated benefits. The goals, shown below, were selected by an expert group of scientists, sociologist, and economists after reviewing available literature to learn what people expect from a healthy ocean. Scores show how well coastal regions optimize a sustainable long-term flow of those benefits to people. The amount of each benefit gained is compared with a sustainable reference point. The score is the average of present Status (the most recent value) and Likely Future Status (the probable change in Status during the coming 5 years) as shown below in Table 2. The Index can be used at nearly all geographic scales from global to local. A regional-assessment of the Ocean Health Index was recently completed for the U.S. West Coast. The

Table 1: Ocean Health Index goals and the associated benefits that are measured

Goal	Sub-Goal	Benefit Measured
Food Provisioning	Fisheries	Seafood sustainably harvested for human consumption from wild, or cultured stocks
	Mariculture	
Artisanal Fisheries		Opportunity to engage in artisanal fishing as a social, cultural and livelihood activity
Natural Products		Amount of sustainably harvested natural products (other than for food provision)
Carbon Storage		Conservation of coastal habitats affording carbon storage and sequestration
Coastal Protection		Conservation of coastal habitats affording protection from inundation and erosion
Tourism and Recreation		Opportunity to enjoy coastal areas for recreation for locals and tourists
Livelihoods & Economies	Livelihoods	Employment (livelihoods) and revenues (economies) from marine-related sectors
	Economies	
Sense of Place	Iconic Species	Sense of place and cultural connectedness to the ocean afforded by lasting special places and iconic species
	Lasting Special Places	
Clean Waters		Clean waters that are free of pollution, debris and safe to swim in
Biodiversity	Habitats	Conservation of biodiversity of species and habitats for their existence value
	Species	

results, [released on June 18, 2014 in the scientific journal PLOS ONE](#), assess the health of

Table 2: Components of goal score calculation

Present Status (50% of goal score)	Likely Future Status (50% of goal score)		
Is the goal's present value (represented by the most recent data available) compared to a goal-specific reference point	Trend (33%) is the average percentage change in Status shown by the most recent five years of data	Pressure (8.5%) is the sum of the ecological and social pressures likely to depress near-future scores for a goal	Resilience (8.5%) is the sum of ecological factors and social initiatives (policies, laws etc.) enacted that can reduce pressures and therefore increase near-future scores for a goal

the coast and waters of California, Oregon, and Washington.

Each goal is assessed on a scale from 0 to 100. A score of 100 means that the evaluated system has achieved its defined target (reference point) for that goal, is sustainably delivering all of the specified benefits, and is likely to continue doing so in the near future. It does not imply that conditions are pristine or that benefits are maximized absolutely, but only relative to the chosen reference points. A score of '0' means that none of the available benefits were gained or that they were obtained in an unsustainable manner. A region's score is the average of its goal scores. Goals not applicable to a region are not calculated or averaged. Natural Products was not assessed for the U.S. West Coast because trade in non-food marine products is nearly zero in the region.

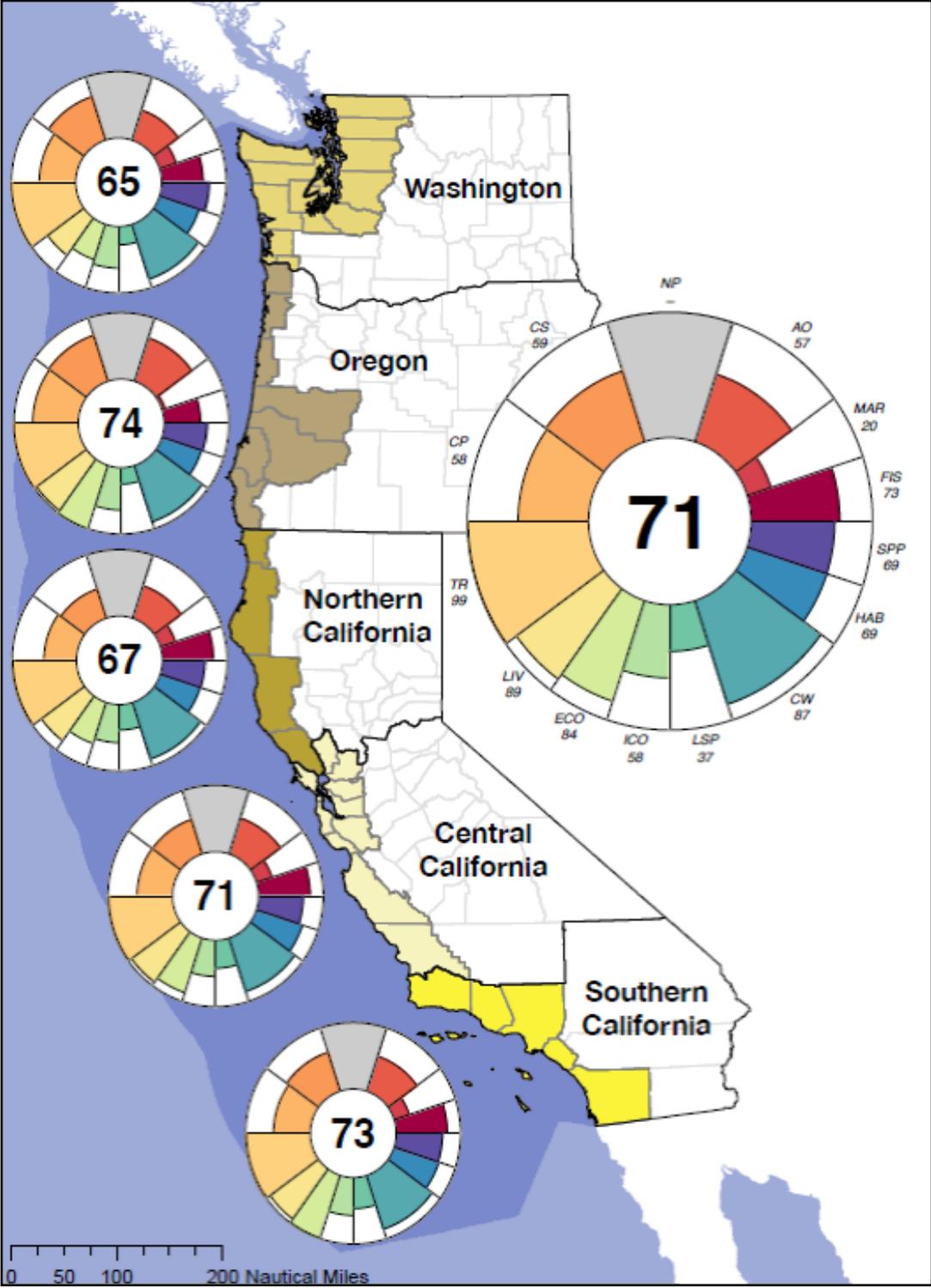
Global assessments measure the marine conditions of every coastal nation and require similar data from each one, allowing country-to-country comparison of results. Regional assessments, such as that for the U.S. West Coast, take advantage of higher quality data that may be available in some countries or areas, yielding more accurate results for use by local managers or policy makers. However, those results are specific to the region studied and not comparable to global results or other regional assessments.

U.S. West Coast regional and sub-regional scores

The U.S. West Coast study used regional data for 80% of the 49 data layers examined. Region-specific methods or reference points were used for all of the 17 goals and sub-goals assessed. Scores were calculated for five coastal sub-regions – Southern California, Central California, Northern California, Oregon, and Washington – and the overall score is the area-weighted average of those five scores.

The U.S. West Coast scored 71 out of 100. Oregon was the highest scoring sub-region (74), followed by Southern California (73), Central California (71), Northern California (67), and Washington (65). Though not strictly comparable, the overall regional score was slightly higher than the global score for the entire U.S. in 2012 and 2013 (67), possibly because the U.S. global score included all five of the country's EEZ: Alaska, Hawaii, U.S. West Coast, U.S. East Coast, and the Gulf of Mexico. The U.S. West Coast is a well studied, relatively healthy, and sustainably managed system, but the area is not fully maximizing all the ocean benefits that it could, particularly in the lowest scoring goals and sub-goals: mariculture, lasting special places, artisanal fishing opportunities, coastal protection, iconic species, carbon storage, and biodiversity.

Figure 1: U.S. West Coast study region. Goal scores per sub-region (left) and overall U.S. West Coast (right). The width in each petal in the plots represents the weight for the goal or sub-goal. The color legend and goal names correspond with table 1. The center number is the overall Index score. The natural products goal is shaded gray because it is not applicable. Regions are depicted with coastal counties and the 200 nm Exclusive Economic Zone is shaded in darker blue for reference only



Overall results for the U.S. West Coast

Table 1: Regional Assessment scores for the U.S. West Coast and each of the five regions studied

Goals are labeled in bold; sub-goals in light text. Goal scores are the arithmetic averages of their sub-goal scores, except for Food Provision, where the sub-goal scores are weighted by yield before averaging.

Region	Goals and Sub-goals																	
	Average Score	Fisheries	Food Provisioning	Mariculture	Artisanal Fisheries	Carbon Storage	Coastal Protection	Tourism and Recreation	Livelihoods	Livelihoods & Economies	Economies	Iconic Species	Sense of Place	Lasting Special Places	Clean Waters	Habitats	Biodiversity	Species
U.S. West Coast (area weighted average)	71	73	71	20	57	59	58	99	89	87	84	58	48	37	87	69	69	69
Northern California	67	79	77	24	51	46	51	99	83	74	65	57	48	38	89	65	66	66
Central California	71	79	78	24	57	54	55	99	94	90	86	54	48	42	85	74	72	69
Southern California	73	79	78	25	55	61	57	99	93	97	99	57	52	47	85	73	72	72
Oregon	74	56	56	5	69	73	71	100	96	98	100	64	44	25	89	64	65	66
Washington	65	64	53	27	47	69	51	100	70	63	56	63	45	28	86	65	69	73

Overall findings:

1. Individual goal scores for the overall region ranged from 20 (mariculture) to 99 (tourism and recreation).
2. Tourism & recreation, clean waters, and livelihoods & economies scored highest.
3. Artisanal fishing opportunities, carbon storage, coastal protection, and sense of place scored lowest.
4. Goal scores that depend on coastal habitats (carbon storage, coastal protection and biodiversity) scored relatively low due to the historical and continuing decline in extent or condition of salt marshes, sea grasses and sand dunes.
5. Status for most goals declined during the past decade, but likely future scores suggest near-term improvements may occur for most goals in most regions. Exceptions were coastal livelihoods & economies in Washington; fisheries and species biodiversity in Oregon; fisheries, species biodiversity, carbon storage, and coastal livelihoods & economies in Northern California; and species biodiversity and fisheries in Central and Southern California.
6. Changing the goal weights from equal (such as in the global model) to regionally-specific — determined by an expert panel (Halpern et al. 2013), which gave the highest weights to clean waters and sense of place — produced lower scores for some sub-regions and higher scores for others, but only changed scores by a point or two.

Goal and sub-goal results for the U.S. West Coast

Food Provision: both land and ocean will need to increase food supply to meet the demand of a growing human population and increase human well-being. The goal is to maximize the amount of sustainably caught and farmed seafood.

Food Provision	U.S. West Coast	Southern California	Central California	Northern California	Oregon	Washington
	71	78	78	77	56	53

Findings:

- Results of regional assessments, such as the US West Coast, cannot be compared quantitatively those from global assessments owing to difference in data and methods. However, it can generally be said that all of the U.S. West Coast's sub-regions are closer to meeting their targets (reference points) than the U.S. as a whole, which received a global score of 40.
- Scores for California's sub-regions were considerably higher than those of Oregon and Washington, but all sub-regions could obtain higher scores by maximizing the amounts of benefits obtained sustainably.

Wild-caught Fisheries sub-goal: the goal is to maximize sustainable wild catch.

Reference point: the total biomass of wild-caught fisheries should be within 5% of the biomass that produces maximum sustainable yield (MSY); and the percent of the population removed by fishing should be within 5% of that at MSY. Regional stock assessments data replaced global fisheries data that were used in the global study.

Wild-caught Fisheries	U.S. West Coast	Southern California	Central California	Northern California	Oregon	Washington
	73	79	79	79	56	64

Findings:

- Though exact comparison is not possible, all sub-region scores were higher than the U.S. score (33) in the 2013 global study, probably because the U.S. West Coast is relatively healthy and generally well managed.
- The scores indicate that significant improvement in fish stocks and management practices is needed in all areas and most especially in Oregon and Washington states.
- The resolution of fisheries catch data was too coarse to permit calculation of sub-region scores, so one score was calculated for the entire state.
- Different stocks dominate the respective fisheries. Low scores in Washington and Oregon are partially related to dependence on Pacific hake, which has historically made up about 30% of the total catch, but that stock was at low biomass and fishing effort levels when

evaluated for this study. Pacific hake abundance varies considerably because it has a relatively short life span and large natural year-to-year variations in recruitment success. A successful year-class, such as that of 1999, can rebuild stocks quickly, but many years may pass before another occurs (Miller et al. 2009). Fishing pressure can be managed by agencies as well as economic decisions by fishermen, but there is no way to alter the stock's natural variability, so it is harder to keep the species at its target abundance ('reference point') where total biomass is within 5% of the biomass that produces maximum sustainable yield (MSY); and the percent of the population removed by fishing is be within 5% of that at MSY. In California, on the other hand, yellowfin tuna has historically made up about 40% of the total catch. This very productive, highly migratory species is currently at ideal levels of biomass and fishing effort, is more resilient to fishing pressure and can respond quickly to management actions than do species that reproduce more slowly and in smaller numbers (NOAA, undated).

- The trend for the most recent five years (2006-2011), only using data from assessed stocks) was slightly negative for Washington (-0.04), but more negative for Oregon (-0.17) and California (-0.20). Considering the future status five years hence, Washington was the only area where status is likely to increase (0.08). Future status is likely to fall in Oregon and Northern California (both -0.03) and somewhat less in central and Southern California (-0.01)
- The study indicates that all five regions are currently reporting smaller harvests at lower sustainability than might be possible if management could improve methods for staying within 5% of the maximum sustainable yield for commercial species.
- Data beyond those used in this study showed that the harvest of wild-caught fish in California, Oregon and Washington had a dollar value of \$566 million in 2010 representing 13% of the total tonnage and commercial value for fisheries landings of the entire USA. (NOAA U.S. Commercial Fisheries Landings , http://www.st.nmfs.noaa.gov/Assets/commercial/fus/fus10/02_commercial2010.pdf).
- Other NOAA analyses indicate that commercial fisheries support 1 million jobs and \$32 billion in income to the U.S. economy each year through direct, indirect and induced employment and spending.

Sub-goal Mariculture: this sub-goal goal is to maximize sustainable harvest of farmed seafood. Shellfish production was evaluated since no marine fin-fish are raised for food on the U.S. West Coast.

Reference point: as mandated by NOAA, increase the amount of U.S. shellfish production by 350% over 2005, to be achieved by 2020. Sub-region targets were derived by distributing that increase over currently farmed bays using a constant proportion of each bay for mariculture. Sustainability is measured using indicators specific to the long-term sustainability of the aquaculture operation itself, namely type of wastewater treatment (closed vs. open system), origin of feed (algae, fishmeal etc.) and origin of seed (native or introduced). These affect the long-term sustainability of the mariculture operation itself. They and other factors, such as habitat modification, use of chemicals, and employment may impact other goals negatively or positively and are incorporated into calculations of those goal scores. Certification, eco-labeling, compliance with FAO Code of Conduct and traceability of product and feed were incorporated as resilience measures.

Mariculture	U.S. West Coast	Southern California	Central California	Northern California	Oregon	Washington
	20	25	24	24	5	27

Findings:

- Mariculture was the lowest scoring goal in the Index, even though use of local data and a new method substantially increased scores compared to the global study.
- Oregon scored lowest and its trend for mariculture status (-0.13) was also the poorest for any area, followed by Washington (-0.09). The trend for the California sub-regions was -0.01. Future status scores appear likely to remain the same (0.00) in Washington and Oregon and to improve slightly (0.02) in the California sub-regions.
- More than 99% of mariculture throughout the region consists of bivalve mollusks (oysters, abalone, clams, mussels, geoducks).
- Concerns about pollution, transmission of parasites or other diseases to wild stocks and genetic pollution of wild populations by fish that escape from farms has limited fin-fish aquaculture. Bivalve aquaculture has faced similar concerns in Puget Sound and elsewhere.
- Scores are low because almost no fin-fish are raised for direct human consumption and because bivalve production is low relative to the sustainable reference point used. Existing bays and estuaries may have room for mariculture development or expansion, but other uses such as tourism and recreation, protection of areas for biodiversity conservation, shoreline protection, wild fisheries and other businesses compete for that same space.
- Fin-fish mariculture currently exists only in Washington, where it is only a small portion of total mariculture. Most of the production is or restocking of food provision purposes rather than food provision, so it is not included in the mariculture sub-goal. Exact numbers are not available because data are proprietary. The small amount of Washington fin-fish production for food purposes, if any, would not affect the state’s overall score food provision score, because it would contribute very little to the mariculture score; and the food provision score is calculated as the yield-weighted average of the sub-goal scores for mariculture and fisheries.
- In Oregon, Both Coos and Yaquina Bays had large salmon-ranching businesses in the 1990s, but no salmon or other marine fin-fish are raised in Oregon today (Oberrecht, undated). The California legislature passed legislation in 2003 that prohibits commercial salmon mariculture in its coastal waters and there are now no commercial salmon culture operations, though land-based tank operations use eggs and sperm from wild-caught fish to produce tens of millions of smolts for release into California’s rivers to increase wild populations (Beer, 2010). Those young fish are not produced as human food, so they are not counted as part of mariculture. Any contribution that they make to wild populations would implicitly be counted as part of the biodiversity goal and wild-caught fisheries sub-goal.

- Marine fin-fish are raised extensively in other countries, but competing uses for coastal space and resources, economic factors (including low cost imports) and restrictive regulatory requirements have hindered such development along the U.S. West Coast and elsewhere in the country (Drawbridge and Taylor, 2010). Whether environmental and economic conditions, as well as technological advances (such as offshore farming) might enable growth of a fin-fish mariculture industry is not yet known.
- Bacterial infections, infestations of parasites, toxic algal blooms, elevated sea temperature events, predation by sea ducks, and imports of lower cost shellfish from growers and harvesters in other states and countries have all impacted the financial success and viability of U.S. West Coast growers. Ocean acidification appears to be harming bivalve aquaculture, especially in Washington and Oregon, by making it harder for the animals, especially larvae, to form shells.
- It is not known whether seafood farming on the U.S. West Coast will contribute to the growing importance of mariculture to the world's food supply. The World Bank projects that by 2030 aquaculture will make up more than 60% of all seafood directly consumed by people. Most of the increase will come from freshwater aquaculture, but mariculture will also make an important contribution. Amounts expected for direct human consumption and their comparison with amounts from wild capture fisheries are:

	Actual 2006 (million tons)	Projected 2030 (million tons)
Aquaculture	47.2	93.6
Wild Catch	64.3	58.2
Global Total	111.7	151.8

Source: World Bank. Fish for 2030. <http://www.fao.org/docrep/019/i3640e/i3640e.pdf>

- In 2010 the worldwide value of aquaculture harvests was US\$ 119 billion compared to the value of wild-caught at US \$ 98.5 billion. In 2010 all of North America produced only 1.1% of that aquaculture output. (World Review of Fisheries and Aquaculture 2012 <http://www.fao.org/docrep/016/i2727e/i2727e00.htm>).

Artisanal Fishing Opportunity: people need and value the opportunity to catch fish for personnel subsistence or for cultural reasons. This goal seeks to maximize that opportunity.

Reference point: there should be fish available to catch (measured by NOAA Fish Stock Sustainability Index [FSSI] in relation to the maximum potential FSSI score); and all areas should be accessible by foot (% of coastal area within 1 mi of a shore access point) and by boat (using the ratio of gas price to median income now vs. 5 yr ago as a proxy, because it represents a major cost of trailoring or driving a boat to areas where fish are available).

	U.S. West Coast	Southern California	Central California	Northern California	Oregon	Washington
Artisanal Fishing Opportunity	57	55	57	51	69	47

Findings:

- Oregon had the highest score (69) and Washington the lowest (47). Public access was the main driver of scores. The public has access to Oregon's entire coastline, leading to a higher score, whereas Washington and California both allow privately-owned access to the coast and have large stretches of restricted-access coastline.
- The U.S. West Coast and its sub-regions scored much lower on this goal in the regional assessment than did the entire U.S. in the 2013 global study, where the U.S. was one of many countries that scored 99 and the overall global score was 95. Those high scores resulted from use of a different type of reference point that compared the opportunities for small-scale local fishing with its estimated need as expressed by per capita GDP corrected by purchasing power parity (PPPpcGDP). The high global score, 95, suggested that most countries were meeting most of the apparent economic need for their citizens to be able to carry out small-scale fishing for subsistence, barter or commercial purposes (mainly local markets). The different reference point used for the U.S. West Coast study takes advantage of detailed regional information for both geographical access and the amount of fish available to catch, neither of which could be evaluated in the global study. It is worth noting that even though better data will produce more accurate scores, those scores will not always be higher.

Natural products: harvesting non-food marine products can provide benefits to coastal residents. This goal seeks to maximize the amounts of such products that are harvested sustainably.

Findings and comments:

- This goal was not included for the U.S. West Coast regional assessment so there is no score.
- The global Ocean Health Index study evaluated production of ornamental fish for aquariums, fish oil, seaweeds, shells, sponges and coral products, because at least some of those products were harvested in many places and data on the amounts of production were available. The Natural Products goal is excluded from the U.S. West Coast study because there is no recorded trade within the region for those products, even though some might occur at small scales. During the 1950s-1990s kelp was harvested in Southern and Central California, but the company now harvests the extensive kelp beds in Chile. Small quantities of kelp are harvested as food for farmed abalone, but not for direct human use. Rather than give scores of zero (0) to all sub-regions, the goal was dropped.
- It would be useful for the region to determine whether there are any other kinds of non-food marine resources that might be sustainably harvested. Such regional resources exist elsewhere. For example, saltwater pearls were not included in the global study, because they are only produced in a few places. However they could be included in a regional Ocean Health Index study for Tahiti, Australia, Indonesia, the Philippine Islands or other places where pearls are harvested or cultured. Asian abalone farmers have developed techniques for growing pearls in their abalone, but whether that could be done in U.S. West Coast abalone farms is not known. Culture of red algae, a beneficial food for abalone and nutritional supplement for people, could perhaps also be a useful future product.
- Researchers at U.S. West Coast universities and biomedical companies are bio-prospecting for medically active compounds in the bodies or secretions of marine

phytoplankton, algae, plants, sponges, jelly organisms, snails, tunicates, echinoderms and other organisms from the U.S. West Coast and worldwide. Many important discoveries have already been made and more are sure to come, but there is no way to include bio-prospecting in Ocean Health Index calculations, because its current realized value is not known and its potential future value is unknowable though potentially very high.

- The Ocean Health Index also does not evaluate extraction of minerals such as oil, gas, sand or gravel from the seabed, although in the calculation of goal scores it does include the pressures caused by those activities. Minerals extraction is not evaluated because the substances mined cannot be replaced as quickly as they are removed and because, in contrast to fisheries, there is no agreed-upon limit to the amount of material that could be removed, so resource exhaustion could occur. Thus, despite the considerable economic significance of minerals extraction in some areas, with the reference points now available this activity is by definition not sustainable.

Carbon Storage: global climate change and ocean acidification caused by increasing concentrations of carbon dioxide (CO₂) in the atmosphere are the most urgent long-term problems confronting people and nature. Coastal marine forests, marshes and seagrass beds are among the world’s most efficient habitats at taking up and sequestering carbon for long periods of time---centuries if undisturbed. The goal is to maximize carbon-storage by coastal habitats.

Reference point: maintain or restore salt marshes to 50% of their pre-industrial extent and condition; support seagrasses by ensuring zero input of nutrients from land-borne runoff.

Carbon Storage	U.S. West Coast	Southern California	Central California	Northern California	Oregon	Washington
	59	61	54	46	73	69

Findings:

- Oregon scored highest, followed closely by Washington. Northern California scored lowest.
- High quality regional data on habitats and better estimates of reference points showed habitats to be worse off than with global data, so habitat-based goals (Carbon Storage, Shoreline Protection) scored lower than in the global U.S. assessment.
- Variation among sub-regions for the carbon storage goal (as well as this goal’s generally low scores for all sub-regions) is primarily due to the status of salt marsh habitats. Salt marsh habitat has been lost throughout the U.S. West Coast, but it has been most severe in California. Washington and Oregon have lost about 35% of the 3.6 million acres of wetlands that existed there in the 1780s (Frenkel and Morlant, 1991), but California has lost 91% of the wetlands estimated to have been present before the 1850s (California Department of Fish and Game, 2001)
- The main causes for salt marsh loss have been residential, commercial, industrial or urban development; diking, filling, draining, pad building for oil exploration, road building, draining for mosquito control or livestock grazing, contamination, introduction of exotic species, sea level rise and excessive level of nutrient run-off from land.

- Most loss of salt marshes occurred decades ago, but the effects of those losses are still felt today. Moreover, losses continue, though much more slowly owing to more effective regulations.
- The California Department of Fish and Game (2001) reported estimates that the state had lost 91% of the historic wetland acreage present before 1850, a total loss of 5 million acres. By contrast, historical maps showed that the coast of New England, which has a much longer settlement history, has lost an estimated 37% of its historical salt marsh coverage, with higher amounts for the state of Rhode Island, which lost 55% since 1832; Massachusetts, which lost 41% since 1777; and Boston, which has lost 81% of its salt marshes. Most losses were attributable to urban growth (Bromberg and Bertness 2005).
- As of 2001, the extent of California's remaining salt marshes was estimated to be 31,300 acres along the North Coast, 3,800 acres along the Central Coast, 93,000 out of an original 200,000 in San Francisco Bay (54% loss) and 13,000 out of an original 53,000 in Southern California (75% loss). More recent work (Solek et al. 2012) noted that the small lagoons and river mouth estuaries of California's central and southern coast are more fragmented by roads, railroads, levees, and developed areas than are northerly areas, reducing tides and lowering species richness; and that approximately 75% of the salt marsh area along the southern coast (given as 3,070 acres) is located in estuaries greater than 500 acres in size, where water flow and biotic structure were better. Solek et al.'s (2012) study used statistically based Rapid Assessment Programs of many factors to grade salt marsh quality, and—in contrast to Ocean Health Index results that are based mainly on geographical extent---their detailed study showed a gradient in salt marsh health from highest in Northern California to lower in the south.
- In addition to reducing the amount of carbon that can be stored (and releasing large amounts to the atmosphere when marshes are destroyed), loss of salt marshes also decreases nursery areas and food supplies for commercially important fish and invertebrates, reduces coastal protection from flooding and erosion, harms biodiversity, impacts some touristic and recreational activities and reduces water quality.

Coastal Protection: coastal vegetation helps protect human life and property from storm surges, flooding and erosion caused by rising sea levels and large storms. Natural habitats cannot protect coastlines from extreme storm waves or flooding, but they can reduce the damage to homes, roads, municipal infrastructure, parks and other property and structures caused by more commonly experienced storm events. The goal is to maximize the protection that natural habitats provide.

Reference point: maintain or restore salt marshes to 50% of their pre-industrial extent and condition; restore sand dunes to their extent and condition between the 1950s and 1960s; and support sea grasses by having zero nutrients introduced from land-borne runoff.

	U.S. West Coast	Southern California	Central California	Northern California	Oregon	Washington
Coastal Protection	58	57	55	51	71	57

Findings and comment:

- All sub-regions scored in the 50s except for Oregon which scored 71. The reason for such low scores is that all sub-regions historically lost substantial amounts of the habitats evaluated for this goal. Oregon scored higher because it has retained a higher percentage of its historical extent of salt marshes than have the other sub-regions and its current rates of habitat loss are somewhat less than elsewhere.
- Trend measurements (2005-2009) show that habitat losses are continuing in most places.
- The trend for the status of salt marsh wetlands was nearly neutral in Washington and Oregon (-0.00 for both), and mildly negative for northern (-0.03), central (-0.02) and southern (-0.02) California.
- The trend for the status of seagrass was positive in Washington, 0.10, slightly negative in Oregon (-0.02), strongly negative in Northern California (-0.41) and negative in Central California (-0.11) and Southern California (-0.08).
- The trend for the status of sand dunes was strongly negative in all areas: -0.14 in Oregon, -0.21 in Washington and -0.17, -0.19 and -0.21 for northern, central and Southern California, respectively.
- People often perceive the coast of Northern and Central California as 'more natural' than the highly-developed coast of Southern California, yet Southern California scores slightly higher for this goal. The reason is that the reference point for coastal protection (as well as carbon storage and the habitats sub-goal of biodiversity) is based on the extent of habitat remaining compared to the historical extent. Southern California has lost a smaller percentage of habitats than have the other two areas; and its rates of current loss (trends) for salt marshes and seagrasses are the same or smaller than in central or Northern California, though its rate of sand dune loss is slightly larger.
- Longer-term data available for the U.S. West Coast showed that the status of these habitat-based goals and sub-goals has declined over the decade from 2000-2010.
- Despite these trends, near-term (five-year) future scores indicate that the status of salt marshes, sand dunes and sea grass is likely to improve owing to more effective management actions and other resilience measures.
- Coastal protection by permanent geological features such as headlands, points, cliffs or others is not included in the goal. Places endowed with such protective features may benefit in ways that more exposed locations do not. Houses built near the edges of cliffs, especially on less consolidated formations that erode easily, are at higher risk from storm waves, sea level rise and other forces that undermine the cliffs. The habitats evaluated in this goal cannot prevent such damage.

Livelihoods & Economies: ocean-related employment helps build healthy sustainable societies. The goal is to maintain the economic vigor of marine sector jobs, wages and economic revenues.

Reference point: there should be no net loss of marine jobs, wages and revenue when compared with the performance of all economic sectors in the sub-region five years ago. Sectors evaluated, using data from the National Ocean Economics Program were living marine resources (fish hatcheries and aquaculture, fishing, seafood markets and seafood processing); tourism and recreation (amusement and recreation services, boat dealers, eating and drinking places, hotels

and lodging, marinas, recreational vehicle parks and campsites, scenic water tours, sporting goods retailers, zoos and aquaria); shipping and transport (deep sea freight, marine passenger services, marine transportation services, dredge and navigation equipment, warehousing); marine-related construction; and ship and boat building and repair.

A high score represents minimal net loss of marine-sector jobs, wages and economic revenues compared to all sectors. The methods correct for broader economic patterns that are independent of the condition of marine and coastal systems, such as the global recession that began in 2008. The performance of each sub-region's marine sectors is compared to itself over time, avoiding direct comparison of economies that differ greatly in size, for example Southern California's coastal economy with that of Oregon.

Livelihoods & Economies	U.S. West Coast	Southern California	Central California	Northern California	Oregon	Washington
	87	97	90	74	98	63
Livelihoods	U.S. West Coast	Southern California	Central California	Northern California	Oregon	Washington
	89	93	94	83	96	70
Economies	U.S. West Coast	Southern California	Central California	Northern California	Oregon	Washington
	84	99	86	65	100	56

Findings:

- Oregon scored highest and Washington lowest in all aspects of this goal. Southern California scored almost as high as Oregon, but Northern California scored significantly behind the rest of the state.
- Despite its high score, Oregon's marine-related jobs, wages and revenue did not increase much, but suffered less decline from their 2004 levels than other sub-regions did.
- Washington, followed by Northern California, posted the lowest scores for both livelihoods and economies, demonstrating the greatest net losses in marine-sector jobs, wages and revenue in nearly all economic sectors. Washington's largest marine sectors declined significantly in the last five years, particularly for jobs in the tourism and transportation sectors and for revenue in tourism and living resources sectors.
- Jobs and revenue in construction and minerals extraction were Washington's best performing sectors. Jobs and revenue in minerals, tourism and transportation were Oregon's best performing sectors. None of Northern California's sectors exceeded their targets. Jobs in Central California's construction, mineral extraction and tourism sectors reached their targets as did revenue for construction and mineral extraction. Jobs and revenue for ship and boat building, jobs for tourism and revenue for transportation met their targets in Southern California. When analyzed over 5 years, wages were weak within all sectors and sub-regions.

- The ‘no net loss’ reference point for this goal intends to ensure that marine sectors keep up with other parts of the economy in order to support vibrant coastal communities that keep their links with the sea. Washington and Northern California’s low scores could indicate that their economies are tending to develop on a path that is based on non-marine sectors such as technology, manufacturing or others.
- Detailed information on methods and data used for coastal and ocean market studies are provided by C.C.Colgan (2007) www.oceaneconomics.org/Download/Market_Guide.asp and in the supplementary online material accompanying the U.S. West Coast study.

Tourism & Recreation: tourism is the largest and fastest growing industry in the world and coastal and marine tourism is one of its most important segments and a major component of thriving coastal communities. The goal is to maintain the value people have for experiencing and enjoying coastal areas and to attract the maximum sustainable number of tourists to those places.

Reference point: there should be no net loss in public participation in 19 different marine and coastal tourism and recreational activities compared to values in 2000.

	U.S. West Coast	Southern California	Central California	Northern California	Oregon	Washington
Tourism & Recreation	99	99	99	99	100	100

Findings:

- The entire U.S. West Coast region and its sub-regions all met their reference targets and received very high scores (99 or 100).
- These scores were much higher than the U.S. score of 45 for tourism & recreation in the 2013 global study for two reasons.
 - First, detailed local data exist for actual participation rates in coastal tourism and recreation activities in this region; and these data express the goal’s intent better than either the international tourist arrivals data used in the 2012 global study or the proportion of the total labor force employed in coastal tourism and travel that was used in 2013. The participation data used include both domestic and international tourism.
 - Second, the availability of adequate time-series data allowed comparison of each sub-region to itself over time rather than comparing it to the best performing region as was done in the global studies.
- Data included the number of people who visited beaches or other marine watersides or participated in surfing, swimming canoeing, personal watercraft use, kayaking, motor boating, rowing, sailing, wind surfing, water-skiing, scuba diving, snorkeling, and hunting waterfowl, viewing or photographing scenery, birds or other wildlife in saltwater surroundings.
- Better data do not always lead to a higher score, but they did in this case.
- The important economic benefits (jobs, wages and revenue) that tourism & recreation provides to coastal communities are evaluated in the livelihoods & economies goal. The

tourism & recreation goal is only concerned with maintaining the number of tourists over time and matching that number to the maximum sustainable number.

- The score of ‘100’ does not imply that the number of tourists is ‘perfect’ for the region, but merely that the reference target has been met. Future changes in ecological, social or political conditions, availability of different types of data or other considerations could allow or necessitate setting a different reference point with resulting changes in scores. Nevertheless, tourism & recreation on the U.S. West Coast is at present successfully meeting expectations for its contribution to ocean health.

Sense of Place: in addition to material benefits with ecological or economic value, the ocean also provides people with intangible benefits such as cultural or personal identity, spiritual or aesthetic enjoyment and appreciation that particular marine species or environments exist. Those values accrue not only to coastal residents or people who visit the coast or work or travel on the ocean, but also to people who will never visit personally, but cherish the awareness that such places exist. For example, most people will never visit Antarctica, yet many place very high value on knowing that it exists and that its unique animal populations are protected. This goal seeks to maximize and protect the cultural and personal identity that people derive from marine areas. Since direct measurements of these benefits are not available, this goal uses as proxies the condition of iconic species and the degree of protection of the coastline and marine waters for all purposes.

Sense of Place	U.S. West Coast	Southern California	Central California	Northern California	Oregon	Washington
	48	52	48	48	44	45

Iconic Species: a small number of the many marine species present in an area become culturally ‘iconic’ to people for cultural, traditional, aesthetic and spiritual reasons. These species thereby help to represent intangible aspects of the area’s importance. The goal is for all regional iconic species to be at minimal risk of extinction. For the U.S. West Coast regional assessment, a comprehensive list assembled containing species with potentially high aesthetic value, association with traditional activities such as fishing, hunting or commerce, or local ethnic or religious significance to the people of California, Oregon, and Washington. The list was then narrowed based both on internal discussion and data availability from the NatureServe database to include the following species:

- Bald Eagle (*Haliaeetus leucocephalus*)
- Blue Whale (*Balaenoptera musculus*)
- Bocaccio (*Sebastes paucispinis*)
- Brown Pelican (*Pelecanus occidentalis*)
- California Sea Lions (*Zalophus californianus*)
- Delta Smelt (*Hypomesus transpacificus*)
- Gray Whale (*Eschrichtius robustus*)
- Great Blue Heron (*Ardea herodias*)

- Abalone (*Haliotis* spp.)
- Humpback Whale (*Megaptera novaeangliae*)
- Northern Sea Otters (*Enhydra lutris kenyoni*)
- Orca (*Orcinus orca*)
- Osprey (*Pandion haliaetus*)
- Salmon spp. (*Oncorhynchus* spp.)
- Southern Sea Otters (*Enhydra lutris nereis*)
- Steelhead (*Onchorynchus mykiss*)
- Stellar Sea Lions (Eastern pop.) (*Eumetopias jubatus*)

Reference Point: each sub-region was evaluated only for those species that occurred within it. Factors included in scoring were the weighted average of species extinction risk weights, whether populations were increasing, stable or decreasing, all ecological pressures (except human pathogens) and all resilience measures except climate change regulations.

Iconic Species	U.S. West Coast	Southern California	Central California	Northern California	Oregon	Washington
	58	57	54	57	64	63

Findings:

- The relatively low score of 58 for the U.S. West Coast indicates that populations of many of these iconic species are broadly challenged throughout the region.
- Oregon (64) and Washington (63) scored highest. California sub-regions all scored in the mid-50s.
- Trends were positive everywhere except in Washington, which had a negative trend (-0.07).
- California Sea Lion, Gray Whale, Humpback Whale and Osprey populations were all increasing with relatively low extinction risk. The Northern and Southern Sea Otter populations were also increasing, but with higher risk of extinction, especially the southern population.
- Bald Eagle, Blue Whale, Brown Pelican and Great Blue Heron populations were all stable (neither increasing nor decreasing) and had intermediate risks of extinction.
- Abalone, Boccacio (rockfish, *Sebastes paucispinis*, Washington only), Delta Smelt, Orca, Salmon (all), Steelhead and Stellar Sea Lion all had negative population trends and intermediate risks of extinction.

- Here and elsewhere it would be highly desirable to collect accurate information on which species different people consider to be iconic and in what ways those species are part of their cultures or personal lives.

Lasting Special Places: many geographic locations hold significant aesthetic, spiritual, cultural, recreational, or existence value for people. The goal is to protect them and their values in perpetuity. People value such places for many reasons that are hard to ascertain and measure. As is true for iconic species, there is no list of all the places that people within a region consider special or of what percent of and how well those areas are protected. As a proxy the protection status of all marine and coastal areas is assessed, with the assumption that protected status indicates a place’s significance to people.

Reference point: 30% of the total area within each of the following three zones to be under public protection: (a) 200 nm – 3 nm offshore; (b) 3 nm offshore – shoreline; and (c) shoreline - 1 mi inland. The 30% guideline originated at the 2003 Fifth World Parks Congress where it was developed for biodiversity conservation. In the absence of other guidance we used it as a target for the fraction of land to be owned and managed in the public’s best interest in perpetuity.

Lasting Special Places	U.S. West Coast	Southern California	Central California	Northern California	Oregon	Washington
	37	47	42	38	25	28

Findings and comments:

- The U.S. West Coast and all its sub-regions scored poorly. California sub-regions, led by Southern California, scored highest. Oregon scored lowest followed closely by Washington.
- Raising scores will require all sub-regions to protect more of their coastline and waters, including establishment of ‘no-take’ areas, in order to approach the 30% goals. None of the regions come close to that target.
- Only fully-protected ‘no-take’ areas are counted, because that high level of protection insures that the area will provide their intended benefits in perpetuity. It is true that placing regulations on an area to protect it could in some cases prevent the very activities that made it special to people in the first place, so greater protection may not represent a healthier state in their view. Nevertheless, if a place is special, enacting appropriate regulations and protection for that location (for example, limited access, fishing, etc.) probably ensures the long-term sustainability of a place people care about.
- Oregon scored lowest despite having public access to its entire coastline. Public access is laudable and important, and was responsible for Oregon having the highest score for the artisanal fishing opportunities goal. However, it is a much smaller factor for lasting special places. This sub-goal focuses on the protection status of all marine and coastal areas, assuming that protection of a place signifies its special importance to people. Despite its beautiful and accessible coast, Oregon is the sub-region with the lowest percentage of protected area in all three of the measured zones, only 0.2 percent
- People might suspect that Northern California, with its beautiful coastal redwoods and scenic coastline, would score higher than Southern California for lasting special places, but

it doesn't. This is because the percentage of the coastal zone designated as Marine Protected Area (MPA) is the most important component of this sub-goal score. MPAs make up 6.4% of Southern California's coastal zone, and the public can access all of that area. Southern California's eight large offshore islands, all of which are fully protected, also contribute to its high score. Corresponding percentages for central and Northern California are 2.8% and 1.5%, respectively. Both Oregon and Washington have less than 1% of their coastal zone in protected status.

Clean Waters: clean water is the foundation for all other ocean health benefits. This goal supports the optimal function of natural communities and human well-being by ensuring that ocean water is clean.

Reference point: there should be zero pollution from excessive nutrients, chemicals, pathogens, and trash. Global methods and reference points were used for nutrients and trash, but with local data. Chemical pollution was indicated by regional NOAA Mussel Watch data and NOAA/FDA-based reference points for As, Cd, Pb, Cr, Hg, Ni, Chlordane, Dieldrin, Mirex and PCB. Pathogen contamination was represented by the number of days when beaches were closed because pathogen counts exceeded EPA standards.

Clean Water	U.S. West Coast	Southern California	Central California	Northern California	Oregon	Washington
	87	85	85	89	89	86

Findings:

- A Clean Water score of 100 would indicate that waters of the area studied are completely free of pollution from excessive nutrients, chemicals, pathogens and trash.
- The U.S. West Coast's Index score of 87 is high, but not high enough. Here and elsewhere global climate change will probably cause rainstorms of greater intensity and volume, more intense rainstorms. New measures to prevent, sequester and treat pollution will be needed to meet the water quality challenges that our changing weather will present. Since clean water is a foundation upon which all other ocean benefits depend, the urgency of this task cannot be overestimated.
- The use of different data and methods precludes direct comparison of results from regional studies with those from global studies. With that caution in mind, it is worth noting that the score for the whole region, 87, was higher than the global score for the U.S. (80) and the overall global score (78) reported for the 2013 global assessment.
- Chemical pollution lowered scores in all California sub-regions. Nutrients lowered scores in Central California, Oregon and Washington. Pathogens lowered the score in Southern California. Trash lowered scores in all California sub-regions. All trends were positive except for pathogen pollution in Southern California and Oregon; and trash, which was negative everywhere except in Oregon (where it was strongly positive (0.19)). The trend for the entire Clean Waters goal was slightly positive in all regions except California, where it was slightly negative (-0.02). The likely future status (~5 yr) is strongly positive everywhere, probably because improving water quality has been a public goal for many years and has led to enactment of many resilience measures.

- Among other pathways, pesticides, herbicides and nutrients from lawns, gardens and farms; sewage, motor oil, and other pollutants are carried by rainwater draining from the land into streams, rivers and the ocean. Consequently, heavy rains can pollute water so that it is unsafe for swimming or other water contact recreation. Drought conditions reduce such run-off.
- Precipitation levels are expected to rise with the predicted onset of El Niño conditions in the Pacific Ocean later in 2014. The strong rainfalls associated with El Niño can lead to extreme runoff of pollutants into nearby streams, rivers and oceans.
- Different types of pollution affect ocean benefits and services in different ways and to different degrees. Chemical pollution might exert its strongest effects on food provision (fisheries and mariculture) and biodiversity. Nutrients would have strong effects on those goals and also on carbon storage and coastal protection (by harming salt marsh and sea grass habitats) and on tourism & recreation (by causing algal blooms). Pathogens have very strong effects on tourism & recreation, but could also affect mariculture. Trash can also have very strong effects on tourism & recreation as well as potential effects on iconic species and biodiversity. Any or all of those effects may cause economic changes that ripple through the livelihoods & economies goal, impacting jobs, wages and the revenue accruing to coastal communities.
- It will never be possible to eliminate the last pollutant molecule, the last pathogenic microbe or the last piece of trash from the ocean. However, the closer that scores get to 100 (and levels of pollution get to zero), the better the ocean can deliver all of its potential benefits and services. All pollution represents a waste of materials and money, so efforts toward a cleaner ocean will have overall financial benefits and will advance the transition toward a cleaner, healthier and more efficient economic system.

Biodiversity: ‘biodiversity’ is the term used to describe the richness of an area’s plant and animal species, the biological legacy that underlies all ecological benefits and services. The goal is to maintain a broad range of marine species and habitats to support robust functions of natural ecosystems and their human uses. Species and Habitats are assessed as separate sub-goals with the average of their scores forming the goal score.

	U.S. West Coast	Southern California	Central California	Northern California	Oregon	Washington
Biodiversity	69	72	72	66	65	69

Finding:

- All sub-regions scored in the mid 60s or low 70s indicating that biodiversity faces challenges throughout the U.S. West Coast.

Species sub-goal: ecological assessments of biodiversity traditionally count the number of species and measure the distribution among them of all organisms present. Such an assessment could not be made for the entirety of the U.S. West Coast sub-regions; moreover, doing and repeating such measurements often enough to detect changes in such large areas would be challenging, expensive and impractical. Instead, the U.S. West Coast regional assessment uses the status of a small sub-sample of species as a proxy for overall species status. Species status was

calculated for 164 species whose risks of extinction have been assessed by the International Union for Conservation of Nature's (IUCN) Global Marine Species Assessment.

Reference point: is for all species within a sub-region to have minimal risk of extinction ('Least Concern'), implying that no species are in immediate danger of serious decline or loss.

Species	U.S. West Coast	Southern California	Central California	Northern California	Oregon	Washington
	69	72	69	66	66	73

Findings:

- Scores were similar to the overall goal score. No sub-region's scores stood out as better or worse than any others.
- Species conservation requires additional attention in order to raise the scores for this sub-goal.
- This target does not satisfy the formal definition of biodiversity, because it does not measure the relative distribution of organisms among the species, however a score of 100 suggests that the number of species present is remaining more or less constant. On the other hand, a score of 0 suggest that many species are either in highly threatened categories or extinct, either of which implies severe decline in biodiversity.
- All species present should be at minimal risk of extinction.

Habitats sub-goal: habitats are the environments where plants and animals live. Each type of habitat is inhabited by predictable groups of plant and animal species that function together ecologically. Some habitats, such as coral reefs, mangrove forests, sea grass beds and others are created by their dominant species. Because they provide homes to so many species, those and other habitats are an important component of biodiversity. This goal measures how successfully habitats are being conserved.

Four habitats — salt marshes, seagrasses, sand dunes and soft-bottom habitats — were used because they represent a large portion of regional coastal and marine environments and have publicly available data with relatively comprehensive temporal and spatial coverage. Other important habitats such as kelp forests, rocky reefs, and the rocky intertidal could not be included due to lack of data on current and/or past spatial extent and condition.

Reference point: the current condition of each habitat was compared to a habitat-specific reference point that is ambitious but feasible: salt marshes should be at 50% of their pre-industrial extent; sea grasses should receive zero nutrients from land-borne runoff; sand dunes should have the same extent as they did in the 1950s or 1960s; and soft-bottom habitats should have zero pressure from bottom trawling.

Habitats	U.S. West Coast	Southern California	Central California	Northern California	Oregon	Washington
	69	73	74	65	64	65

Findings:

- Central and Southern California scored slightly higher than other sub-regions.
- If time-series data were available on the number of species present and the number of individuals within each species there might be less need for a habitats sub-goal. Lacking those data, data on habitats provide useful information about changes in biodiversity, because they provide living space, shelter, nurseryman space, food or other support for many species. Loss of habitats is a good proxy indicator for decline in biodiversity.
- Historically, all sub-regions have lost substantial amounts of three of the habitats evaluated for this goal (salt marshes, sea grasses and sand dunes) and trend measurements (2005-2009) show that losses are continuing in most places, though much more slowly than in the past.
- The trend for the status of sand dunes was strongly negative in all areas: -0.14 in Oregon, -0.21 in Washington and -0.17, -0.19 and -0.21 for northern, central and Southern California, respectively.
- The trend for the status of salt marsh wetlands was nearly neutral in Washington and Oregon (-0.00 for both), and mildly negative for northern (-0.03), central (-0.02) and southern (-0.02) California.
- The trend for the status of seagrass was positive in Washington, 0.10, slightly negative in Oregon (-0.02), strongly negative in Northern California (-0.41) and negative in Central California (-0.11) and Southern California (-0.08).
- The fourth environment evaluated, soft bottom habitat, is neither created nor destroyed, so its condition is measured as the percentage of its area that is fished using bottom trawls. Bottom trawling disturbs the habitat and injures or kills organisms that use it. The trend for the status of soft bottom habitats was positive in Washington (0.07), strongly negative in Oregon (-0.19), mildly negative in Northern California (-0.03), positive in Central California (0.04) and neutral in Southern California (0.00).

Perspective on the quest to improve ocean health

Given the integrated nature of the Ocean Health Index, factors affecting one goal frequently affect others. In most areas, many goals need improvement. Selecting which to work on first depends both on the availability of human and financial resources and on the region's long-term strategy. A downloadable Toolbox will be available in 2014 to help countries evaluate scores and make those strategic choices.

Restoring ocean health will take decades and, for some goals, several generations. With patience, commitment and continuity of effort, the Ocean Health Index and other instruments will be important guides in that quest. Key to success will be:

- Gaining broad public acceptance of the new definition of ocean health that includes benefits to people;
- Promoting the importance of regular, quantitative measurement of ocean health components;

- Gaining broad agreement on the need to collect and report---in an agreed-upon format-- all data needed by the Ocean Health Index (at whatever scale it is being used) and by other assessments related to ocean health;
- Engaging individual nations to construct their own national or sub-national Ocean Health Indices that are tuned to individual situations and incorporate any higher quality local information and knowledge available to them; and,
- Continuing measurement of the Ocean Health Index (and other assessment tools) for long periods to monitor progress toward ocean health and guide actions thereto.

The Ocean Health Index can report the following success to date:

- The World Economic Forum endorsed it as one of two strategies for ocean improvement.
- The United Nations will consider the Index as one input into its World Ocean Assessment.
- The U.S. West Coast study and ongoing focal studies for Brazil and Fiji (in preparation) demonstrate the geographic scalability of the method.
- China, Colombia and Israel are in the early stages of regional Ocean Health Index assessments carried out in-country.
- Ecuador, Taiwan, portions of Canada and New Caledonia, among others have expressed desire to initiate their own focal studies.
- A workshop for Baltic Sea nations held in May 2014 may stimulate use of the Index in that region.
- Presentations of results to the 10-nation Nairobi Convention in 2012 and 2013 may stimulate adoption in some eastern African locations.

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SUMMER 2014

SANCTUARY WATCH



NATIONAL MARINE SANCTUARY
NOMINATION PROCESS
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THE OFFICE OF NATIONAL MARINE SANCTUARIES is part of NOAA's National Ocean Service. 1305 East-West Highway, Silver Spring, MD 20910 | Phone: 301-713-3125 | Web: <http://sanctuaries.noaa.gov>

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YOUR CHALLENGE,



YOUR CHANCE

“For the first time in years, the doors open to establish new national marine sanctuaries. I challenge everyone who cares about our nation’s ocean and coasts to make your voice heard. This isn’t just about the environment. It’s about taking a stand for the special places you hold dear. This is your chance to let America know — to let the world know — that this place matters to me. We have an opportunity to make a difference, and it’s up to all of us to take responsibility — for ourselves and for future generations.”

— Edward James Obnos



RISING TO THE CHALLENGE



Photo: Jaime Windon

By Daniel J. Basta

Our nation was founded on the principles of community voice, citizen action and the sense that, as individuals, we can make a difference.

Now, for the first time in nearly 20 years, the American people can nominate marine and Great Lakes places for consideration as national marine sanctuaries. We have not entered into this process lightly; rather, we have heard from communities and stakeholders, political leaders, and others across the country who want to secure lasting federal protection for and a voice in the management of their special ocean places.

This process will require a great deal from our staff, but we expect an equal amount from those communities interested in nominating a site for consideration. Nomination is only one part of what may be further years of work, evaluation, and public participation toward designation as a national marine sanctuary.

You’ve heard the phrase “it takes a village.” In this case, it certainly does. It takes businesses, next-door neighbors, recreators, artists and students — people of every walk of life, background and political viewpoint to ultimately put forth a nomination. And that’s the way it should be. This is the American public’s process, and that journey is a central part of what makes our nation — and our national marine sanctuaries — strong.

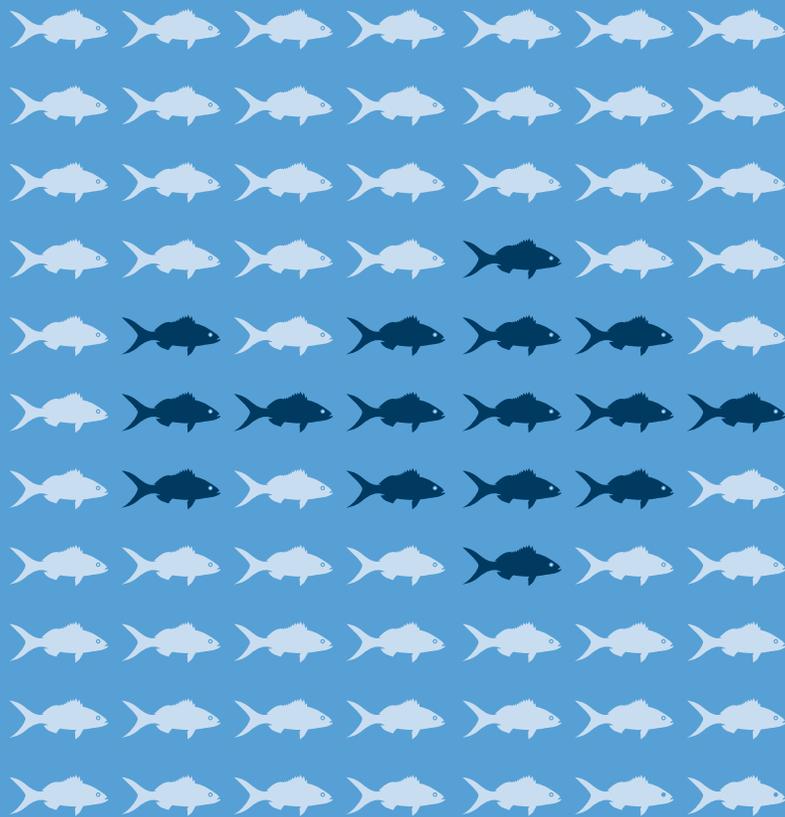
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BEFORE & AFTER

Sanctuaries Make a Difference

Yellowtail Snapper **POPULATION**

in the Tortugas Ecological Reserve



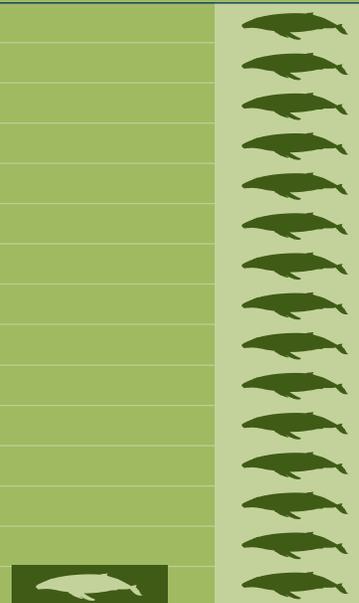
 = BEFORE
 +  = AFTER

The yellowtail snapper is the most economically important reef fish to the fishermen of the Florida Keys. It is also an excellent indicator species for the effectiveness of fisheries management. The population of yellowtail snapper has dramatically increased as a direct result of the establishment of the Tortugas Ecological Reserve in the Florida Keys National Marine Sanctuary.

Source: <http://floridakeys.noaa.gov/scisummaries/reeffish.pdf>

21,000

Protected Humpback Whales



Each icon represents 1,400 whales

 = BEFORE
 = AFTER

Their population decimated by commercial whaling, humpback whales in the North Pacific Ocean numbered only about 1,400 in the mid-1960s. Through an international ban on commercial whaling and protections under the Endangered Species Act and the Marine Mammal Protection Act, the North Pacific humpback whale population now numbers more than 21,000. About half of this population spends winter in and around the Hawaiian Island Humpback Whale National Marine Sanctuary, created by Congress in 1992 to protect humpback whales and their habitat.

Source: http://sanctuaries.noaa.gov/science/condition/pdfs/hihw_condition_report

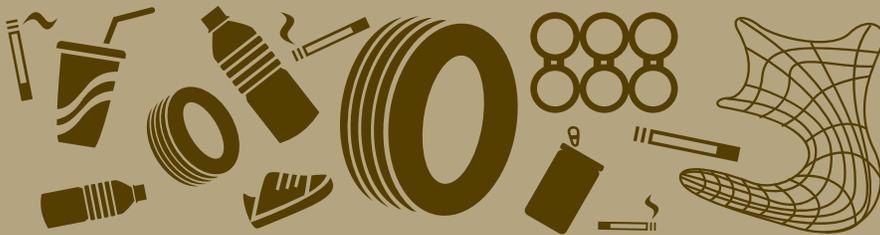
COMMUNITY REVITALIZATION

Renovated from the defunct Fletcher Paper Mill, a victim of difficult economic times, the Great Lakes Maritime Heritage Center is now a popular destination for visitors of all ages. In 2013, the center welcomed over 82,000 visitors. Featuring a life-size replica of a portion of an 1800's Great Lakes Schooner, a re-creation of a shipwreck site and an artifact lab, the center allows the public to experience and appreciate more than 200 shipwrecks in and around Thunder Bay National Marine Sanctuary.



Source: http://sanctuaries.noaa.gov/science/condition/pdfs/tbnms_lowres.pdf

MARINE DEBRIS REMOVAL



- 22 tons of trash removed yearly by 800 volunteers in Olympic Coast NMS
- 600 tons of debris removed from Papahānaumokuākea MNM over 10 years
- 185 ton dock from Japan's tsunami removed from Olympic Coast NMS
- 7,000 feet of gear disentangled from 17 whales in Hawaiian Islands Humpback Whale NMS since 2002

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

\$0.00

A recent economic impact study found no short-term financial loss for commercial and recreational fisheries due to the implementation of the Tortugas Ecological Reserve in the Florida Keys National Marine Sanctuary over a ten-year period. This finding sharply contrasts theoretical literature which projected short-term losses for those displaced from marine reserves. In fact, commercial catches in the region increased and continue to do so.

Source: http://ccma.nos.noaa.gov/ecosystems/coralreef/TortugasAssessmentReport_final.pdf

HABITAT RESTORATION

- 500+ sites assessed for damages, totaling 1.3M square feet of seagrass, coral and hardbottom habitats since 2000
- \$2M+ in fines assessed were used to restore damaged habitats in sanctuaries
- 70+ seagrass and coral habitats successfully restored to date

Source: ONMS staff, unpublished personal communication



Infographic/Illustrations: Matt McIntosh

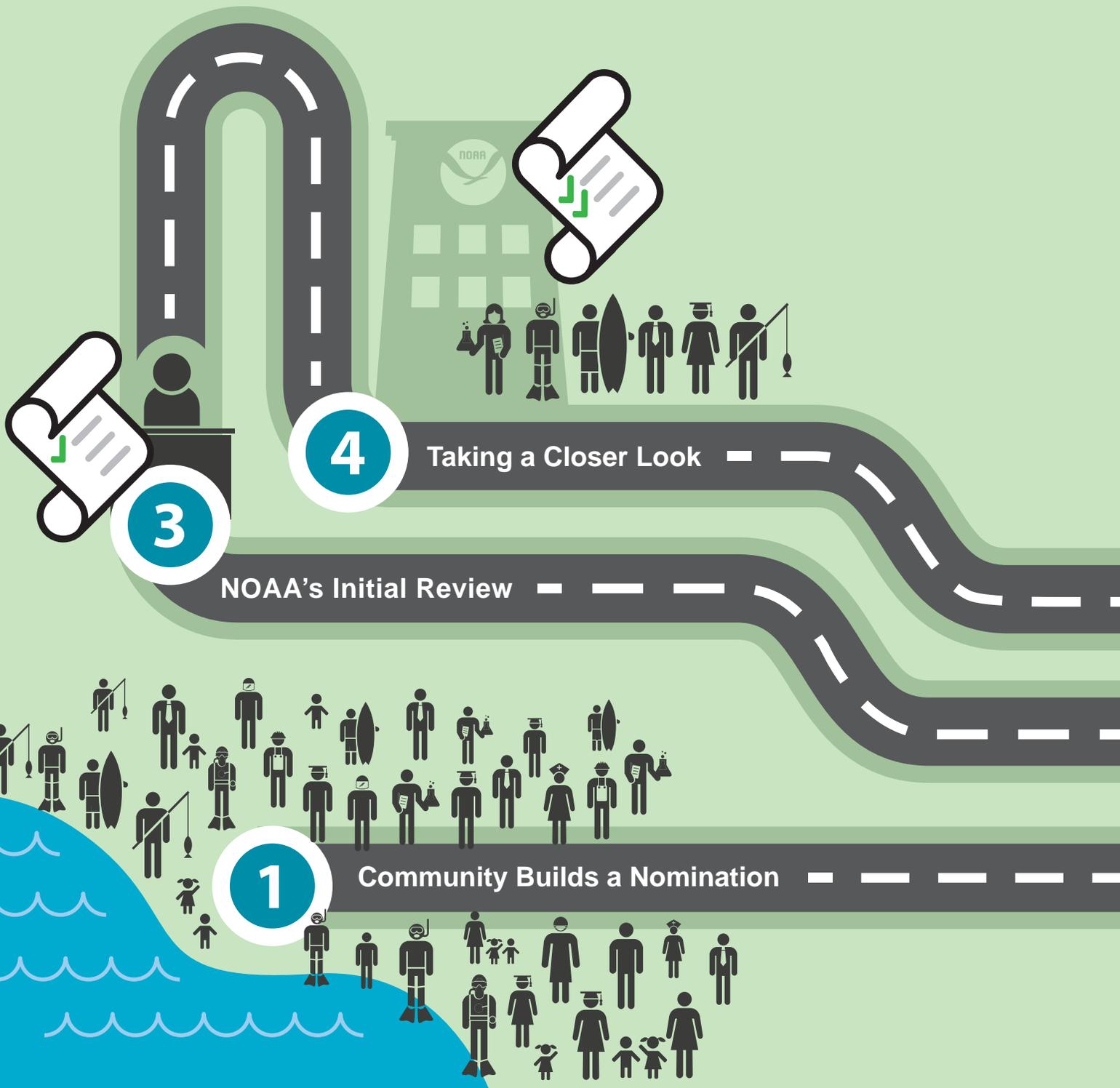
The Road to Nomination

For the first time in two decades, NOAA invites communities across the nation to nominate their most treasured places in our marine and Great Lakes waters for consideration as national marine sanctuaries.

In response to ongoing widespread interest from the public, NOAA has launched a new, locally driven sanctuary

nomination process developed with input from more than 18,000 public comments. Throughout the nomination process, NOAA will be available to answer questions and provide guidance to nominating communities and other interested parties. NOAA will also update nominators on the progress of the agency's review of their nomination.

PLEASE NOTE: Nomination is not the same thing as sanctuary designation. Designation occurs as a separate process that, by law, is highly public and participatory and often takes several years to complete.





SANCTUARY NOMINATION PROCESS

1 COMMUNITY BUILDS A NOMINATION

A community gathers information and support for the special place it wishes to nominate, following the guidelines at www.nominate.noaa.gov.

2 COMMUNITY SUBMITS NOMINATION TO NOAA

Once ready, the community submits its nomination to NOAA.

3 NOAA'S INITIAL REVIEW

NOAA looks at whether or not the nomination meets the basic requirements.

4 TAKING A CLOSER LOOK

NOAA takes a closer look at everything that makes the nomination a potential candidate for sanctuary designation, while continually working with the community throughout this process.

5 NOMINATION IS ACCEPTED

NOAA will notify the community once all the requirements have been met and the nomination has been accepted.

6 NOMINATED AREA ADDED TO INVENTORY

NOAA will place successful nominations in an inventory of areas it could consider for potential designation as a national marine sanctuary.

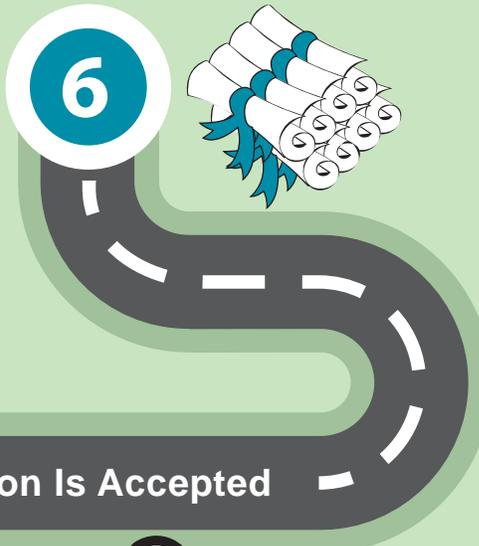
PLEASE NOTE:

Addition to the inventory does not guarantee sanctuary designation, which is a separate public process described in the National Marine Sanctuaries Act.



Nominated Area Added to Inventory

PLEASE NOTE: Addition to the inventory does not guarantee that a nominated area will become a sanctuary.

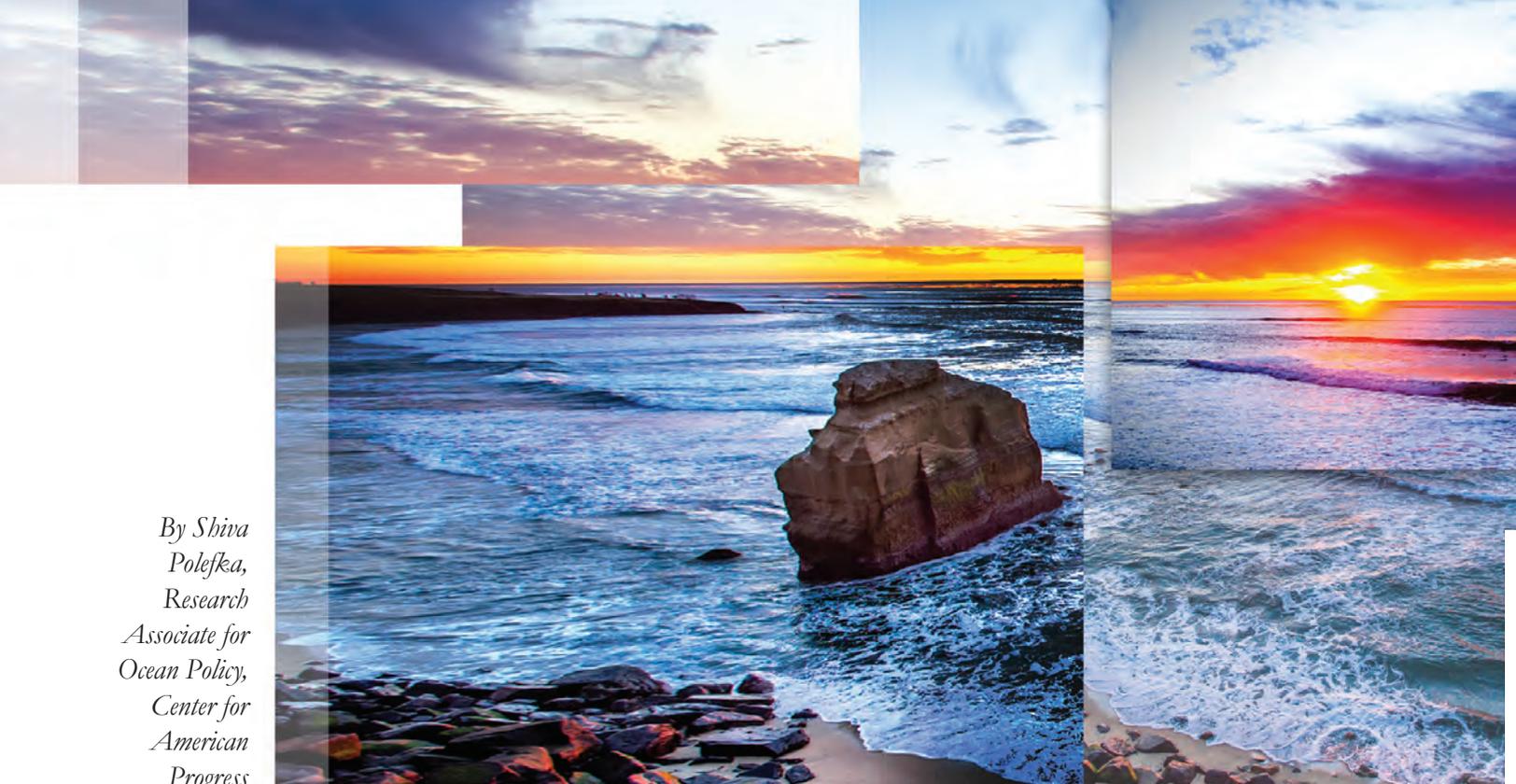


5 Nomination Is Accepted

Community Submits Nomination to NOAA



Infographic/Illustrations: Matt McIntosh



By Shiva
Polefka,
Research
Associate for
Ocean Policy,
Center for
American
Progress

SANCTUARIES: A Vital Component of the U.S. Ocean Management Mosaic

To insure that our coastal ocean waters are utilized to meet our total needs from the sea.”*
That’s how Rep. Charles Mosher of Ohio, speaking before his colleagues in Congress in 1971, described the idea behind the legislation that would eventually become the National Marine Sanctuaries Act. Those needs, he said, include “recreation, resource exploitation, the advancement of knowledge of the earth, and the preservation of unique areas... [and] all are important.”

Mosher saw this new legislation as a formal expression of the balance between those needs. Most importantly, he said, it addressed “our national concern over indiscriminate and thoughtless utilization of the oceans.”

Earlier Efforts

This was not the first attempt by governmental leaders to make society’s interaction with

the ocean more sustainable. Efforts to curb indiscriminate exploitation of marine resources date as far back as the early 1850s, when California passed state laws to manage oyster harvest and protect salmon runs. Likewise, a 1911 treaty between the U.S., Great Britain, Japan and Russia attempted to control rampant fur seal hunting — and became the world’s first international agreement on wildlife.

Unfortunately, these early, valiant efforts failed to counterbalance the world’s skyrocketing demand for marine resources. By the early 1970s, ocean health was in rapid decline. Garbage dumping, devastating offshore oil spills, and rapacious industrial whaling, among other issues, focused the American consciousness on the seas and motivated broad, bipartisan consensus for a new paradigm of ocean management.

Though environmental challenges old and new continue to plague the world’s oceans today, the spirit and the substance of the efforts by Rep. Mosher and his colleagues helped

usher in this paradigm, including the creation of a unique system for protecting America’s extraordinary offshore resources — cultural and ecological, Great Lakes and marine.

Elevated Protection

Today, an array of policy tools exists to help protect special offshore places and conserve marine resources, ranging from place-based designations like marine reserves to effective federal laws like the Magnusson-Stevens Fishery Conservation and Management Act, the Endangered Species Act and the Clean Water Act.

Yet within this legal and regulatory mosaic, the National Marine Sanctuary System has come to serve a unique and important role in ocean and Great Lakes management. Like other relevant laws and designations, sanctuaries confer an elevated level of protection for the resources they encompass, bringing the unparalleled scientific and enforcement capabilities of the federal government to bear on their protection.

*Representative Mosher (OH). “Marine Protection, Research and Sanctuaries Act of 1971.” 117 Congressional Record at 30855.



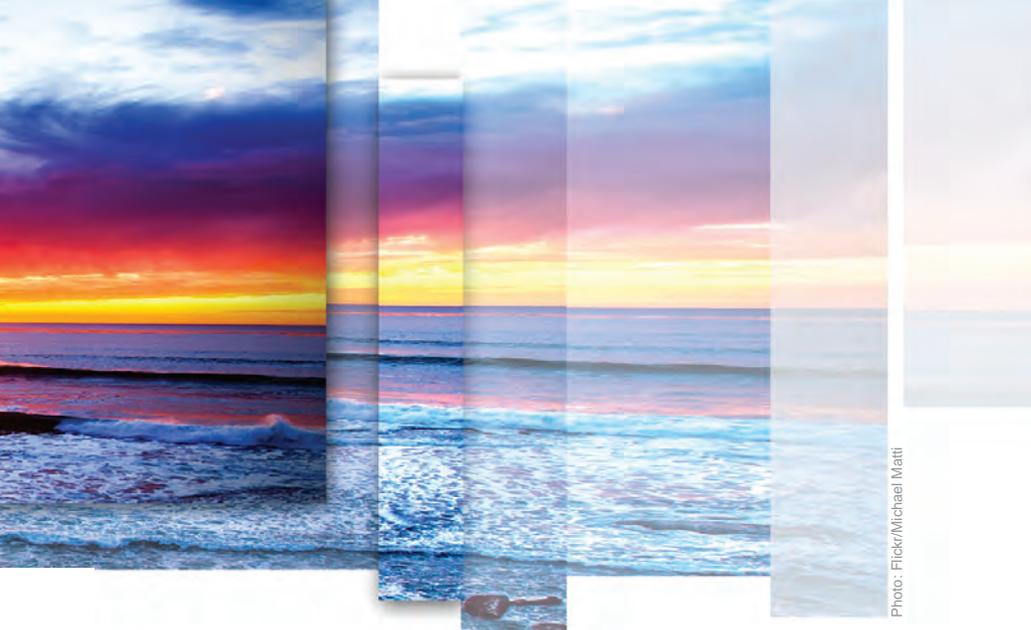


Photo: Flickr/Michael Matti

SANCTUARY SUCCESS STORIES

Nationwide, America's most extraordinary marine natural and cultural resources and the coastal communities dependent on them have reaped tremendous benefits from this unique combination of federal protection and empowered local influence. A few examples include:

STOCKS RESTORED

Key West fishermen saw the value of their total annual catch rise by 40 percent over 10 years — from \$40 million in 2001 to \$56 million in 2011 — after Florida Keys National Marine Sanctuary worked with local scientists, conservationists and fishermen to implement a no-fishing zone to restore depleted populations of grouper and snapper species.

THE SANCTUARY CITY

Thunder Bay National Marine Sanctuary, the sole site within the Great Lakes and home to dozens of historical shipwrecks, has become an engine for economic diversification and stability for the city of Alpena, Mich., which now hosts more than 82,000 sanctuary visitors yearly.

FEWER WHALE STRIKES

Stellwagen Bank National Marine Sanctuary, which protects the biodiversity critical to a whale-watching industry worth about \$26 million per year to the New England economy, led a successful multi-year effort in collaboration with the shipping industry to reroute shipping lanes away from key whale habitat, thereby reducing ship collisions with humpback, fin, and critically endangered North Atlantic right whales.

Stakeholder Empowerment

However, unlike these other programs, national marine sanctuary designation today represents empowerment of local stakeholders in the management of the offshore environments they cherish and depend on. Sanctuary advisory councils provide a channel for citizens, public interest organizations, businesses and local governments to directly influence sanctuary management and elevate priorities for consideration within NOAA. This influence manifests as site-specific management plans and regulations, tailored to the unique needs, vulnerabilities and activities of each site.

Furthermore, by regularly and formally convening local stakeholders, sanctuaries provide a crucial vehicle for coordinating the multitude of uses of the space and resources in and around these special places. The very features that attract fishermen, scientists, environmentalists and the public to sanctuaries can often produce competition and even conflict among these interests.

Success via Collaboration

By providing a legally sanctioned forum, sanctuaries facilitate open discussion, foster understanding and even collaboration among stakeholder groups. For instance, after years of contention between fishermen and environmentalists related to state fishing policy, representatives for these two groups in the Channel Islands National Marine Sanctuary Advisory Council found significant common ground on the emerging threat of ocean acidification. This common ground led to collaborative research, and then in 2008 to the completion of a report and management recommendations for the

sanctuary superintendent that was unanimously adopted by the full council.

Similar collaboration-driven success has occurred at sites throughout the sanctuary system, leading to benefits for the offshore environment, coastal communities and coastal industries. These victories came to pass because of national marine sanctuaries. Sanctuaries themselves have succeeded because of federal collaboration with the local stakeholders, who care for and depend on our country's oceans and Great Lakes, day in and day out.

Building on the Foundation

Forty-three years ago, Rep. Mosher and his colleagues established a system intended to improve balance among coastal and ocean uses, toward a national approach for offshore resources that is sustainable rather than "indiscriminate." Today, the combination of federal management capacity and local stakeholder engagement that defines and energizes national marine sanctuaries is helping fulfill the promise of their foundational efforts.

The National Marine Sanctuary System continues to evolve, and will require significant growth through designation of new sites where elevated resource protection is warranted and sought after by local communities, in order to realize the system's full potential. But sanctuaries today are indispensable — no other marine natural resource policy tool has the breadth and adaptability to balance the complex, overlapping interests invested in our nation's extraordinary offshore heritage.



OF THE PEOPLE BY THE PEOPLE FOR THE PEOPLE

From school teachers to senators, people across the nation have been asking for the chance to nominate new national marine sanctuaries. We've been listening.

For the first time in more than two decades, NOAA has reopened the door to protect new areas of America's marine and Great Lakes waters as national marine sanctuaries. In this issue of Sanctuary Watch, we explored the who, what, why and how of the new sanctuary nomination process, including a step-by-step nomination guide and a personal challenge from actor Edward James Olmos. Here are excerpts from the thousands of comments submitted by people from all walks of life in support of new national marine sanctuaries!



VOICES OF CONCERN

The call for action has come, in part, because of the negative impacts communities are seeing in their waters. These are just a few examples of why people want better protection in the areas they hold dear.

HABITAT DESTRUCTION

Jody McCaffree – North Bend, OR



When I was younger, my family spent most of our summer vacations camping on the south coast of Oregon, while my dad fished for salmon. It wasn't until I was older that I realized how fortunate we were to always have fresh native fish on hand. Unfortunately, due to many years of industrial development in the Coos Bay area, the health of our estuarine ecosystems has been compromised, and several species of salmon are now on the endangered list. We have a duty to do what we can to preserve and protect these waters for future generations.



“We are pleased that NOAA has sought public input on its sanctuary nomination and designation criteria, and that the revamped process will strengthen the ability of communities and other interested parties to actively participate.”

— Congressional letter of support signed by 26 Members of Congress, including Sen. Barbara Boxer and Sen. Dianne Feinstein of California

“Sanctuaries are a key component of our nation’s commitment to conserve our ocean and Great Lakes for future generations, and we very much support efforts to reinvigorate the National Marine Sanctuary System.”

— Joint letter of support signed by 120+ non-governmental organizations, businesses and academic institutions

“This process is an important first step toward filling a gap in protection for many of our coastal waters. I value clean beaches, clean water, and healthy fish and wildlife. We need to take steps now to protect our ocean for future generations.”

— Excerpt from comments submitted by 16,000+ Sierra Club Members

POPULATION DECLINE

Jeanette Davis – Baltimore, MD



I’m pursuing my Ph.D. in marine molecular biology, with a research focus on the Hawaiian sea slug *Elysia rufescens*, a species of photosynthetic sea slug that could be useful in developing anticancer drugs. This species, which gathers in Hawaii’s Black Point Bay in large numbers once a year to mate, was once nearly overharvested because of its medical potential. It is so important to protect creatures like this, and the marine

habitats they depend on, both for the health of the ocean and the benefits they could have in saving human lives.

POLLUTION

Samuel Janis—Governors Is., New York, NY



When it rains, I watch from my office on Governors Island as a stream of floating garbage pours into a small cove. This is the reality of living along New York Harbor, the nation’s most urbanized estuary. When it rains more than a quarter-inch in 24 hours, our city’s wastewater mixes with street runoff and overflows into the harbor, disrupting the ecological balance and hampering natural restoration and recovery. We, the people of

New York City, urgently need to address this issue if we want to live in a city with swimmable, fishable, healthy waters.

WHAT

CHANGE THE FUTURE OF THE OCEAN
CHOOSE SANCTUARIES

WILL

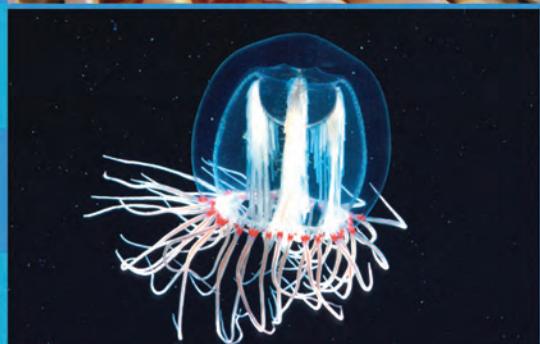
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YOU

DO?



NATIONAL MARINE SANCTUARIES *of the West Coast*



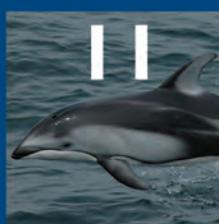
INSIDE HIGHLIGHTS



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Habitats



Wildlife



Culture



Conservation

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*Connected by
the Currents*

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WELCOME

Our five West Coast national marine sanctuaries encompass nearly 13,000 square miles of ocean which includes hundreds of miles of dramatic coastline. Teeming with life and filled with history, they offer countless opportunities for exploration, recreation and contemplation.

This guide introduces you to the natural and cultural wonders of your national marine sanctuaries. Whether you're traveling on foot or bicycle, by car or boat, above water or diving below, it can lead you to new discoveries and a greater appreciation of these ocean treasures.

Explore and enjoy!

Cover: From top left, clockwise:
Stellar Sea Lions. Photo: Bob Wilson
Seabirds. Photo: Gulf of the Farallones National Marine Sanctuary
Giant Kelp. Photo: Laurie C Van De Werfhorst
Planktonic Jelly. Photo: Shane Anderson
Fish-eating Anemone. Photo: Steve Lonhart

National Marine Sanctuaries: *America's Underwater Treasures*

The passage of the Marine Protection, Research and Sanctuaries Act of 1972 made it possible for special areas of our nation's ocean and Great Lakes waters to be designated as national marine sanctuaries. Following the legacy of our national parks, these areas—selected for their biodiversity, ecological integrity and cultural history—celebrate and safeguard our country's richest underwater treasures.

Today, the National Marine Sanctuary System, administered by the National Oceanic and Atmospheric Administration (NOAA), consists of 13 national marine sanctuaries and one marine national monument encompassing more than 150,000 square miles of ocean and Great Lakes waters.

Sanctuaries range in size from the one-quarter-square-mile tropical coral reef of Fagatele Bay National Marine

Sanctuary in American Samoa to the 6,094-

square-mile Monterey Bay National

Marine Sanctuary—one of the largest marine protected areas in the

world. The 139,797-square-mile

Papahānaumokuākea Marine

National Monument in the

Northwestern Hawaiian

Islands, which became a

part of the sanctuary sys-

tem in June 2006, is larger

than all the lands managed

by the National Park Service

combined. Together, these

14 special places within

the sanctuary system include

the breeding and feeding

grounds of whales, sea lions,

sharks and sea turtles; colorful coral

reefs, lush kelp forests and deep sea

gardens of corals and sponges; ancient

submerged volcanoes; and archeological treasures

such as the remains of the Civil War ironclad USS Monitor

off the coast of North Carolina and hundreds of shipwrecks in Lake Huron



Our national marine sanctuaries are part of our collective riches as a nation, treasures that belong to all of us.

They protect some of our most precious marine resources and serve as natural classrooms. They provide for a wide range of recreational activities, from beachcombing and tide pooling to whale watching and sport fishing. They support valuable commercial industries such as fishing and kelp harvesting. And they help ensure, with proper management, these activities remain a part of our country's legacy far into the future.

To learn more, visit
sanctuaries.noaa.gov

Office of National Marine Sanctuaries

West Coast Regional Office

99 Pacific Street, Bldg. 200, Suite K

Monterey, CA 93940

(831) 647-1920

Contact office for additional copies of publication.

NATIONAL MARINE SANCTUARIES OF THE WEST COAST

Cordell Bank Reef. Photo: Robert Schmieder, Cordell Expeditions



Giant Kelp. Photo: Hal Beral

CHANNEL ISLANDS



Healthy Reef at Harris Point. Photo: Jim Knowlton

<http://channelislands.noaa.gov>

Twenty-five miles off the coast of Santa Barbara, the waters around the Channel Islands host an incredible array of marine life and habitats. Here, warm and cold water currents collide to create a transition zone where cold water species blend with warmer water species to create unique and diverse marine communities.

Channel Islands National Marine Sanctuary and Channel Islands National Park were both designated in 1980 to protect these communities and to preserve cultural and archeological treasures. The sanctuary encompasses 1,470 square miles of ocean around Anacapa, Santa Cruz, Santa Rosa, San Miguel and Santa Barbara Islands. The sanctuary sits amid some of California's richest fishing grounds. To help protect and restore this fragile ecosystem, 11 marine reserves closed to all fishing and two state marine conservation areas open to limited fishing have been set aside. Between them, these protected areas cover 318 square miles. The national park also protects the five islands and their surrounding waters out to one nautical mile.

Visitors to the islands can walk along sandy beaches and rocky shores studded with tide pools. Seagrass meadows thrive in shallow, soft-bottomed areas. Giant kelp form dense underwater forests of amber and gold that attract sport divers from around the world.

More than 30 species of marine mammals, including rare blue and humpback whales, come to feast on the bounty, as do more than 60 species of sea birds. Elephant seals, harbor seals, California sea lions and northern fur seals use the islands as rookeries. The islands provide important nesting sites for Black Storm Petrels and Xantus's Murrelets and Anacapa Island is the only permanent rookery in California for threatened California Brown Pelicans.

The islands are also rich in history. Archaeologists have found remnants of sites occupied by the early Chumash peoples dating back thousands of years. And the prevailing currents and weather conditions made shipwrecks a common occurrence here; more than 150 ships lie on the seafloor around the Islands.

MONTEREY BAY



Sea Lions. Photo: Brad Damitz

<http://montereybay.noaa.gov>

Monterey Bay National Marine Sanctuary embraces a 276-mile-long stretch of the central California coast from the Marin Headlands south to Cambria, and from the seashore to an average 35 miles offshore. Designated in 1992, it's our nation's largest marine sanctuary, protecting 6,094 square miles of one of the world's most productive marine environments.

Its northern shores are lined with pocket beaches and steep bluffs. The shoreline of Monterey Bay itself is a long crescent-shaped beach punctuated in the middle by Elkhorn Slough. Rugged rocky shores line its southern coast where steep mountains rise from the edge of the sea. Underwater, one of its major features is the huge Monterey Canyon. From its head near where Elkhorn Slough meets the bay, the canyon meanders 60 miles out to sea, cutting a trench one mile deep. In 2008, the sanctuary was expanded to include the Davidson Seamount, an extinct underwater volcano with 200-year-old coldwater corals.

The sanctuary contains a great diversity of habitats and marine life. More than 450 species of algae grow here. And 33 species of marine mammals, 94 species of seabirds, 345 species of fish, four species of sea turtles and thousands of invertebrates have been recorded in its waters. Some live here year round. Others visit seasonally or migrate through. When the California Current runs strongly, it carries cold-water animals down from the north. When it weakens in late summer, the warm water brings sea turtles, swarms of jellies and other plants and animals up from the south.

Some 2,000 sea otters live in kelp beds along the coast here. In winter and spring, gray whales can be spotted from high bluffs. Visitors who venture offshore in boats can find blue and humpback whales, along with seabirds, killer whales and other dolphins. Divers find kelp forests filled with fishes and invertebrates. The sanctuary's rich waters also support important commercial and sport fisheries for market squid, salmon, rockfish and other species.

GULF OF THE FARALLONES



Tufted Puffin. Photo: Jeff Foot

<http://farallones.noaa.gov>

Designated in 1981, Gulf of the Farallones National Marine Sanctuary protects 1,279 square miles of ocean wilderness off the coast of northern California just west of the Golden Gate Bridge. Marine habitats found here include sandy beaches, estuaries, rocky shores, open ocean and deep sea. The sanctuary encompasses four estuaries—Esteros Americano, Esteros de San Antonio, Tomales Bay and Bolinas Lagoon—which are important nurseries for a host of marine fishes and invertebrates and critical habitat for nesting and migrating shore and water birds.

The sanctuary contains 26 federally listed endangered or threatened species, including seabirds such as Marbled Murrelets. Thirty-six species of marine mammals have been seen here. It's also home to one of the most significant populations of breeding white sharks in the Pacific Ocean and the largest concentration of breeding seabirds within the contiguous United States. The Gulf of the Farallones also provides crucial habitat for more than a quarter million breeding seabirds.

From fall through winter, sanctuary beaches serve as nurseries for tens of thousands of elephant seals and sea lions; 20 percent of California's harbor seals breed here during the spring. And northern fur seals have recently begun breeding on the islands again after an absence of more than 150 years.

For thousands of years, Coast Miwoks harvested the sanctuary's abundant halibut, rockfish, salmon, clams and mussels. Explorers, traders, whalers, sealers and gold miners made this area an international center of commerce. Many ancient and modern ships lie entombed within the sanctuary.

Visitors can begin their exploration of all the Gulf of the Farallones has to offer at the sanctuary's visitor center located in San Francisco's Presidio at West Crissy Field, in the Golden Gate National Recreation Area.

CORDELL BANK



Rosy Rockfish. Photo: Jodi Pirtle/CBNMS

<http://cordellbank.noaa.gov>

The most remote of the five West Coast sanctuaries is Cordell Bank National Marine Sanctuary, just 52 miles northwest of the Golden Gate Bridge. Designated in 1989, the sanctuary protects 529 square miles of ocean around Cordell Bank—an underwater mountain that rises to within 115 feet of the surface. The bank sits 20 miles west of Point Reyes on the edge of the continental shelf, where the seafloor drops off precipitously into the depths.

Salmon, tuna and other large predatory fish use the sanctuary seasonally. Over 20 species of marine mammals migrate from around the globe to feed in these productive waters, as do many species of seabirds—including migratory albatrosses, shearwaters and petrels.

The bank's undersea ridges and pinnacles are covered with colorful gardens of sponges, anemones and hydrocorals. These provide homes to flourishing communities of fishes, such as lingcod and rockfish and invertebrates such as seastars, urchins, crabs and giant Pacific octopus.

Since the sanctuary is entirely offshore, it can only be visited by boat, and even then, only in good weather. September and October are the best months, when calm seas and light winds make the trip smoother and the marine life easier to see. If you're traveling along the coast, you can learn more about Cordell Bank at the Point Reyes National Seashore Visitor Center, Gulf of the Farallones National Marine Sanctuary Visitor Center at Crissy Field and Bodega Marine Laboratory in Bodega Bay.

To learn more, visit
sanctuaries.noaa.gov

OLYMPIC COAST



Octopus. Photo: Steve Fisher

<http://olympiccoast.noaa.gov>

Designated in 1994, Olympic Coast National Marine Sanctuary spans 135 miles of coastline to an average of 35 miles offshore, encompassing 3,310 square miles in all. Nearly two-and-a-half times the size of Olympic National Park, the sanctuary's sparsely populated shoreline includes more than 48 miles of wilderness beaches.

Visitors can explore miles of sand and cobble beaches and dramatic, rocky shoreline with tide pools, offshore islands and seastacks. Birders will find large colonies of seabirds such as murrelets and tufted puffins, as well as one of the largest populations of bald eagles in the lower 48 states. During annual migrations, more than a million seabirds, waterfowl and shorebirds travel along this coast.

Twenty-nine species of marine mammals are found here. These waters also teem with fishes. Seven species of salmon, along with halibut, rockfish, herring, sturgeon and others support important sport, tribal and commercial fisheries.

These waters are also rich in human history. Native peoples—the Hoh, Makah, Quileute and Quinault—have lived along this coast for thousands of years, as they continue to do today. And more than 180 ships lie wrecked on the seafloor along this rugged and stormy coast.

Visitors can learn more about sanctuary resources, science and conservation, and opportunities to explore this wilderness coast by visiting the Olympic Coast Discovery Center in Port Angeles, and the Makah Museum in Neah Bay.



Blue Ring Top Snail on Giant Kelp. Photo: Frank Virga

RESEARCH



R/V Shearwater. Photo: Robert Schwemmer/NOAA

Conservation Science in Our Sanctuaries

Our sanctuaries work in partnership with scientists from universities, public and private research centers, government agencies, international partners and other organizations to characterize, monitor and study the ocean, habitats and the plants and animals in and around them. Knowledge gained from this work plays an important role in the management of all our national marine sanctuaries on the West Coast.

Understanding What We Have

Research conducted in these protected areas adds to our understanding of the dynamic ocean along our coast. One goal is to discover what is present within sanctuaries. Geologists use sonar, radar-like laser systems and other devices to map the seafloor. Oceanographers track the flow of winds and currents and use satellite imagery and other technology to measure water temperatures and the abundance and distribution of plankton. Archeologists survey the remains of shipwrecks. Deep-sea biologists probe the depths with manned and unmanned submersibles and remote sensors. Others study the movements and habits of marine mammals and seabirds.

Monitoring Change

Long-term observations are key to successful long-term management of our sanctuaries. Fisheries biologists track the status of populations of rockfish and other commercially important fishes. Oceanographic imagery can alert us to changes in climate, the lack or abundance of plankton and patterns of productivity. Scientists and volunteers patrol beaches looking for dead or injured seabirds and marine mammals, which could give clues to offshore oil spills or other pollution.

Gaining New Understanding

Research on processes that affect the marine environment and control connections between places is critical to understanding each sanctuary's role within the larger marine ecosystem and in protecting the habitats and living resources it contains.

Managing for the Future

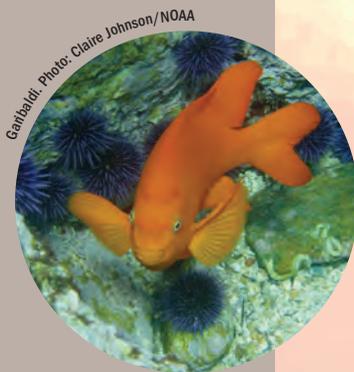
Information gathered through these and other studies provides us a baseline against which to measure future changes in climate and the abundance and distribution of plants and animals. By monitoring long-term trends, we're able to assess the effectiveness of our conservation efforts and make sound resource management decisions for the future.

To learn more, visit sanctuaries.noaa.gov/science

CONNECTED BY THE



Anacapa Sunrise. Photo: Keith Berson



Giantfish. Photo: Claire Johnson/NOAA



Humpback Whale. Photo: Sophie Webb



Elephant Seal Pup. Photo: Robert Schwemmer/NOAA

Each of our five West Coast national marine sanctuaries is a jewel unto itself with its own unique character. Each has a distinct set of physical conditions, including climate, daily weather patterns, the lay of the coast and the make-up of the seafloor. These and other factors help define the nature of each sanctuary and set each apart from the others.

But in the restless ocean, driven by wind and storms and powerful currents, no place is truly isolated from another. Each of our sanctuaries is intimately connected not only with the others, but also to the entire coast from Alaska to Baja, California, and to the far reaches of the world ocean.

Our national marine sanctuaries on the West Coast are linked by the California Current—a broad, shallow “river” of ocean water meandering southward along the Pacific Coast. This slow-moving surface current carries some 10 trillion gallons of water per hour—a flow 55 times greater than the Amazon. Below it, two counter currents, the Davidson Current and a deeper undercurrent, flow north.

Carrying cold, nutrient-rich water southward from the North Pacific, the California Current shapes the nature of the entire west coast, setting the stage for an abundance and diversity of ocean life equaled in only a few other places on Earth.

The current runs strongest in spring and summer, when northwest winds drive it southward and towards the coast. During these times, cold, nutrient-rich water wells to the sunlit surface. There, light and nutrients fuel an explosion of life with clouds of tiny, drifting plants known as phytoplankton that form the base of ocean food webs here. Closer to shore, these same forces spur the growth of towering kelp forests.

When it runs strong, the current carries drifting plants and animals southward from sub-arctic waters. When it slackens in the fall, the surface waters warm and southern species move northward. This ever-shifting mix of species adds to the great diversity of our marine communities in our West Coast national marine sanctuaries.

The current serves as a vast, open highway for whales, birds, fishes and plankton, which follow

Currents



it on long migrations in search of food or suitable places to nest, spawn or give birth. For some—such as Pacific sardines, northern anchovies, gray whales, Western Gulls and Brandt's Cormorants—the boundaries of their lives are largely defined by the boundaries of the California Current.

Vast schools of sardines, anchovies and hake spawn in the warmer waters around the Channel Islands, then swim north through our other sanctuaries where they find rich pastures of plankton to feed on. The small fishes are joined by giant blue whales and other whales that come to feed on krill and various plankton.

Salmon spawned in streams along the Olympic Coast follow the current north to the Gulf of Alaska and south to Cordell Bank, Gulf of the Farallones, Monterey Bay and the Channel Islands sanctuaries in search of food.

Gray whales traverse the entire coast, passing through all five sanctuaries twice each year as they migrate from Alaska to Baja, California. Meanwhile, pods of transient orcas travel from the Olympic Coast to Monterey Bay and Channel Islands in spring to hunt gray whale calves as they swim north with their mothers.

Elephant seals, sea lions and fur seals roam widely along the coast and far out to sea then return to rookeries in the Channel Islands, Monterey Bay and the Gulf of the Farallones national marine sanctuaries where they give birth to their pups.

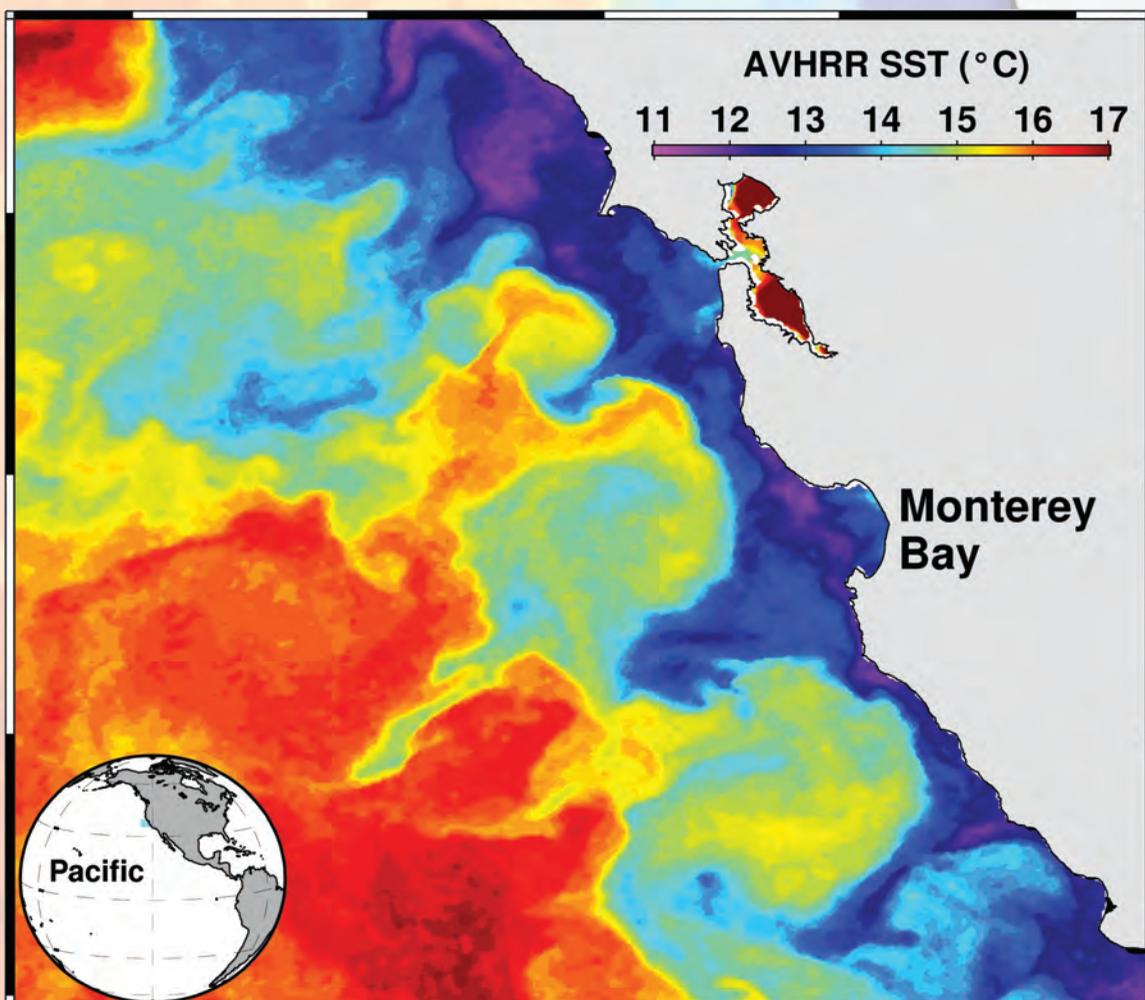
A Brown Pelican or Black Storm Petrel appearing along the Olympic Coast may have been hatched and fledged on the Channel Islands. And some 400,000 gulls, cormorants and murrelets nest in the Gulf of the Farallones then fly far and wide to our other sanctuaries and beyond. Our sanctuaries

protect vital habitat for shorebirds and countless species, along the important migration route known as the Pacific Flyway.

The connections extend further still as other species pass through these waters on their way to and from more distant places. Each year, albacore tuna follow currents across the Pacific Ocean and back again; Sooty Shearwaters travel here from as far away as New Zealand; and leatherback turtles migrate from Indonesia. Albatrosses breeding on the Northwestern Hawaiian Islands regularly fly back and forth to the Olympic Coast and Northern California national marine sanctuaries to find food for their chicks.

The great currents shaping ocean life recognize no man-made boundaries. No one sanctuary can shelter these wide-ranging ocean wanderers. The lines of our sanctuaries can only mark their passage. But taken together, the influence and protection of our sanctuaries extend far beyond their physical boundaries.

Each sanctuary is distinct from the other, but they're all part of a larger system connected by wind and water. And as part of this greater system, our national marine sanctuaries help protect not just individual places, but the entire fabric of ocean life along the West Coast.



This satellite image captures the sea surface temperature (SST) of the Pacific Ocean along the Monterey Bay coastline on October 17, 2005. The blue color represents colder water, which demonstrates the currents and upwelling of nutrients. This image is a rare example of a cloudless day when the satellite was overhead. Special thanks to John Ryan of the Monterey Bay Aquarium Research Institute for use of this image.

130° 0'0"W

125° 0'0"W

120° 0'0"W

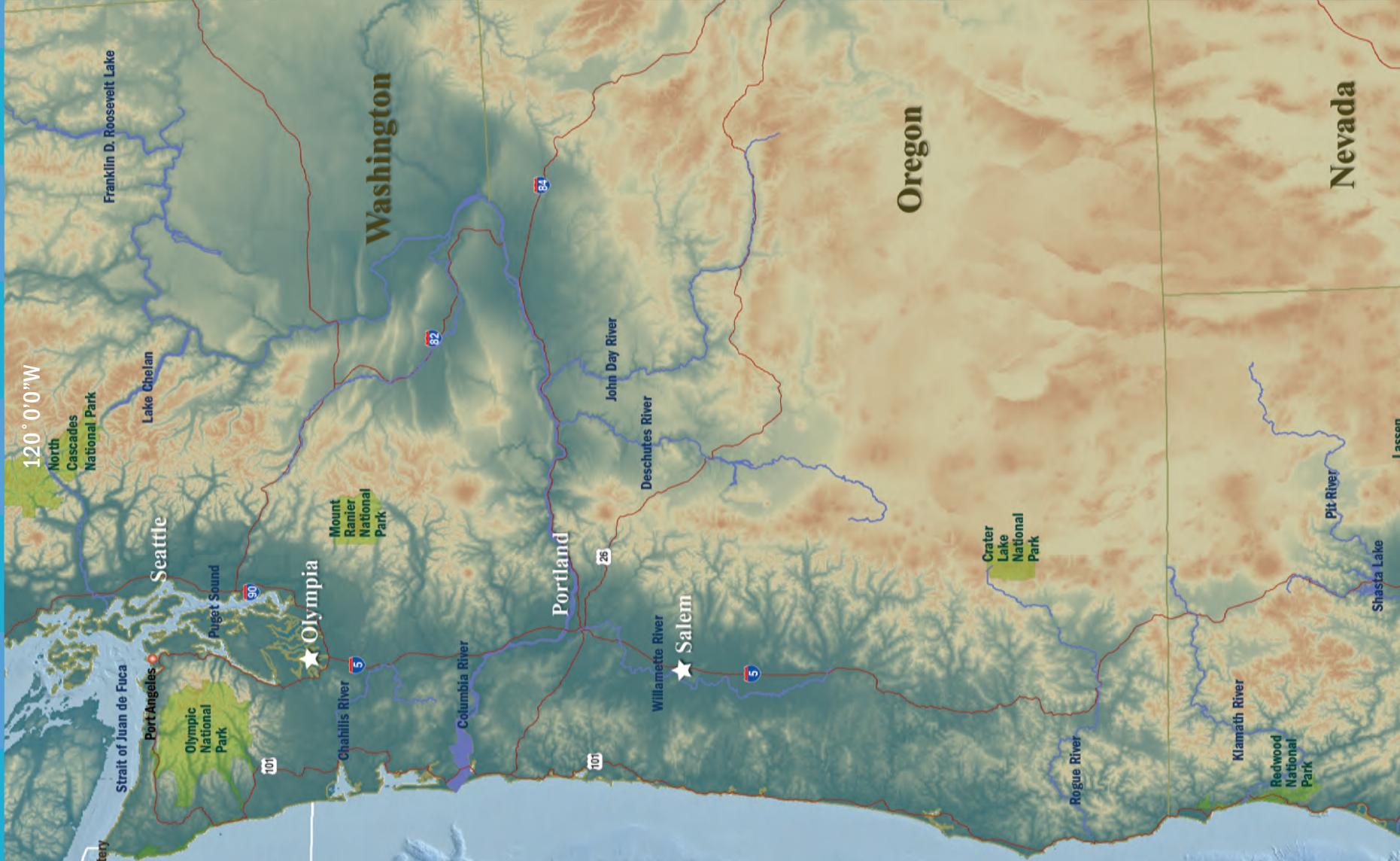
OUR NATIONAL MARINE SANCTUARIES of the West Coast

45° 0'0"N

The mission of the NOAA Office of National Marine Sanctuaries is to conserve, protect and enhance the biodiversity, ecological integrity and cultural legacy of our nation's system of marine protected areas.

To protect any one sanctuary, we must also look beyond its boundaries to the larger ecosystems of which it is an integral part. Our sanctuaries are connected to one another and to the ocean beyond by winds and currents, and the great migrations of birds, fish and marine mammals. Only by managing each national marine sanctuary with an understanding of the vital role it plays in the life of the others can we ensure the health of the ocean, and our planet, as a whole.

Even with the best management, sanctuaries alone can't ensure the long-term health of our ocean. Just as the ocean affects our daily lives, our daily actions affect the health of the ocean. No matter where we live, each of us can become an ocean steward by making choices

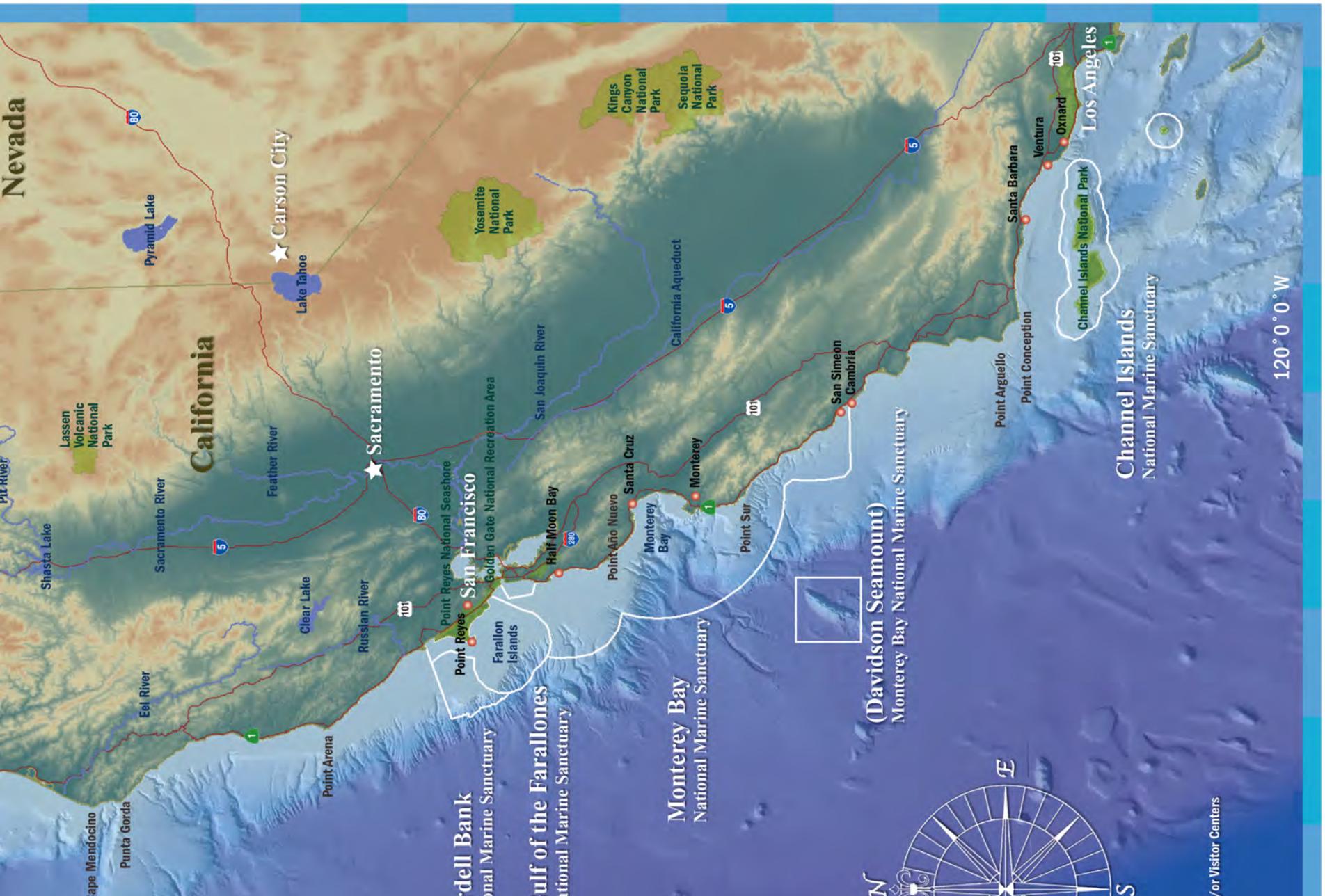


of the ocean. The matter that we live, each of us can become an ocean steward by making choices as consumers. The oil, lawn fertilizers and other chemicals we use eventually flow into streams and rivers, which flow into the ocean. To reduce pressure on depleted fisheries we can choose to eat sustainably caught seafood. To learn more about what you can do to support ocean conservation and national marine sanctuaries, explore these visitor centers along the West Coast:

- **Olympic Coast Discovery Center**
Port Angeles, WA
- **Gulf of the Farallones**
National Marine Sanctuary Visitor Center
San Francisco, CA
- **Coastal Discovery Center**
San Simeon, CA
- **Outdoors Santa Barbara Visitor Center**
Santa Barbara, CA

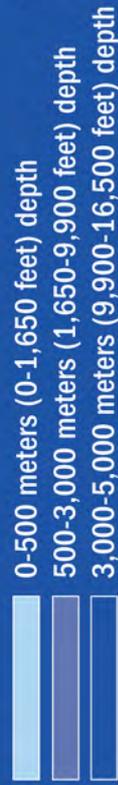
40° 0'0"N

Pacific Ocean



35° 0'0"N

Bathymetric Chart



Miles



• Sanctuary Offices and/or Visitor Centers

★ State Capitals

125° 0' 0" W

120° 0' 0" W

GIS courtesy of Pam van der Leeden of Cordell Bank National Marine Sanctuary
The boundary for Channel Islands National Marine Sanctuary has been revised slightly since this map went to press. See <http://sanctuaries.noaa.gov/gallery/atlasmaps/ci.html> for updated boundaries.



(Davidson Seamount)

Monterey Bay National Marine Sanctuary

Channel Islands
National Marine Sanctuary

Channel Islands National Park

Los Angeles

Oxnard

Ventura

Santa Barbara

Point Arguello

Point Conception

San Simeon

Cambria

Point Sur

Monterey Bay

Point Año Nuevo

Santa Cruz

Half Moon Bay

Golden Gate National Recreation Area

San Francisco

Point Reyes National Seashore

Farallon Islands

Point Arena

Eel River

Russian River

Clear Lake

Sacramento River

Shasta Lake

Lassen Volcanic National Park

Pyramid Lake

Lake Tahoe

Carson City

Yosemite National Park

Kings Canyon National Park

Sequoia National Park

California Aqueduct

San Joaquin River

Sacramento

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NATIONAL MARINE SANCTUARIES OF THE WEST COAST

Seastars. Photo: Steve Lonhart for NOAA/MBNMS

From seashore to seafloor, from muddy estuaries to clear, blue waters, our national marine sanctuaries encompass many habitats. Each habitat is home to its own distinctive community of plants, algae and animals ideally suited to meet the challenges and reap the rewards of living there. On the West Coast, many habitats connect our sanctuaries to each other.

Sandy Beaches



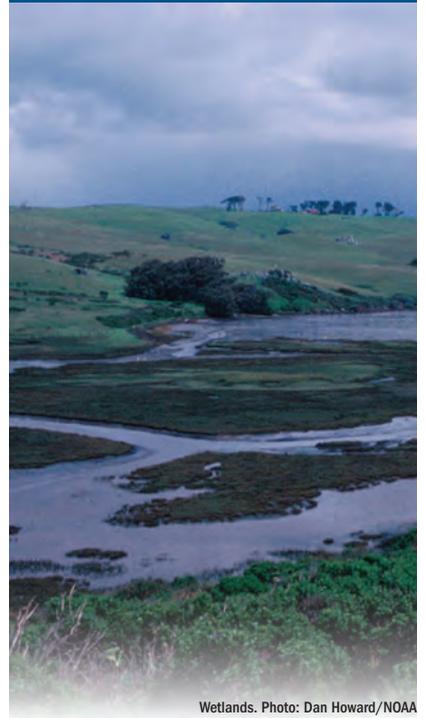
Marbled Godwits. Photo: Peggy Hansen

Rocky Shores



Rocky Intertidal. Photo: Coke Smith

Estuaries and Sloughs



Wetlands. Photo: Dan Howard/NOAA

Many visitors know national marine sanctuaries first by their sandy beaches. Some stretch in long crescents, others lie in small pockets at the mouths of streams or between rocky outcrops.

At first glance, beaches appear barren: a world of sand and restless waves broken only by gulls wheeling overhead. But look more closely and you'll see shorebirds—sandpipers, willets, godwits, plovers and others—scurrying along at the water's edge. Their presence gives proof to buried treasures as they pick and probe through sand and beach wrack in search of worms, clams, crabs and tiny shrimp-like amphipods. In this rough-and-tumble world of crashing waves and scouring sand, animals survive by burrowing in or flying away. All of the West Coast sanctuaries, except Cordell Bank, which lies entirely offshore, protect large stretches of sandy beach habitat.

Rocky coastlines are worlds of extremes and dramatic beauty. They're also places of amazing diversity and abundance, where plants and animals fight for space on the rocks. Life here moves to the rhythm of the tides. When the tide is out, sea creatures face hours of exposure to baking sun and drying wind. The returning tide brings with it both pounding waves and a host of hungry fishes and other predators moving up from deeper waters below.

Creatures able to meet these challenges reap great rewards. The rocks provide firm footing and hiding places where they can hold their own. And each returning tide brings a fresh feast of planktonic food from the sea. The tides also bring new generations to the shores. Many marine alga species and animals cast their spores and eggs into the water. They drift on the currents, sometimes far offshore, until the currents carry them back to settle on the rocks, starting the cycle anew.

These wetlands play vital roles in the ecology of our coastal waters and in the lives of many marine animals. Their quiet waters, sheltered from the crash of ocean waves, serve as nurseries, sheltering the young of flounders, rays, sharks and other fishes. An abundance of plankton nourishes dense beds of oysters as well as sardines, anchovies and other coastal fishes. Clams and worms burrow into the thick mud. The abundance of food attracts hundreds of species of birds. Some nest here, others stop to rest and eat in the middle of long migrations; many find winter refuge in these rich, protected waters.

In spite of their importance, estuaries and sloughs are the most endangered habitats in our sanctuaries. Where many estuaries, sloughs and freshwater marshes once lined the coast, less than 10 percent remain today. Most have been drained and filled to make way for houses, agriculture and commerce. Three of our sanctuaries—Olympic Coast, Gulf of the Farallones and Monterey Bay—protect some of the largest and most significant of those remaining.

California Sheepshead. Photo: Jim Knowlton

Habitats

Kelp Forests

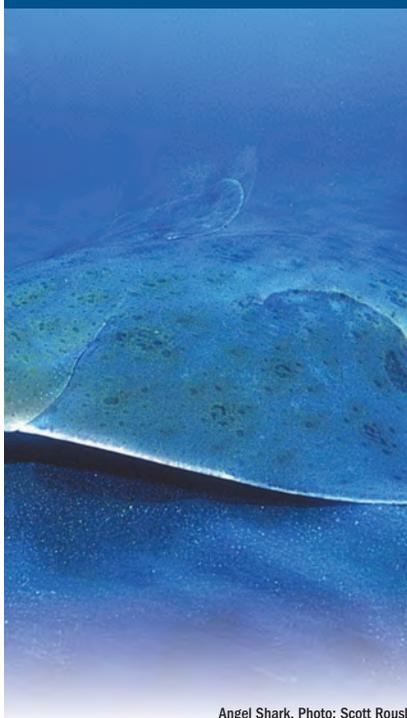


Harbor Seal in Kelp. Photo: Douglas Klug

Out from the tide pools, on the rocky seafloor in water depths typically 20 to over 100 feet, lies the cathedrals of the kelp forests. Giant kelp, covered with fronds from seafloor to surface, define the underwater forests of the Channel Islands and Monterey Bay sanctuaries. Bull kelp, with a bare stipe (stem) topped by a whiplike tangle of fronds, takes over in our northern sanctuaries. Both are among the most productive and fastest-growing plants in the world.

From the surface, the brown, tangled mats of fronds are all that can be seen. Below lies a rich, multi-layered world. The towering groves provide shelter, food and living space for thriving marine communities. A single kelp holdfast can be home to a thousand species, from tiny algae to giant kelpfish. And their influence extends far beyond their boundaries: from microscopic plankton to sharks and whales, countless millions more drift or swim through these swaying undersea forests.

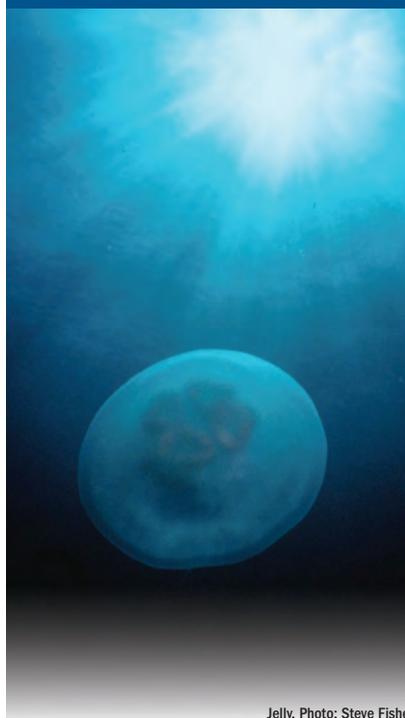
Sandy Seafloor



Angel Shark. Photo: Scott Roush

Much of the seafloor in our sanctuaries is covered with sand or mud. Unlike in rocky areas, giant kelp can't take hold, so the sands lie open and bare. With no firm footing and no place to hide, life here lies low. Anemones, clams, worms, sand dollars and brittle stars burrow into the sand. Safely hidden, they expose only their feeding tentacles, arms and breathing siphons into the water above. Shrimps and crabs try to blend in as they scuttle across the sands searching for food. Flounders and skates lie perfectly camouflaged as they wait for a meal. More active fishes, like surfperch, spiny dogfish and salmon come and go above the shifting sediments.

Open Ocean



Jelly. Photo: Steve Fisher

Far out from land, the coastal waters gradually merge with the California Current and the open ocean. This fluid world changes moment to moment. One patch of water may appear clear and barren of life while nearby another teems with plankton, schools of fishes, pods of feeding whales and flocks of seabirds. Thus, the open ocean, the largest habitat on earth, is also very dynamic.

Generally spring and summer are times of abundance as cold, nutrient-rich water wells up to the sunlit surface, fueling dense blooms of microscopic plants—phytoplankton—that color the water a murky brownish-green. These blooms spur an explosive growth of swarms of tiny drifting animals called zooplankton. Great whales and schools of herring, sardines and anchovy feast in the pastures of plankton. The multitudes of small fish in turn draw larger predators. Pods of dolphins, sharks, seals, seabirds and people all come to hunt in these open waters.

Deep Sea



Squid. Photo: Jamie Hall

In places along our sanctuaries, submarine canyons cut into the continental shelf, bringing fingers of the deep sea closer to shore. The largest, Monterey Canyon, 60 miles long and one mile deep rivals the Grand Canyon in size.

Darkness and a scarcity of food, along with bitter cold and immense pressure, define the deep. Sunlight fades quickly underwater; around 300 feet below the surface, there's no longer enough light for plant plankton to grow. In this dark world, animals rely solely on what can be scavenged from the productive surface waters. Still, the deep shelters delicate creatures in a diversity—if not abundance—rivaling the crowded tide pools and kelp forests.

The open midwaters of the deep sea are home to anglerfishes crowned with glow-in-the-dark lures and viperfish, their gaping mouths filled with long fangs. Intricate glass sponges and deep sea corals grow attached to the seafloor and the rocky walls of undersea canyons. Solitary and stationary, they patiently filter tiny bits of food carried past them on the currents.

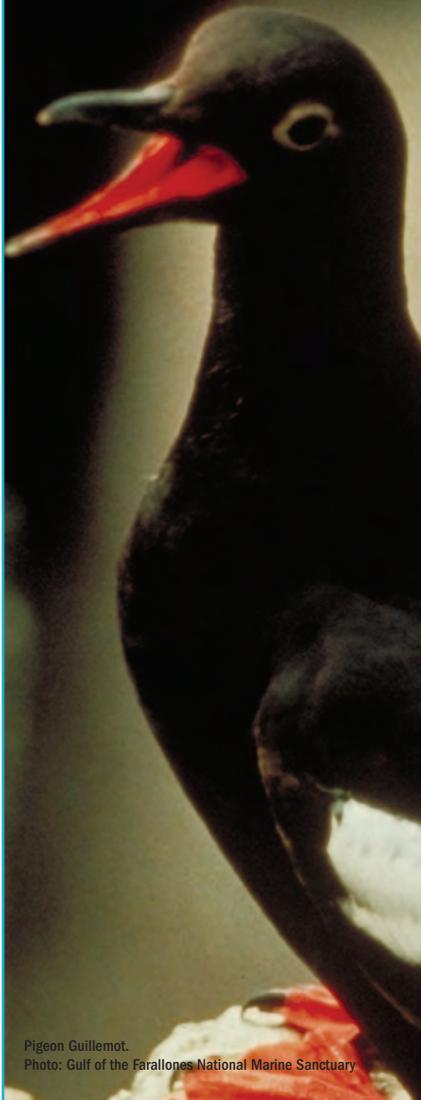
NATIONAL MARINE SANCTUARIES OF THE WEST COAST



White-sided Dolphin. Photo: Cornelia Oedekoven

Our five West Coast national marine sanctuaries encompass some of the richest and most diverse marine communities anywhere in the world. A single walk along one of our beaches, a trip to a rocky tide pool, or a journey by boat out to offshore waters can reveal dozens or hundreds of different marine plants and animals. And it would take a lifetime of exploration to even begin to know them all.

Many excellent field guides are available to help you identify the wildlife you'll encounter in our sanctuaries. Visitor centers or local bookstores often have a good selection of guidebooks.



Pigeon Guillemot.
Photo: Gulf of the Farallones National Marine Sanctuary

Invertebrates



Seastars. Photo: Joe Heath

Invertebrates—animals without backbones—make up the overwhelming majority of animal life in our sanctuaries and throughout the ocean. “Invertebrate” is a broad term, encompassing a dizzying variety of different species, including everything from sea anemones and sponges, to crabs and shrimps, worms, snails, clams, octopuses, sea stars and many others. Many thousands of species live in our sanctuaries.

Tide pools are the best places to look for invertebrates, as nearly every square inch is covered with life. Limpets, periwinkles and other snails cling to life on rocks exposed at low tide. Ochre sea stars, in shades of yellowish-brown, purple and orange, are commonly seen intertidal predators. Little hermit crabs clamber among rocks and seaweed in the pools as they scavenge for bits of food. You may catch a glimpse of a purple shore crab peeking from beneath a rock, or a green sea anemone, with its flowery crown of tentacles, anchored among the sand and rocks in deeper pools.

Clumps of California mussels crowd wave-swept rocks, often growing so closely together that they keep other animals and plants from gaining a foothold. Where there's space, tiny barnacles—relatives of crabs and shrimp—live inside little volcano-shaped shells cemented to the rocks.

Seaweeds



Kelp. Photo: Susan Lang

Walk along the rocky shores of any of our sanctuaries and you'll see lush gardens of seaweeds—mostly brown, red and green algae. They grow from the most exposed tide pools to the seafloor a hundred or more feet deep. These algae cling tightly to rocks or the seafloor with rootlike structures called holdfasts, without which they'd be swept away with the currents.

While these are the algae we can see, they're far from the only plantlike beings here. The open waters are home to groups of tiny photosynthetic organisms that survive by being small enough to stay afloat near the sunlit surface. While tiny, they occur in almost unimaginable numbers, especially in spring and summer when they turn the water murky with their abundance, and they play a central role in the overall richness of life here.

Brown rockweeds are among the most commonly seen seaweeds carpeting the intertidal rocks all along the Pacific Coast. Filmy, bright green clumps that resemble watery heads of leaf lettuce are the aptly named sea lettuce. Coralline algae grow in little, crusty, branching thickets or as red or pinkish crusts on the surface of rocks. Feather boa kelp—named for its long, narrow fronds—grows among tangles of seaweeds of wave-swept rocks. Away from the tide pools, forests of bull and giant kelp grow in deeper waters just offshore bathed by the currents.

Marine Mammals



Pinnipeds. Photo: Roger Conrad

The waters of our five national marine sanctuaries along the West Coast are home to more than 36 species of marine mammals, including whales, dolphins, seals, sea lions and sea otters. Some, like sea otters, seals and sea lions can be easily seen from shore. Others, like blue and humpback whales, stick to offshore waters, where upwelling along the edge of the Continental Shelf creates rich feeding grounds. While some live in the sanctuaries year-round, many appear here seasonally.

Harbor seals and California sea lions are among the most common and familiar marine mammals along the Pacific Coast. They can often be seen hauled out on rocks or swimming in the waters just offshore. Sea otters can be seen swimming among the tangled floating fronds of giant kelp.

Whales and dolphins swim further offshore, but can often be spotted by their spouts or seen from boats. Twice each year, in late fall and early spring, more than 20,000 gray whales pass through the waters of our sanctuaries as they migrate between their feeding grounds in Alaska to their calving areas off Baja, California. They're commonly seen from vantage points along the shores. Blue whales are rarer, but in summer and fall they feed on dense swarms of plankton in the open waters of our national marine sanctuaries along the California coast. Orcas (sometimes called “killer whales”) are large dolphins. They're most commonly seen off the Olympic Coast, but some travel down the coast to California as they prey on fishes, squid, seals and whales.

Birds



Western Gull Chick. Photo: Chuck Graham

Birds can be seen in abundance in all our sanctuaries. At least a hundred or more species—including seabirds, shorebirds, wading birds, waterfowl and others—live in, or pass through sanctuary waters. The Pacific Coast lies along the Pacific Flyway, a major migration route for birds as they fly to and from summer feeding areas as far north as the Bering Sea and wintering grounds here or further south. And the waters of our sanctuaries, rich in food, nesting and resting areas, provides habitat critical to their continued survival.

Nine or more species of gulls live along the Pacific Coast, with Western Gulls one of the largest and most commonly seen species. California Brown Pelicans can be seen year-round in the Channel Islands, where they nest. In summer, they migrate in large numbers to central California, with some wandering as far north as the Olympic peninsula. Three species of cormorants—Pelagic, Double-Crested and Brandt’s—live along the coasts of our sanctuaries. They all lead similar lifestyles, nesting on islands, rocks or cliffs and diving underwater to hunt fish.

About 20 species of sandpipers can be seen on sandy beaches along the Pacific Coast. Birders sometimes refer to this group collectively as “peeps” for the plaintive peeping and piping calls they make as they scurry in small flocks at the edge of the waves. Seabirds frequent offshore waters. Some, such as Sooty Shearwaters, come ashore only to nest. In summer, you may see them in flocks of hundreds of thousands of birds flying low over the water in long, narrow lines stretching for a mile or more.

Fishes



Garibaldi. Photo: Laurie C Van De Werfhorst

From two-inch-long gobies to 20-foot-long white sharks, more than 500 species of fish live in the waters of our national marine sanctuaries along the West Coast. Though most are hard to see without venturing underwater with scuba gear, they can be found here everywhere from wave-splashed tide pools to the bottom of deep-sea canyons. Some spend their entire lives in a single set of tide pools. Others, such as salmon and tuna, travel far and wide up and down the coast or even across the Pacific Ocean to Japan and back.

Tide pools are home to dozens of kinds of small fishes including sculpins, blennies, gunnels and clingfish, which are often collectively called “tide pool johnnies.” A good-sized tide pool may have dozens of these fishes, but you’ll have to look closely to see them; most are well camouflaged with mottled colors and patterns blending in perfectly with their surroundings.

Most fishes live in more open waters. Rockfish are the largest group of fishes along the West Coast. More than 60 species live along the Pacific Coast. Many are sought after by sport and commercial fishermen. Salmon are most common in the Olympic Coast National Marine Sanctuary where five species—chinook, sockeye, pink, chum and coho—feed in offshore waters and enter freshwater streams to spawn.

White sharks are generally quite rare and rarely seen, but in late summer and early fall they do gather off the seal and sea lion rookeries on the Farallon Islands.

OCEAN ETIQUETTE

Marine Wildlife Viewing Guidelines

These guidelines are intended to help you enjoy watching marine wildlife without causing them harm or placing your personal safety at risk. Please note that these are general guidelines and it is best to follow location or species-specific guidelines if they are available. For more information visit, <http://sanctuaries.noaa.gov/protect/oceanetiquette.html>



Learn before you go. Many marine wildlife species have specific habitat needs and sensitive lifecycle requirements. Use the Internet, guidebooks and knowledgeable people to learn more about wildlife that can be found in the place you are visiting.



Keep your distance. Getting too close to animals can be harmful to them and to you. Take precaution and use equipment such as binoculars that let you view animals from a distance where they won’t be disturbed.



Hands off. Touching wildlife, or attempting to do so, can injure the animal, put you at risk and is illegal for most protected species.



Do not feed or attract marine wildlife. Feeding or attempting to attract wildlife may harm animals by causing sickness, death and habituation to people. Animals that are accustomed to humans become vulnerable to injuries and can be dangerous to people.



Never chase or harass wildlife. Mind your proximity and approach patterns. Never surround, trap or separate animals, approach them head on, or approach them directly from behind.



Stay away from wildlife that appears abandoned or sick. Animals that appear sick may not be. They may just be resting or are young awaiting the return of a parent. If animals are approached, their behavior may become aggressive. If you think an animal is sick or injured, contact local authorities.



Wildlife and pets don’t mix. Wild animals can injure and spread diseases to pets, and pets can harm and disturb wildlife. If you are traveling with pets, keep them leashed and away from marine wildlife.



Lend a hand with trash removal. Human garbage and fishing debris are some of the greatest threats to marine wildlife. Carry a trash bag with you and pick up litter found along the shore.



Help others to become responsible wildlife watchers and tour operators. Lead by example. It’s up to you! Obtain and carry a few copies of the Marine Wildlife Viewing Guidelines on your travels and share them with others. Patronize businesses that follow these guidelines. Protecting and conserving wildlife is everyone’s responsibility.

To learn more, visit

marinelife.noaa.gov

to view hundreds of photos and videos of the diverse marine life found in our national marine sanctuaries.

NATIONAL MARINE SANCTUARIES OF THE WEST COAST

Petroglyph at Wedding Rock. Photo: Olympic Coast National Marine Sanctuary

First People



Guy Capoeiman, Quinalt Nation. Photo: Olympic Coast National Marine Sanctuary

All along the Pacific Coast, native people have drawn from the ocean's bounty. They have made their living as hunters, gatherers and fishers, made jewelry and ornaments from shells, and traded up and down the coast.

They lived here for many thousands of years before the arrival of Europeans to the Pacific Coast. The newcomers exploited native tribes for labor and resources, introduced diseases that decimated entire tribes and sought to stamp out ages-old cultural traditions. But native peoples, though fewer in number, still survive up and down the Pacific Coast. Many still carry on native traditions, and some tribes still stand as sovereign nations in their ancestral lands.

Their ancestors lived along the Olympic Coast for at least 6,000 years. The sea was central to their cultures from the food they ate to the art they produced. These people were intimately attuned to the tides, currents and seasons. They hunted seals and whales, gathered crabs and mussels, fished for halibut, salmon and lingcod and gathered kelp to eat and to use for medicine.

Four tribes—the Makah, Hoh, Quileute and Quinalt—still live on the Olympic Coast as sovereign nations. Today, they hold to their traditional culture while serving as managers of the natural resources on their lands. The sanctuary supports them in their cultural revival and helps protect their cultural legacy. Olympic Coast sanctuary staff supported a canoe journey made by all tribes along the length of the coast, allowing a new generation of the ocean-going peoples to experience the traditions of their ancestors. Working with others under the supervision of the Makah, the sanctuary is involved in archeological studies of village and midden or refuse sites on their land.

The Coast Miwok, the first peoples near San Francisco, are part of the cultural heritage of the Gulf of the Farallones National Marine Sanctuary. Living in village communities, they built a strong culture based around fishing and gathering and hunting on land and sea. The ocean provided crabs, abalone, oysters and fish. They made flat beads from clam shells, which were strung together and used for trade throughout much of Northern California.

While much of their culture has been lost, they regained federal recognition as a tribe in 2002 and there are some 500 Coast Miwok tribal members today.

Like other native people along the Pacific Coast, the Ohlone of California's central coast drew their living from both land and water for 10,000 years or more. The Monterey Bay area provided acorns for food, and willows and other

plants for basket making. The sea supplied fish, birds, sea lions and other marine mammals and many kinds of shellfish.

Despite the devastation of their culture and the loss of their lands, there are still some 500 Ohlone today, most living in their ancestral area. Though few in number, they continue to thrive as a tribe and still carry on native traditions.

Native peoples have a long history on the Channel Islands. Daisy Cave on San Miguel Island is the site of the oldest known coastal shell midden in North America. This rock shelter was occupied by a series of native peoples over the course of more than 10,000 years. A sample of bone from the remains of "Arlington Springs Woman," recovered from Santa Rosa Island, dates back to 13,000 years ago, making her the earliest-known human in North America.

The Chumash, who lived on the four northern islands and on the mainland, were skilled in making their living from the sea. They built unique plank canoes, called tomols, to fish and collect abalone around the islands, and to trade with peoples on the mainland. And as integral members of an extensive system of trade among various tribes, they collected the shells of *Olivella* snails, which they used as currency.

Like other native peoples the Chumash suffered with the coming of Europeans and others to their lands. But there are still many people who can trace their ancestry back to these historic Chumash communities. They survived on the strength of their connection with their heritage to the islands, and today they're working to keep that heritage strong and vital. The sanctuary recently partnered with the Chumash community to build the tomol 'Elye'wun (Swordfish) under the leadership of the Chumash Maritime Association. The tomol and its paddlers made an historic journey from the mainland to Santa Cruz Island (Limuw)—the first such crossing in over 125 years.



Steven Villa, Barbareno Chumash/Diegeno Tomolero (paddler) of a Chumash Plank Canoe. Photo: Robert Schwemmer/NOAA

Shipwrecks



Lumber Schooner *Comet* Shipwrecked at San Miguel Island in 1911. Photo: Santa Barbara Museum of Natural History

Our national marine sanctuaries on the West Coast share a long and diverse maritime history. And they hold remnants of that history in the hundreds of ships that lie wrecked in their waters. These historic maritime heritage resources preserve a seafaring legacy dating back to early explorers, traders, whalers, fishermen and immigrants who have traveled this coast since the mid-1500s.

Fierce storms and a rocky shoreline have combined to make the Olympic Coast a graveyard for ships. Historic records reveal that more than 200 shipwrecks have been documented in Olympic Coast National Marine Sanctuary. Many simply disappeared, their epithet written by the lighthouse keeper at Tatoosh: “Last sighted, Cape Flattery.”

Cordell Bank was discovered by accident in 1853 when hydrographer George Davidson was returning to San Francisco from a mapping expedition in northern California. In 1869, Edward Cordell, of the U.S. Coast Survey, officially surveyed the area that now bears his name. No one knows for sure if any shipwrecks occupy the seafloor of the Cordell Bank National Marine Sanctuary. The sanctuary’s deep waters and distance from shore make it less likely for ships to run aground.

Powerful storms, thick fog and strong currents have claimed nearly 200 ships in the waters of Gulf of the Farallones National Marine Sanctuary. The earliest recorded shipwreck was the Spanish Manila galleon *San Agustin*, which sank in a gale while anchored in Drake’s Bay in 1595.

More recently, the C-3 freighter *Jacob Luckenbach* went down 17 miles off the Golden Gate in 1953 after colliding with the steamship *Hawaiian Pilot*. Over the next few decades it was the source of a number of “mystery” oil spills. The NOAA Maritime Heritage Program determined through historical research that the ship was a likely source of the oil discharges. Those suspicions were confirmed through the combined efforts of the local sport diving community, who investigated the site, and the sanctuary’s BeachWatch volunteer monitoring program. In 2002, the sanctuary, working with the U.S. Coast Guard and other agencies, took part in an effort to pump approximately 100,000 gallons of oil from the wreck’s deep bunker tanks, ending the mystery oil spills.

Monterey Bay and the surrounding coast were long a center of trade and a base for fishing and whaling. Being the largest sanctuary along the West Coast,

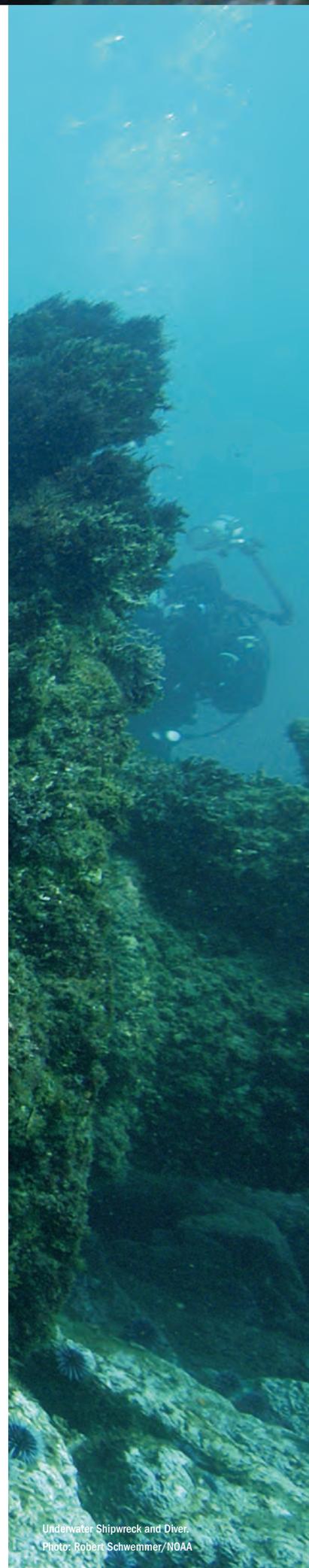
nearly 400 ships have been recorded lost in the region. One tragic event occurred in 1929 when an oil tanker *S.C.T. Dodd* rammed the passenger steamer *San Juan* off Pigeon Point, sending 73 passengers and crewmen to their deaths.

The submerged remains of the rigid airship USS *Macon* and four Curtiss F9C-2 *Sparrowhawks* aircraft lie off Point Sur, California. The site was first recorded in the 1990s by the U.S. Navy, working in partnership with the Monterey Bay Aquarium Research Institute. In 2006, the sanctuary led an expedition to conduct the first archaeological survey resulting in listing the site on the National Register of Historic Places.

More than 140 historic ships and military aircraft have been lost at the Channel Islands. Each has a story to tell about the history, technology and society of earlier times.

One of the oldest documented wrecks is the *Winfield Scott*, a side-wheel passenger steamship that operated during the California Gold Rush. With over 500 passengers heading to Panama from San Francisco, and a load of gold bullion and mail the ship grounded in dense fog on Anacapa Island in 1853. All passengers were rescued after being stranded on Anacapa Island for about a week before boarding the steamer *California* to continue their journey to Panama.

Today, NOAA, Channel Islands National Park and the Coastal Maritime Archaeology Resources group record the archaeological remains of the maritime heritage sites on and around the Channel Islands. Exhibits featuring some of the shipwrecks in the sanctuary are on display at the Santa Barbara Maritime Museum.



Underwater Shipwreck and Diver. Photo: Robert Schwemmer/NOAA

NATIONAL MARINE SANCTUARIES OF THE WEST COAST

Conservation

Underwater Diving. Photo: Scott Roush



Sea Lion Rookery on San Miguel Island. Photo: Roger Conrad

Things You Can Do to Help Protect Our Ocean and Our Planet

Practice Daily Conservation: We can help protect our watersheds and ocean with these simple, everyday activities:

- *Reduce, Reuse, Recycle*
- *Use natural organic alternatives to fertilizers and pesticides on lawns and gardens*
- *Be mindful of your own environment. Keep litter, used motor oil, antifreeze, toxic chemicals, pesticides and debris out of drains, and conserve water*
- *Learn about sustainable seafood and choose wisely to support local, sustainable fisheries*
- *Properly dispose or pick-up trash that could entangle wildlife*

Support Sanctuary Associations: Some sanctuaries have nonprofit associations supporting conservation and education activities in these underwater treasures.

Visit these websites for more information:

- **National Marine Sanctuary Foundation:** nmsfocean.org
- **Farallones Marine Sanctuary Association:** farallones.org
- **Monterey Bay Sanctuary Foundation:** mbnmsf.org
- **Cordell Marine Sanctuary Foundation:** cordellfoundation.org

Volunteer: Each sanctuary has opportunities for volunteers who do everything from helping out at visitor centers to monitoring wildlife washed up on beaches.

Channel Islands National Marine Sanctuary

The Channel Islands Naturalist Corps is a group of specially trained volunteer ocean stewards dedicated to educating passengers on board whale watching vessels.

Email channelislands@noaa.gov • Phone (805) 966-7107

Cordell Bank National Marine Sanctuary

Learn more about volunteer opportunities.

Email cordellbank@noaa.gov • Phone (415) 663-1397

Gulf of the Farallones National Marine Sanctuary

Be a Sanctuary Ambassador or become a Beach Watch volunteer. Opportunities to be a sanctuary educator at the visitor center or in school outreach programs are also available.

Email farallones@noaa.gov • Phone (415) 561-6622

Monterey Bay National Marine Sanctuary

Volunteer as a Team OCEAN kayak naturalist. Join Beach COMBERS, become a member of the Sanctuary Citizen Watershed Monitoring Network or a Coastal Discovery Center docent.

Email montereybay@noaa.gov • Phone (831) 647-4201

Olympic Coast National Marine Sanctuary

Volunteer at the Olympic Coast Discovery Center in Port Angeles or participate in the Coastal Observation and Seabird Survey Team.

Email olympiccoast@noaa.gov • Phone (360) 457-6622

All sanctuaries have advisory councils, which are comprised of volunteers from different constituencies who meet quarterly to advise management issues.

Email sanctuary.education@noaa.gov



Debra Herring, member of the Channel Islands Naturalist Corps. Photo: Claire Johnson/NOAA

