



Oregon Coast and Ocean: State of the Science

January, 2024. Prepared for the Oregon Ocean Science Trust.

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Table of Contents

Introduction	4
Approach	4
Directory Development	4
Data Collection	5
Analysis and Synthesis	5
Creation of Online 2023 State of the Science Inventory	6
Results & Key Findings	6
Respondent Demographics	6
Ocean and Coastal Topics	8
\$1 Million Funding Needs	8
Most Well-Studied Topics	9
Research Gaps	10
Regional Research	12
Other Key Findings	14
Summary & Recommendations	15
Appendix A: Research Entities	18
Appendix B: Survey Questions	23
Appendix C: Inventory Instructions	25
Appendix D: Research Projects Ideas	26



Introduction

The Oregon Ocean Science Trust (OOST) was established in 2013 by Senate Bill 747 to promote competitive research and monitoring that increases understanding of Oregon's ocean and coastal resources. The Trust has five voting members and two non-voting members from the Legislature. The OOST promotes research and monitoring, elevates innovation and collaboration, and supports ocean science through capacity enhancement and granting. The OOST is dedicated to promoting and supporting peer-reviewed, competitive research and monitoring that leads to increased knowledge and understanding of Oregon's ocean and coastal resources, while actively fostering collaborations and linking ocean and coastal efforts with funding. Discussions at the 2016 OOST Summit further identified priority funding areas for projects and research, including sea life and habitats, people and the ocean, and climate.

OOST initiated an effort in Fall 2023 to gather insights from a wide spectrum of marine science professionals across the state. This ambitious undertaking sought the insights of marine science professionals with a dual purpose: 1) to assess Oregon's current *state of the science* in anticipation of the 2023 Ocean and Coastal Research Summit, and; 2) to provide enduring support for OOST's long-term priorities and planning. Integral to this initiative is also the creation of a comprehensive inventory detailing the landscape of ocean and coastal science, policy, and research in Oregon.

Sea & Shore Solutions supported this endeavor by conducting a thorough survey of Oregon coastal and ocean research efforts. This report summarizes the findings of the survey results, offers recommendations, and gives instructions to accessing and using the 2023 State of the Science Inventory. These results are not intended to be comprehensive of all ocean and coastal research, researchers, and entities in Oregon, but rather to offer a snapshot in time to aid in informing the OOST's planning and decision making into the future. The findings serve as a foundational resource, offering transparency, thorough analysis, and valuable recommendations to support forthcoming initiatives and decision-making processes.

Approach

Oregon's coastal and ocean state of the science was assessed through a four-phased process, including the development of a directory of research entities and databases, data collection via an online survey and phone calls, analysis and synthesis of results, and construction of the 2023 State of the Science Inventory.

Directory Development

The project began by developing a directory of entities (federal and state agencies, institutions, Tribal governments, organizations, etc.) and personnel who are involved in marine and coastal scientific research and monitoring in Oregon. This served as the contact directory for data collection. A total of 137 entities and 104 key personnel were identified, along with contact information ([Appendix A](#)). During



this process, a list of existing research databases in Oregon was also collected, including 13 large-scale databases.

Data Collection

Contacts within the directory were surveyed through an online questionnaire tailored for academics, agencies, and NGOs, and other ocean-minded organizations ([Appendix B](#)). Responses were solicited through targeted outreach to the directory and snowball sampling. Surveys were initially distributed through email; to address gaps in participation, phone interviews were conducted with key individuals who had not responded online and individuals who requested participation via phone calls. All participation was voluntary.

The survey form asked participants general demographics about their primary research institution, topical research focus, and open-ended questions about data gaps, research needs, and perceptions about Oregon's ocean and coastal research. Follow-up conversations were conducted with participants who expressed interest, with open-ended interviews capturing novel additions to initial responses.

Analysis and Synthesis

Results were compiled in a detailed database and cleaned to allow for robust and streamlined analysis. During the cleaning process, NGOs, fiscal-sponsored conservation organizations, and nonprofits were grouped as one institution type. As appropriate, *other* responses were grouped into the most applicable individual topical categories.

Demographic data, including institution age, size, and type, were assessed across the respondent groups, and allowed more robust analysis of research topics based on organizational characteristics. A thematic analysis was conducted on responses to each of the open ended survey questions. These prompts assessed what the participant would prioritize if granted \$1 million for research or monitoring, which research topics are perceived as well-studied, and perceived research gaps. To facilitate analysis, responses were coded within a research theme. The thematic codes include:

- **Climate Change:** Sea level rise, resilience, harmful algal blooms (HABs).
- **Ocean Acidification:** Ocean acidification (OA) and hypoxia.
- **Restoration/Management:** Conservation, indigenous stewardship, habitat restoration.
- **Social Science:** Economic studies, communications, social factors.
- **Fisheries:** Species-specific research for fisheries and fisheries management.
- **Species** (excluding fisheries): invasive species, marine mammals, species listed under the Endangered Species Act.
- **Habitats** (biotic and abiotic): Understanding and/or characterization of habitats and physical drivers.
- **Estuaries:** Estuary-specific research and monitoring.

Although this project is focused on Oregon-specific coastal and ocean efforts, participants were asked to share any research in California or Washington that they would like to see replicated or considered in

Oregon. Responses were reviewed for commonalities and resources (links, publications, etc.) and clearly documented in the results of this assessment for reference.

Creation of Online 2023 State of the Science Inventory

The final results are displayed in an inventory using the *Notion* database software. This platform is designed for easy filtering and sorting and provides an adaptable and easily navigable view of the data and results. The inventory structure is enabled to support long-term usability and facilitate data updates through time as desired. Please see [Appendix C](#) for instructions on accessing and using the Notion 2023 State of the Science inventory.

Results & Key Findings

The survey received a 38% response rate, which is respectable considering the time constraints and the inherent nature of online surveys distributed via email. This may signify a strong desire of Oregon’s marine science community to actively engage in dialogue with OOST. It is imperative to recognize that the following results serve as a momentary snapshot, capturing a specific point in time. These results are not intended to be comprehensive nor extrapolated into the future. Additionally, these responses only reflect information shared by professionals who voluntarily completed the survey, increasing the subjectivity of the results. Analysis of these data may aid in forming a foundational framework for interpretation of marine science interests and needs in Oregon and can be beneficial to support OOST decision making and planning.

Respondent Demographics

A total of 51 individuals completed the survey, representing 30 total research institutions spanning academia, federal agencies, state agencies, and non-government organizations and nonprofits. Within academic responses, members of all major research universities in Oregon participated: Oregon State University (11 respondents), Portland State University (5 respondents), University of Oregon (1 respondent). In addition, we received one response from the University of Washington regarding the Coastal Observation and Seabird Survey Team project, which is ongoing in Oregon. Nearly half of the respondents were members of a large organization with over 100 employees, and just over half of the respondents were members of long-standing organizations over 30 years old (Table 1).

Table 1. Organizational characteristics shared by survey respondents, including organization type, size, and age. Total responses (n) and percentage of respondents (%).

Organizational Characteristic	n	%
Organization Type		
Academia	18	35%
Federal Agency	1	2%
State Agency	13	25%



NGO and Non-Profit	19	37%
Organization Size		
Under 10 employees	15	29%
10 - 30 employees	5	10%
30 - 50 employees	4	8%
50 - 100 employees	4	8%
Over 100 employees	23	45%
Age of Organization		
Under 5 years	2	4%
5 - 10 years	3	6%
10 - 15 years	5	10%
15 - 20 years	4	8%
20 - 30 years	6	12%
Over 30 years	31	61%

When compared with the full directory, the distribution of survey responses across organization type is moderately aligned, with the organizations being less than 15% over- or under-represented. Notably, it appears that state agencies and NGOs were overrepresented in the survey sample by about 13% and 11% respectively, meaning that more state agencies and NGOs responded to the survey proportional to academia and federal agencies. While it is important to note these differences, there are several possible reasons for the discretion. The most obvious reason is simply lack of responding to the survey, but this could also indicate that some of the organizations in the directory may not actually conduct ocean science, such as the U.S. Department of Energy or the U.S. Forest Service. The directory could be improved through a separate project dedicated to expanding efforts to a more robust directory.

Table 2. Proportion of each organization type within the full population (directory) that was contacted and the sample (survey responses), along with the strength of the difference. Negative values indicate underrepresentation in this assessment, and positive values indicate overrepresentation.

Organization Type	Full Directory	Survey Responses	Difference
Academia	41%	35%	-6%
Federal Agency	9%	2%	-7%
State Agency	12%	25%	+13%
NGO/Non-Profit	26%	37%	+11%



Ocean and Coastal Topics

Respondents were asked to share ocean and coastal research topics that their organization researches or monitors. Across all organization types, conservation, habitat, and climate were the most commonly researched topics; urbanization and hazards were the least researched topics (Table 3). These topics were also assessed based on organization type. State agencies were involved in all topics, but were most involved in conservation, habitat, policy, and climate. State agencies were least involved in urbanization, hazards, and pollution. NGO/non-profits were involved in all topics except urbanization, and were most involved in conservation and species & biodiversity. NGOs were least involved in energy, hazards, pollution, and oceanography, tides, and currents. There is only one response from a federal agency and that agency (NOAA Office for Coast Management) reported being engaged in aquaculture, climate, conservation, habitat, hazards, planning & management, pollution, policy, recreation & tourism, society & economics, and oceanography, tides, and currents.

Table 3. Ocean and coastal research topics shared by survey respondents as an ongoing priority of their research organization. Total responses (n) and percentage of respondents (%).

Topic	n	%
Conservation	39	76%
Habitat	39	76%
Climate	37	73%
Species & Biodiversity	36	71%
Planning & Management	30	59%
Fisheries	27	53%
Society & Economics	26	51%
Marine Mammals	24	47%
Policy	24	47%
Aquaculture	22	43%
Recreation & Tourism	22	43%
Pollution	21	41%
Energy	19	37%
Oceanography, Tides, & Currents	19	37%
Hazards	15	29%
Urbanization	11	22%

\$1 Million Funding Needs

“If you had \$1 million in funding, what would you research in Oregon and why?”

To understand the most ambitious research needs, participants were asked to share what they would research with \$1,000,000. Respondents shared a wide range of research ideas that may provide inspiration ([Appendix D](#)). Responses were categorized within key themes, offering a comprehensive overview of subjects of interest for future studies (Figure 1). Notably, monitoring, especially long-term monitoring, emerged as a recurring response but was not considered an independent theme. Instead, responses related to monitoring were categorized based on the specific purpose of the monitoring activity. Responses could be coded up to three different themes.

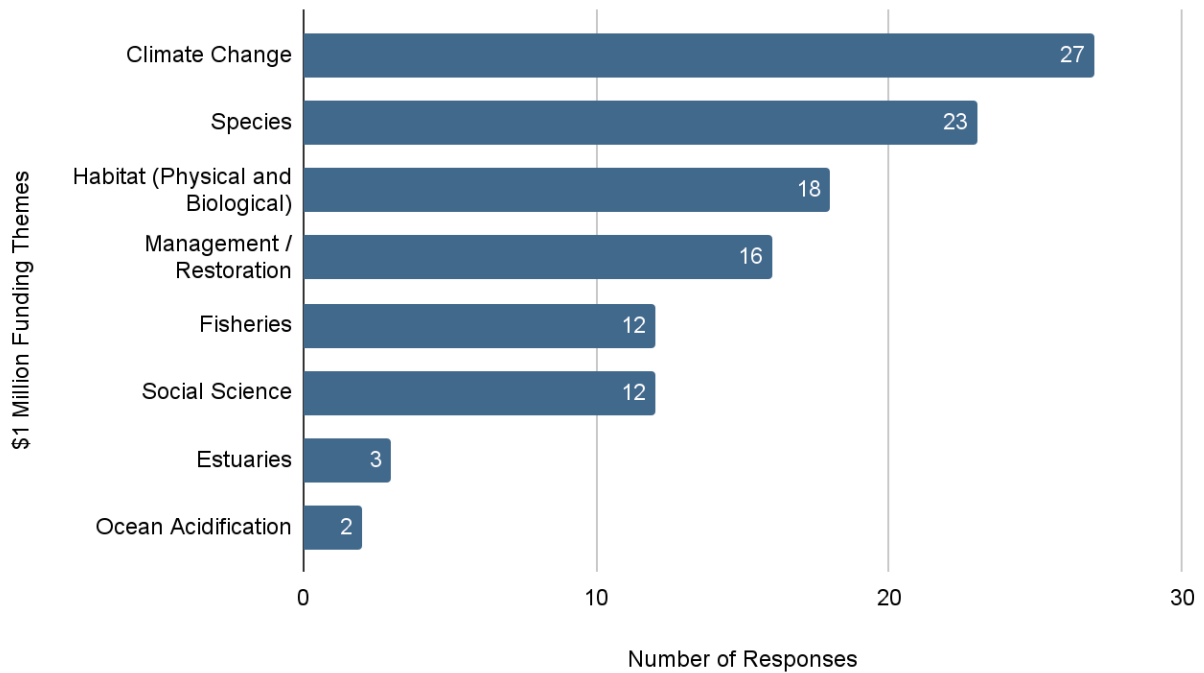


Figure 1. Thematic responses to \$1 Million funding needs.

Most Well-Studied Topics

“In your professional opinion, what are the most well-studied ocean and coastal research topics in Oregon?”

A key component of the state of Oregon’s coastal/ocean science is the research that has already been conducted or is currently being conducted. Respondents were asked to share the research topics that they believe to be the most well-studied across the state. Responses to this question greatly varied, including ocean acidification and hypoxia, intertidal ecology, marine reserves, coastal hazards, human dimensions, fisheries, eelgrass, physical oceanography, pollution, wind energy, and climate change (Table 4).



Table 4. Most well-studied research topics, as perceived by survey respondents. Total responses (n) and percentage of respondents (%).

Theme	n	%
Fisheries	24	60%
Oceanography, tides, currents	10	25%
Ocean Acidification	5	13%
Estuaries	4	10%
Species	3	8%
Marine Reserves	3	8%
Social Science	2	5%
Intertidal Ecology	2	5%
Pollution	1	3%
Habitats & Ecosystems	1	3%
Offshore Wind & Infrastructure	1	3%
Climate/Resilience	1	3%
Hazards	1	3%

Among respondents, there is a clear perception that fisheries is the most well studied topic in Oregon. Likewise, fisheries ranked among the second highest responses in topics that responding organizations are currently studying. Results indicate that academic research institutions and agencies are the two entities with the most focus on fisheries research. However, it is crucial to distinguish between a topic being well studied and well understood. Despite fisheries being extensively studied, participants also identified fisheries as a topic with notable gaps in ocean and coastal research in Oregon.

Research Gaps

“In your professional opinion, what are the largest gaps in ocean and coastal research topics in Oregon?”

In contrast to the previous question, this question aims to understand the largest gaps in ocean and coastal research. Responses varied greatly, including topics such as contaminants, social science, conservation, marine mammals, fisheries, climate change, food webs, recreation, and oceanography (Table 5). One participant shared the need to research “climate change effects on ocean marine life including distribution, timing of migration events, habitat use, and displacement.”

While the responses exhibited diversity in topical focus, a consistent thread ran through the responses highlighting the need for increased collaboration, integration, and interdisciplinary studies. For example, one participant shared the need to “integrate nearshore ecological and socio-economic research in nearshore conservation and management decisions”, and another shared that “integration of different sampling programs that target different taxa might allow for more advances in our understanding of

coastal food webs.” Similarly, a participant shared that Oregon researchers “also need to be looking at effects of multiple stressors, the human impacts and aggregate changes that can lead to tipping points for species and the cascading effects via food webs.”

Gaps in the human elements of Oregon’s coast and ocean were noted by 16% of participants. Specifically, one participant shared the need for more “Tribally-lead stewardship”, and several noted the need to research connections between community needs, climate resilience, and infrastructure. Likewise, one participant shared the need to “support diversity, equity and inclusion in ocean and coastal spaces and its influence on natural resource ocean/coastal management and policy”. Additionally, One participant identified the need to specifically research Oregon’s coastal workforce and related barriers, sharing that “there are massive barriers to entry for fisheries and aquaculture, and if we don't figure out how to overcome these, we will lose industries that are not only vital for the health of our coastal communities, but which will be replaced by far less sustainable import products, resulting in ecological harm as well as socioeconomic loss.”

Regarding wind energy, most responses discussed the need to understand the social and ecological impacts of wind energy development. Participants highlighted that social science projects could investigate the human dimensions of wind energy development in Oregon. Responses also noted that projects exploring the ecological impact of wind are critically needed. For example, in a follow-up interview a participant shared:

States set goals to generate a certain amount of gigawatts of wind energy by a certain year. While these are noble goals to set, little is investigated as to how those stated goals translate in a spatial context (i.e., how many turbines will that take, how much ocean space is required, etc.). This makes assessments on impact and cumulative effects not feasible or realistic.

Table 5. Largest gaps in Oregon’s coastal and ocean research, as perceived by survey respondents. Total responses (n) and percentage of respondents (%).

Theme	n	%
Species	8	18%
Pollution	7	16%
Climate & Resilience	7	16%
Fisheries	7	16%
Social Science	7	16%
Habitats & Ecosystems	6	14%
Offshore Wind & Infrastructure	6	14%
Estuaries	5	11%



Collaborations/Interdisciplinary	4	9%
Entanglement Reduction	3	7%
Long Term Monitoring	3	7%
Diversity & Inclusion	2	5%
Ocean Acidification	2	5%

Regional Research

“What research have you seen in Washington or California that you would like to see in Oregon?”

The survey finished by asking respondents to share research projects from Washington or California that may be beneficial to extend to Oregon. Responses varied greatly; the most prevalent common thread amongst respondents was an interest in long-term, region-wide, inter-institution collaborations. The highlighted responses below are specific examples provided by participants. A summary of specific regional projects with direct links provided by participants is available in Table 6. Additional responses that are not included in Table 6 due to not having direct examples or links provided include topics such as: eelgrass restoration, long-term monitoring of marine fishes, hazard planning, MPA connectivity, dam removal, harmful algal bloom monitoring, urchin population monitoring and the general work of the California Energy Commission.

Table 6. Research projects in Washington and/or California that may be beneficial to expand to Oregon, including the name of the project, lead organization, and state(s) involved in the project. Table includes responses in which participants provided direct links to specific projects.

Name	Lead Organization	State(s) Involved	Notes from Respondent
TIDES (Tribal Intertidal Digital Ecological Surveys) Project	Partnership between the Tribal Marine Stewards Network and SCRIPPS	California	Tribal Intertidal Digital Ecological Surveys - combining traditional knowledge and imaging techniques to achieve best possible outcomes in light of climate change.
Risk Assessment Mitigation Program (RAMP)	California Ocean Protection Council	California	Extending elements of the RAMP monitoring effort, especially frequent systematic surveys for whales and sea turtles to inform management. It could be helpful to examine the implementation of California's RAMP to see what worked well and what was most informative, with the view to develop a more streamlined/efficient system for Oregon. Passive acoustic monitoring may also be a

			helpful component to augment this type of approach.
Marine Protected Area Connectivity	California Department of Fish and Wildlife	California	California's ability to develop long-term marine monitoring datasets, including their coastal fisheries and MPA monitoring, is something that must be replicated in Oregon.
Imaging Flow Cytobots (IFCBs)	California Ocean Observing System	California	Installation of imaging cytobots at several coastal locations along the Oregon coast. Will allow for knowledge of phytoplankton community including potential HAB species.
Backyard Buoys	Pacific Islands Ocean Observing System	Pacific Islands	Deploy inexpensive Backyard wave buoys along the Oregon coast, especially in coordination with ports and Native American nations
Interactive Sea Level Rise Projection Tools	Washington Coastal Network	Washington	Monitoring and projecting sea level rise.
Tracking Coastal Change with Photogrammetry	United States Geological Survey (USGS)	California	Tracking impacts of shoreline change.
ROV Survey Program	Washington Department of Fish and Wildlife	Washington	Oregon's ROV program would benefit from a well-designed ROV survey program with the goal of improving the basin-wide understanding and modeling of important fishery species through a robust ROV video sampling program.
Annual Kelp Coverage Monitoring	California Department of Fish and Wildlife	California	Annual aerial monitoring of kelp coverage along the coast.
Microplastic Abundance in Drinking Water	California State Water Resources Control Board	California	Establishing baseline data of microplastic abundance in drinking water.
pH and pCO₂ Measurements	Northwest Environmental Moorings	Washington	Additional monitoring in bays and estuaries.
Long-term surveys of whales along Pacific Coast	Marine Mammal Institute	California, Oregon, Washington, Alaska	Long-term and large-scale genetic sampling and photo-identification of whales along the Pacific Coast, including Alaska
Citizen Science Forage	Washington Department of	Washington	Engaging the community in fish spawning

Fish Beach Spawning Monitoring	Natural Resources		monitoring
Entanglement Risk Reduction for Whales and Sea Turtles in Fishing Gear	California Ocean Protection Council	California	Investment of financial resources towards reducing entanglement risk in commercial fixed gear fisheries.

Other Key Findings

This assessment indicates a growing momentum to explore and engage in emerging focus areas, such as wind energy, restoration, climate, and resilience, alongside a pressing need for sustained, long-term monitoring across various domains including species, fisheries, habitats, and oceanography.

Across all research topics, respondents highlighted a need for collaborative and multidisciplinary efforts, with a special focus on Tribally-led research.

Fisheries was established as a key research topic that has been extensively studied, yet still has significant gaps. Respondents highlighted that there are some key data gaps with the potential to impact key management decisions and fisheries limits. For example, many fisheries assessments are based on age-structure as indicated by otoliths. Climate change may one day alter how otoliths produce the signature rings that assessors rely on for age determinations. This interaction and related implications for fisheries management is not currently an area of study.

In the context of conservation, this assessment underscores both a general need for conservation, and specifically advocates for effective conservation strategies. Recognizing that the definitions of efficacy may vary wildly, particularly through a diversity and equity lens, this underscores the importance of understanding what effective conservation entails in the Oregon context. This is an example of research that would need to be led by social scientists.

Across all topics, respondents indicated a desire for stronger interdisciplinary and inter-entity collaboration and capacity for collaboration. Agencies, academics, and others revealed a shared aspiration for sustained, long-term monitoring and collaboration spanning topics, disciplines, states, and institutions. However, the existing desire for collaboration is hindered by a lack of capacity to actively engage in collaborative efforts. This shortfall is often attributed to the exclusion of collaborative partners, especially Tribes and community organizations, during initial project development. Hence, it is strongly recommended to foster open discussions and co-development of research early in the project development phase, rather than introducing these elements once funding has already been allocated to the project lead.

Collaboration could also be strengthened across projects through the sharing of resources. An example of this is with sharing boat time; agencies pay for research vessels by the day but are likely only using the vessel for part of the day. It could be extremely valuable to establish a network to maximize the use of



the vessel and contribute to other projects, or a program to offer vessel time to Tribes or other entities to pursue their own research interests. Another example is present with the interest to investigate the use of ropeless and pop-up fishing gear. Ropeless and pop-up gear is needed to reduce entanglement risk for vulnerable species. The uptake of the use of these alternative gear would require buy-in and support from fishermen. This represents a program with significant collaborative possibilities including entrepreneurship, resources for fishermen to invest in new gear, and scientific study. This collaborative ethos aligns with Oregon's robust history of science-fishermen collaborations, presenting exciting opportunities for future joint endeavors.

Finally, respondents across organization types shared an increased focus on Tribally-led research and stewardship of natural resources. Any Tribally-led research or co-development of research with Tribes requires capacity for Tribes to collaborate. There is a distinct need for funding agencies to actively support Tribally-led research and stewardship, with a recognition that Tribal projects may differ from conventional western science research projects typically funded through these channels.

Summary & Recommendations

There is a wealth of research covering a wide variety of marine and coastal topics in Oregon. At large, there are significant efforts in Oregon are focussed on climate, energy, fisheries, and hazards from many types of entities. This report also highlights that topics such as ecosystem and habitat data, climate change and resilience, social science, and impacts of offshore wind infrastructure are considered to be gaps in understanding about Oregon's Ocean. There is momentum to further investigate traditional topics such as fisheries, ecosystems, and social science and also emerging topics such as climate change, resilience, offshore wind, and infrastructure. Notably, responses indicate a common need for long-term monitoring, increased collaboration, capacity building, and expansion of Tribally-led research.

This project revealed many opportunities to inform OOST's decision making. Specifically, four overall themes emerged as key considerations for OOST: Long-Term Monitoring, Collaborative Research, Diversity, Equity, and Inclusion, and Balancing Emerging and Well-Studies Topics (Figure 2).

Figure 2. Recommendations for Oregon Ocean Science Trust consideration.

LONG-TERM MONITORING

Funding for projects should be allocated with a long-term vision in mind, specifically for habitat monitoring and climate change. This will help ensure that ongoing research projects receive support to maintain and grow existing long-term datasets, and will enable the creation of new monitoring programs. This support is particularly necessary in advance of large-scale or long-term coastal change, such as offshore wind development and climate change.

COLLABORATIVE RESEARCH

Collaborative, interdisciplinary, and transdisciplinary projects should be elevated. There is a need for capacity development to increase research coordination efforts across entities and state borders. Increased coordination would benefit the state of Oregon by expanding capacity, establishing geographic context of Oregon's science, and allowing for more robust comparisons across time and geography. These collaborations will likely need capacity for dedicated coordinators to facilitate programs.

DIVERSITY, EQUITY, AND INCLUSION

Expansion of Tribally-led stewardship and inclusion of diverse groups in equitable collaborations would greatly benefit future ocean and coastal research. Funding research that explores the relationships between community needs, resilience, infrastructure, and related workforce would help ensure the sustainability of Oregon's ocean-related industries and communities, helping to promote balanced use, community involvement, and applicability of research.

BALANCE EMERGING AND WELL-STUDIED TOPICS

Funding should look towards emerging topics but should not exclude topics that are viewed as well-studied. These well-studied topics, such as fisheries and physical oceanography, still exhibit many data gaps with management implications. As environmental, social, and political factors change, some well-studied topics may eventually reduce in relevance; this 2023 analysis indicated that well-studied topics are still relevant and necessary.

The information uncovered in this report can provide an excellent list that students and researchers can utilize to explore in-need projects and opportunities. Similarly, the 2023 State of the Science inventory stands out as an information-rich resource for researchers, especially early career professionals and students, serving as a source of inspiration for future projects. Future assessments may build upon this

inventory by including ocean users beyond research groups in Oregon. This expansion of the target audience would offer a more comprehensive understanding of the varied stakeholders influencing and impacted by ocean science in Oregon.



Appendix A: Research Entities

This list documents the 137 entities that were invited to participate in the survey.

Organization Name	Type	Sub Type
College of Science	Academic	Oregon State University
College of Earth Ocean and Atmospheric Sciences	Academic	Oregon State University
College of Agricultural Sciences	Academic	Oregon State University
College of Business	Academic	Oregon State University
College of Education	Academic	Oregon State University
College of Engineering	Academic	Oregon State University
College of Forestry	Academic	Oregon State University
College of Liberal Arts	Academic	Oregon State University
College of Public Health and Human Sciences	Academic	Oregon State University
Graduate School	Academic	Oregon State University
Honors College	Academic	Oregon State University
Reserve Officer Training Corps - Navy	Academic	Oregon State University
Hatfield Marine Science Community Listserv	Academic	Oregon State University
Hatfield Marine Science Office of Associate Dean	Academic	Oregon State University
PISCO	Academic	Oregon State University
Port Orford Field Station	Academic	Oregon State University
Brander Lab	Academic	Oregon State University
Marine Studies Initiative (MSI)	Academic	Oregon State University
The Pacific Northwest Center for Translational Environmental Health Research	Academic	Oregon State University
Marine Mammal Institute (MMI)	Academic	Oregon State University
GEMM Lab (MMI)	Academic	Oregon State University
Cetacean Conservation and Genomics Laboratory (CCGL)	Academic	Oregon State University
Oregon Marine Mammal Stranding Network (MMI)	Academic	Oregon State University
Translational and Integrative Sciences Lab (MMI)	Academic	Oregon State University
Ocean Observatories Initiative	Academic	Oregon State University
OSU Glider Research Group	Academic	Oregon State University
Coastal Imaging Lab	Academic	Oregon State University
Oregon Coastal Ocean Currents	Academic	Oregon State University
Plankton Ecology Lab	Academic	Oregon State University



Collaborative Robotics and Intelligent Systems Institute (CoRIS)	Academic	Oregon State University
Cooperative Institute for Climate, Ocean, and Ecosystem Studies	Academic	Oregon State University
Marine Resource Management	Academic	Oregon State University
Coastal Oregon Marine Experiment Station	Academic	Oregon State University
College of Arts and Sciences	Academic	University of Oregon
Charles H. Lundquist College of Business	Academic	University of Oregon
College of Education	Academic	University of Oregon
Robert D. Clark Honors College	Academic	University of Oregon
School of Law	Academic	University of Oregon
School of Journalism and Communication	Academic	University of Oregon
Oregon Institute of Marine Biology (College of Arts and Sciences)	Academic	University of Oregon
College of the Arts	Academic	Portland State University
College of Education	Academic	Portland State University
College of Liberal Arts and Sciences	Academic	Portland State University
College of Urban and Public Affairs	Academic	Portland State University
Maseeh College of Engineering and Computer Science	Academic	Portland State University
Department of Geology	Academic	Portland State University
School of Business	Academic	Portland State University
University Honors College	Academic	Portland State University
Graduate School	Academic	Portland State University
Applied Coastal Ecology (ACE) Lab	Academic	Portland State University
Center for Life in Extreme Environments	Academic	Portland State University
Institute for Sustainable Solutions	Academic	Portland State University
COASST	Academic	University of Washington
Oregon Kelp Alliance	Academic	Federal Agency
The Research Group	Consultancy	
Cascadia Research Collective	Consultancy	
Nhydra Ecological Research	Consultancy	
Cascadia Visualizations	Consultancy	
Swell Consulting	Consultancy	
Silvestrum Climate Associates	Consultancy	
United States Department of Agriculture	Federal Agency	
United States Forest Service (Dept of Agriculture)	Federal Agency	



United States Environmental Protection Agency	Federal Agency	
United States Department of Defense - Oregon National Guard	Federal Agency	
United States Department of State	Federal Agency	
NASA - Oregon Space Grant Consortium	Federal Agency	
United States Department of Commerce	Federal Agency	
NOAA (Department of Commerce)	Federal Agency	
United States Coast Guard (Dept of Homeland Security)	Federal Agency	
U.S. Department of Transportation	Federal Agency	
United States Department of Energy	Federal Agency	
National Science Foundation	Federal Agency	
Federal Maritime Commission	Federal Agency	
United States Fish and Wildlife Service (Dept. of Interior)	Federal Agency	
Oregon National Wildlife Refuge System (US Fish and Wildlife)	Federal Agency	
National Park Service (Dept. of Interior)	Federal Agency	
Bureau of Land Management (Dept. of Interior)	Federal Agency	
Army Corps of Engineers (Portland District)	Federal Agency	
Oregon Coast Aquarium	NGO	
North Coast Land Conservancy	NGO	
Cascade Head Collaborative	NGO	
Oregon Museum of Science and Industry	NGO	
Surfrider Foundation - Oregon Chapters	NGO	
Portland Audubon	NGO	
Audubon Society of Lincoln City	NGO	
Midcoast Watershed Council	NGO	
Oregon Coast Visitors Association	NGO	
Sierra Club	NGO	
SOLVE	NGO	
Seattle Aquarium	NGO	
Ocean Conservancy	NGO	
American Cetacean Society - Oregon Chapter	NGO	
Natural Resource Defense Council	NGO	
Defenders of Wildlife	NGO	
Western Environmental Law Center	NGO	



Oregon Wild	NGO	
Center for Biological Diversity	NGO	
Oceana	NGO	
Oregon Zoo	NGO	
Institute for Applied Ecology	NGO	
Pew Charitable Trusts	NGO	
Haystack Rock Awareness Program	NGO	
Elakha Alliance	NGO	
The Nature Conservancy	NGO	
Oregon Shores Conservation Coalition	NGO	
Central Coast Food Web	NGO	
McKenzie River Trust - Coast Program	NGO	
Coast Range Association	NGO	
Siuslaw Watershed Council	NGO	
Oregon Kelp Alliance	NGO	
Wild Salmon Center	NGO	
Ecotrust	NGO	
Oceanic Ecology Research Group	Other	
Friends of Otter Rock	Other	
Cape Perpetua Collaborative	Other	
Redfish Rocks Community Team	Other	
West Coast Ocean Alliance	Other	
West Coast Ocean Alliance	Other	
PACWAVE	Other	
Columbia River Gorge Commission	Other	
Oregon Economic and Community Development Department	State Agency	
Oregon Business Development Department	State Agency	
Oregon Department of Environmental Quality	State Agency	
Oregon Department of Agriculture	State Agency	
Oregon Water Resources Department	State Agency	
Oregon Department of Emergency Management	State Agency	
Oregon Department of Transportation	State Agency	
Oregon Department of Land Conservation and Development	State Agency	



Oregon Coastal Management Program	State Agency	
Oregon Watershed Enhancement Board	State Agency	
Oregon Department of State Lands	State Agency	
Oregon Department of Fish and Wildlife	State Agency	
Oregon Parks and Recreation Department	State Agency	
Oregon Department of Forestry	State Agency	
Oregon Department of Geology and Mineral Industries	State Agency	
Oregon Land Grant	State Agency	
Oregon Sea Grant (NOAA)	State Agency	



Appendix B: Survey Questions

The [Oregon Ocean Science Trust \(OOST\)](#) was established in 2013 to promote high-quality research and monitoring of Oregon's ocean and coastal resources in order to inform policy and management. OOST hopes to strategically fund ocean research projects that fill critical gaps in Oregon's ocean and coastal research space, especially research that can contribute to scientifically-informed policy and management decisions. The following survey will gather information about the current state of ocean science and research in Oregon, and help identify areas of excellence and critical gaps. OOST will use your answers as a resource to help determine future funding pathways.

Consent and Confidentiality Statement

The survey will take 5-10 minutes, and is fully accessible online through a computer or your mobile device. Your participation is completely voluntary. By continuing with the survey, you consent to providing your perspective and participating in this assessment.

Please direct any questions or comments to Katy Nalven at katy@sea-shoresolutions.com.

-
1. Please type the name of your organization
 2. My organization is a...
 - a. Federal agency
 - b. State agency
 - c. Academic research institution
 - d. Non-governmental organization
 - e. Non-profit organization
 - f. Other
 3. Please add the primary point of contact for your organization
 4. What is the size of your organization?
 - a. Under 10 employees
 - b. 10-30 employees
 - c. 30-50 employees
 - d. 50-100 employees
 - e. Over 100 employees
 5. How long has your organization been in existence?
 - a. Under 5 years
 - b. 5-10 years
 - c. 10-15 years
 - d. 15-20 years
 - e. 20-30 years
 - f. More than 30 years
 6. Please select all of the following ocean/coastal research topics that your organization conducts studies on or researches (select all that apply):



- a. Aquaculture
 - b. Climate
 - c. Conservation
 - d. Energy
 - e. Fisheries
 - f. Habitat
 - g. Hazards
 - h. Marine Mammals
 - i. Planning & Management
 - j. Pollution
 - k. Policy
 - l. Recreation & Tourism
 - m. Society & Economics
 - n. Species & Biodiversity
 - o. Oceanography, Tides & Currents
 - p. Urbanization
 - q. None of the above
 - r. Other
7. Please describe the primary activities of your work related to ocean and coastal science, policy, and research in Oregon.
 8. If you had \$1 million in funding, what would you research in Oregon and why?
 9. In your professional opinion, what are the **most well-studied** ocean and coastal research topics in Oregon?
 10. In your professional opinion, what are the **largest gaps** in ocean and coastal research topics in Oregon?
 11. What research have you seen in Washington or California that you would like to see in Oregon? Please include a link or citation if applicable.
 12. Is there anything else you would like to share with OOST about Oregon's ocean and coastal research?
 13. If you have more information that you would like to share with us during a phone call, please leave your email or phone number so we can get in touch with you.



Appendix C: Inventory Instructions

The interactive 2023 State of the Science database is available at <https://sea-shoresolutions.notion.site/Oregon-State-of-the-Science-Inventory-846d5081ba7c431b8d21c0d51e0d6251?pvs=4>. This inventory allows users to explore coastal and ocean research organizations by organization type, research topic, and funding needs. Each organization includes point of contact details, primary research insights, and identified \$1M needs based on respondents within the entity's professional opinions.

Access detailed information on each entity by clicking on the respective entry. This action will reveal institution details, survey responses, research departments or associated research, and pertinent takeaways when applicable

Entities containing multiple departments or respondents are conveniently grouped. Use the drop-down arrow to reveal respondents with these entities. For example, the Oregon State University (OSU) category encompasses the College of Earth, Ocean, and Atmospheric Sciences (CEOAS), which further includes the Ocean Observatories Initiative (OOI), each with specific respondents. Toggle the arrow downward to uncover additional categories.

Users can also view this [step-by-step guide](#) for tips on how to use and navigate the inventory/

Please note that this list is non-exhaustive, offering a snapshot of survey responses and a brief description of research within each entity. Only the respondents to the survey are detailed.



Appendix D: Research Projects Ideas

The following list shares specific, actionable research projects shared by respondents through the survey.

Establish a passive acoustic monitoring network (PAM), via a "gateway" or T-shape design, and incorporating near real time units and archival units. Acoustic detections are an important complementary data collection method to visual observations, and can also - depending on their design - inform managers of whale presence, abundance, and habitat use, and contribute to the development of predictive models. Archival PAM also holds the benefit of providing a continuous data collection method, as opposed to period snapshots provided by aerial or vessel-based surveys. We recommend taking a look at the PAM monitoring network and associated power analyses that has been developed for the east coast: <https://rWSC.org/pam/>.

Entanglement in commercial fishing gear is a major threat to the recovery of threatened and endangered whales and sea turtles (e.g. humpback whales and leatherback sea turtles) and it also adversely impacts non-listed populations (e.g. gray whales). The Oregon Department of Fish and Wildlife is developing a Conservation Plan to reduce entanglement risk and to apply for incidental take permits from the National Marine Fisheries Service. But effective implementation of the Conservation Plan will require significant resources for monitoring, predictive modeling, and innovative fishing gear solutions. With new and dedicated funding, we would support real-time monitoring for whale and sea turtle presence off the Oregon coast, predictive modeling of the overlap of protected species and fixed fishing gears, and collaborative solutions including testing of innovative "pop-up" or "ropeless" fishing gears as a solution to allow continued fishing in areas/times otherwise closed to conventional fishing gears for the purpose of entanglement risk reduction.

We need abundance surveys of commercially or recreationally important nearshore fish.

Harmful algal bloom monitoring, mitigation and prevention. Currently, OR is the only west coast state without a dedicated harmful algal bloom monitoring program.

I would establish baseline estimates of population sizes for the nearshore subtidal organisms. This is the area that is going to be hit hardest by climate change, and is where recreational fishing occurs. Despite this we don't even have basic biological data (like how old some species live) for these species we catch.

There could be a project to study where the old females of Canary, Black and Yellowtail Rockfish go. They are missing from the population but males are present. Where do they go and what happens is critical to understanding the population dynamics and managing the species. We have done as much research as we can on this topic using just modeling methods.

We need information on the effects of offshore floating wind on Oregon coast economies and coastal resources.

Fisheries succession -- how do new fishers enter the industry, what are their barriers/needs, how can they gain professional mentorship, how can they become knowledgeable stewards of our marine resources and advocates for our ocean ecosystems?

Oregon could engage in an all inclusive study of how Oregon can be a global leader in marine resources. This study could document what we do really really well, what we need to improve, and setting an example for other places.

We need better riparian management and waterways health. Salmon and other wildlife status on the coast. Monitoring our waterways and identifying problems with regularly-collected data by trained staff. I would work with and empower our existing organizations (mid-coast water planning partnership, Lincoln County Soil and Water Conservation District, OSU Extension) to make data driven suggestions for local and state policies regarding how our waterways are managed.

I would set up an objective dedicated survey of killer whale populations in both coastal and offshore waters to better understand their distribution, occurrence, and habitat needs. I would also focus on building a community network to educate and conserve killer whales and their habitat. I would also develop workshops with the fishing industry to solve problems related to protecting endangered southern resident killer whales and their endangered Chinook (Spring) salmon prey.

There is a need to investigate the impacts of ocean acidification on the tourism industry. How can we connect ocean science to impacts of local businesses, cultural heritage and resiliency of coastal communities?

Oregon needs a feasibility report on which ports would be best positioned for EV charging for electric boat motors including commercial, charter and recreation businesses.

I would study physical drivers (abiotic factors) that control the landscape distribution of forested tidal wetlands (tidal swamps), because: 1) these factors are not yet well-constrained; 2) these tidal swamps provide very high levels of ecosystem services (particularly carbon sequestration and salmonid rearing habitat) and 3) Oregon's tidal swamps have been disproportionately impacted by human activities on the coast since European arrival (95%loss, as quantified in our recent research).

We would develop an exhaustive database on efforts around the nation and world to respond to climate change effects through planning measures, natural solutions, etc., and conduct in-depth legal research on the alternatives. We would also expand our citizen science efforts to gather information on shoreline phenomena (marine debris, beached birds, beached mammals, king tides, etc.), and in estuaries. We might also support research aggregating information about the habitat needs of the widest possible range of endangered/threatened/of concern species inhabiting estuarine and coastal habitats.



I would co-design a research project with Tribal partners aimed at understanding Tribal marine management strategies and piloting the benefits of re-introducing these management strategies in Tribal homelands. I would do this because I believe applied research has the ability to uncover new findings at the same time that it creates impact; Indigenous-led stewardship has been shown to be effective all across the world, and Oregon would benefit from re-introduction of fish weirs, clam gardens, and other landscape-scale modifications to benefit the marine and coastal environment.

We need to chart and map Oregon waters routinely from border to border using autonomous underwater gliders equipped with sensors for temperature, salinity, dissolved oxygen, chlorophyll-fluorescence, light backscatter, nitrate, and, importantly, carrying passive acoustic hydrophones to listen for coded acoustic tags and ambient noise (climb) and active 3-frequency acoustics for zooplankton to fish (dive). All these technologies are available now. We need sampling along the north and south coast of Oregon.

We need methods of Improving estimates of abundance and stock structure of Oregon cetaceans using environmental DNA and genomics.

We need to improve understanding of larval fish growth and survival via high spatial and temporal resolution sampling coupled with molecular identification of species. We lack a complete understanding of key mechanisms affecting successful recruitment of ecologically and economically important fishes. One hindrance is the difficulty of morphologically identifying key taxa such as rockfishes. Genetic identification is expensive for samples containing numerous larvae and lack of taxonomic resolution substantially hampers our understanding of what environmental conditions are important to survival.

We need a full exploration of the full Oregon shelf and slope, a poorly understood invertebrate fauna.

Investigate the persistence of shells and ecological and chemical value, how long shells persist in the environment, crucial for habitat restoration for shellfish. Likewise, we need better monitoring of estuarine conditions – general water quality in full constraints of carbonate chemistry.

Development and implementation of additional pH or eDNA sensors for the coastal ocean.

I would expand the higher-resolution systems near the coast, to improve the spatial resolution over spatially-varying bottom topography, and for improved safety at ports.

I would investigate chemical leeching from microplastics (specifically fibers) into Oregon seafood species.

With \$1M I'd focus research on how coastal conservation and restoration efforts affect conservation outcomes, particularly in estuaries and the nearshore environment. Many millions have been spent on seagrass restoration for example, and there is excellent effort being put forth right now on kelp conservation, but very little of this work has been evaluated for how Oregon's fish communities of fishery and conservation interest respond to these efforts. Furthermore, since long-term monitoring is limited and very little restoration effort is done in an adaptive management frame, such evaluations need to be made across different restoration and conservation styles to better understand which approaches are most effective at achieving conservation and management success. Work would include monitoring for abundance and diversity of organisms of course, but also for growth, survival, and body condition, which can be used to indicate quality of habitat for conservation efforts in comparison to natural habitats. Such efforts focused on the coastal margin have direct practical aspects as offshore development for wind energy and other efforts move forward, as we would be able to identify specific locations and habitats of key importance to the productivity of Oregon's natural resources.

