

Multiagency Report on Ocean Acidification and Hypoxia (OAH) Programs and Needs

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*Submitted by the Oregon Coordinating Council on Ocean Acidification and Hypoxia to
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the Oregon Ocean Acidification and Hypoxia 2019-2025 Action Plan*



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INTRODUCTION

Background

Fossil fuel combustion and related accumulation of carbon dioxide (CO₂) and other greenhouse gases have led to climate and ocean change. The earth's ocean has absorbed 30% of the excess CO₂ produced from fossil fuel combustion since the Industrial Revolution (mid 1800s), and the concentration of CO₂ in the ocean's surface continues to increase. When absorbed by seawater, CO₂ undergoes chemical reactions that lower seawater pH, making it more acidified. Low oxygen conditions in the ocean (or hypoxia through deoxygenation), are also more common as a result of climate change, due to changing wind and weather patterns, changing ocean circulation, and a warming ocean. These patterns are not just present globally, they are being observed and documented in Oregon's waters. The West Coast is a global hotspot of changing ocean conditions – most notably ocean acidification and hypoxia (OAH), and which has already impacted the coastal environment and the human communities that rely on them.

Oregon is among the first places in the world to observe the direct impacts of OAH. Since the early 2000s, OAH has decreased the aquaculture industry's ability to grow larval oysters – at the outset, OAH decreased production to near zero. In response, the oyster industry is now using closed-tank systems to create the water quality necessary for larval oyster production in most hatcheries, applying lessons learned from their increased understanding of coastal variability of OAH conditions. OAH is affecting our fishermen, who at times pull pots full of dead Dungeness crab, during what is now termed the “hypoxia season” each summer. Leading scientists are likening these hypoxia events to the Pacific Northwest's late summer wildfire season. Changing OAH conditions are undermining Oregon's ocean communities, economies, and ecosystems. The changes we see today are projected to get worse, and Oregon now has the opportunity to prepare for these changes to improve our future outlook.

OAH Council and the Oregon OAH Action Plan

Because of these unfolding events, in 2017, the Oregon legislature created the Oregon Coordinating Council on Ocean Acidification and Hypoxia (OAH Council). In 2019, the OAH Council completed the [Oregon OAH Action Plan \(2019\)](#) at the Governor's request and, with her approval, submitted the Action Plan to the International Alliance to Combat Ocean Acidification (OA Alliance), demonstrating our state's ongoing commitment to preparing Oregon for future change. Oregon's universities and scientists continue to provide leadership that has been invaluable to decision-makers within the state, as well as regionally and nationally, as OAH affects are anticipated to become more widespread. Oregon is using the following working model to categorize our work and needs, within 5 thematic areas:

Theme 1: Understanding – advance scientific understanding of OAH

Theme 2: Mitigation – reduce and mitigate causes and stressors of OAH

Theme 3: Adaptation – strengthen ecosystem and socio-economic resilience to OAH

Theme 4: Awareness – expand public awareness and understanding of OAH

Theme 5: Coordination – build state approach for addressing OAH

Moving forward, we need a diversity of partners and solutions, to best prepare Oregon for future conditions. The state has invested in science-informed, climate and ocean change policy at multiple levels of government. In order to combat near and long-term OAH effects, it is essential that relevant state agencies develop clearly defined goals and establish strategies, within existing authorities, to facilitate Oregonian's adaptation to and mitigation of climate and ocean change that is projected to further impact communities, economics, and ecosystem. While OAH issues have been incorporated into

some aspects of agency planning processes for budget, staffing, and management outcomes, there are additional opportunities to integrate OAH into the day-to-day work of state agency programs.

Structure of the OAH Multiagency Report

This **Multiagency Report on Ocean Acidification and Hypoxia (OAH) Programs and Needs** (the Report) outlines for the legislature and the public, the existing programs and policies that are already at work to address OAH impacts for 8 of Oregon’s state agencies. The report also identifies potential opportunities and resource enhancements that would better-prepare Oregon for future ocean change. This multiagency report directly addresses the Governor’s recommendation to have State agencies consider and integrate the recommendations of the State’s OAH Action Plan into current management goals. A key aspect of the Report is to highlight opportunities to coordinate and effectively use limited resources. Specifically the Report includes a section for each agency, addressing the following:

Authority and Nexus with Climate/Ocean Change

A description of agency authorities, responsibilities and key policies that relate to OAH

Program Elements that Relate to Climate/Ocean Change and OAH Action Plan Goals

A description of current management strategies for each agency that relate to OAH

Opportunities for Augmenting ODFW Programs and Actions

An evaluation of potential enhancements to support agency capacity to further prioritize OAH adaptation into agency activities

Also included in the agency sections are references, as appropriate, describing how agency authorities, programs, and opportunities relate to parallel initiatives on climate and ocean change including, but not limited to: [Executive Order 20-04](#) and the [Oregon Climate Adaptation Framework](#). The 8 State agencies requested to participate (as described in the [2019 OAH Action Plan – Appendix D](#)), and whose authorities and responsibilities have a direct nexus with OAH impacts, adaptation, and mitigation are:

Oregon Department of Fish and Wildlife (OAH Council, Co-Chair)

Emerging fisheries, resilient fishing communities, OAH research & monitoring

Department of Land Conservation and Development (OAH Council, member)

Ocean planning, coastal zone management, federal consistency, statewide planning goals, climate adaptation framework

Department of Environmental Quality (OAH Council, member)

Water quality planning, point and non-point source pollution, clean watershed plans (TMDLs), greenhouse gas reductions

Oregon Department of Agriculture (OAH Council, member)

Food safety, aquaculture and agriculture permitting and practices

Department of State Lands

Submerged aquatic vegetation, removal/fill permitting, mitigation of development impacts, authorization of use of state-owned navigable waterways (including estuaries and the territorial sea)

Oregon Department of Forestry

Forested watersheds, carbon offset and mitigation, nonpoint source pollution on forested lands

Oregon Health Authority

Impacted coastal communities

Oregon Department of Energy

Carbon mitigation framework, impacts on ecosystem and economics.



OREGON DEPARTMENT OF FISH AND WILDLIFE (ODFW)

“The mission of the Oregon Department of Fish and Wildlife (ODFW) is to protect and enhance Oregon’s fish and wildlife and their habitats for use and enjoyment by present and future generations.”

Oregon is already experiencing climate and ocean changes consistent with changes observed and projected globally. Metrics of change include air and water temperatures, disrupted precipitation patterns, snow pack, water flow, sea level rise, and increases in ocean acidification and hypoxia. These changing conditions are undermining the ability of lands and waters to support Oregon’s native fish and wildlife, and the associated cultural and economic benefits they provide. As member and Co-Chair of the legislatively-created OAH Council, ODFW’s role in state governance is squarely to provide leadership for the state on understanding trends in our ecosystem. Working on behalf of the State, and with our sister agencies and outside partners, ODFW has been instrumental in furthering understanding of the changes facing Oregon’s fish, wildlife and habitats, as well as, in developing policies, research, and communication tools to help Oregon prepare for the changes facing us. This report describes ODFW authorities and current programs that relate to ocean/marine resources and the climate/ocean changes facing them. In addition, this report describes opportunities for augmenting our authorities and programs to better position the agency for future management challenges.

Authority and Nexus with Climate/Ocean Change

ODFW is responsible for managing and protecting Oregon’s biological resources. Statutory management authority for the agency is found in Chapters 496 - 513 of the Oregon Revised Statutes. The primary statutes that govern the management of fish and wildlife resources in Oregon are the State Food Fish Management Policy and the State Wildlife Policy. While most of the agency’s authority is related to fishing and hunting management, ODFW also has significant responsibility for serving as the State’s authority on Oregon’s diverse ecosystems, habitats, and non-harvested species, including the State Endangered Species Act. ODFW administrative guiding policies are set by the Fish and Wildlife Commission, whose seven members are appointed by Oregon’s Governor. This Commission establishes OARs to implement the statutory authority delegated by the Oregon legislature, and guides the agency in implementing a diversity of management functions for the state including fishing and hunting laws (and regulations), licensing and permitting, and wildlife and habitat protection.

As co-chair of the [Oregon Coordinating Council on Ocean Acidification and Hypoxia](#) (OAH Council; created by Senate Bill [1039](#) in 2017), ODFW works collaboratively within the State and regionally to coordinate OAH-related research and monitoring, and to identify actions and initiatives to address Oregon’s risk from and vulnerability to OAH. Within ODFW’s Fish Division, management of ocean issues including OAH impacts lies largely within the Marine Resources Program (Marine Program). ODFW’s Marine staff are responsible for the monitoring, sampling, research, and management of commercial and recreational marine fisheries as well as their associated marine habitats. Marine staff are also engaged in a wide variety of research, management and policy issues on sustainable ocean use and conservation. The Marine Program plays a critical advisory role for the State in providing impacts analyses for human development projects and activities, which are likely to impact ocean fish and/or wildlife. These analyses are considered in State and Federal agency permitting processes of other State and federal agencies (e.g., Department of State Lands’ Removal/Fill Permits, Department of Land

Conservation and Development Federal Consistency determination permits, Department of Agriculture Shellfish Cultivation Permits, and the Federal Energy Regulatory Commission permitting of coastal and ocean energy projects).

Program Elements that Relate to Climate/Ocean Change and OAH Action Plan Goals

ODFW programs contribute to many actions identified in the 2018 OAH Report and the 2019 OAH Action Plan. There are 7 key program areas to highlight within the 5 themes of Oregon’s OAH Action Plan:

1. Ocean Science and Monitoring (Theme 1 – Understanding)
2. Fisheries Monitoring (Theme 1 – Understanding)
3. Mitigating Co-Stressors (Theme 2 – Mitigation)
4. Climate Ready Fisheries Management (Theme 3 – Adaptation)
5. Climate Resilient Communities and Ecosystems (Theme 3 – Adaptation)
6. Public Communications and Outreach (Theme 4 – Awareness)
7. Agency Planning and Regional Leadership (Theme 5 – Coordination)

1. Ocean Science and Monitoring

ODFW plays an important role in collecting and coordinating oceanographic information. ODFW and Marine staff direct, design, and help coordinate efforts to inventory chemical, physical, and biological data to inform management and adaption to OAH. Examples include:

- **Oregon Ocean Acidification Monitoring Group (O-OMG)** is statewide network of researchers, managers, and citizens who are interested in conducting OAH monitoring. This group was developed by, and is currently supported by ODFW staff. *Projects include* -
 - Tillamook Bay monitoring program 2017 – continuous: [OWEB grant](#) with Oregon Department of Environmental Quality (DEQ) and other regional partners.
- **[West Coast OAH Monitoring Inventory](#)** under the guidance of the **[Pacific Coast Collaborative \(PCC\)](#)**, is a regional inventory of OAH monitoring assets from Alaska, British Columbia, Washington, Oregon, and California, and has since been used to inform future investments in OAH monitoring coast wide. Oregon is a founding member.
- **[Marine Reserves Monitoring](#)** - The Oregon Legislature established five reserves (and associated marine protected areas) in 2009. One goal of the reserves is to serve as reference research sites to inform how man-made stressors, including OAH, are impacting Oregon’s marine resources. This on-going monitoring program allows early detection of changes in marine communities and ocean chemistry and is MRP’s primary program that compares the ecosystems in fished areas with areas closed to fishing, allowing the ability to separate fishing effects from environmental effects. *Data collections include* -
 - Subtidal fish and invertebrate community surveys (including Cape Perpetua reef long-term monitoring) using SCUBA, ROV, Hook and Line, and SMRFS
 - Oceanographic parameters (temperature, salinity, oxygen, pH)
 - Intertidal invertebrates (sea star wasting disease)

- **MRP Habitat Project** – Project team is focused on surveying essential habitat for commercially and recreationally important marine species harvested in Oregon waters. Data collections include:
 - ROV surveys of fish, invertebrates and habitat features (including temperature and oxygen sensors)
- **Research Collaborations** - ODFW continues to participate in collaborative research throughout our State to both support excellence in science and to increase the applicability of research to natural resource management issues. Example projects include:
 - **Whale distribution** - collaboration to understand whale interactions with Dungeness crab gear, so that both the fishery and the whales continue to thrive; collaborators include ODFW, US Coast Guard, National Oceanographic and Atmospheric Administration, Oregon State University, and other State agency partners in Washington and California.
 - **Pink shrimp larvae development and growth** - collaboration to understand the multi-stressor impacts of OA and temperature on growth and development of pink shrimp, a key Oregon commercial fishery; collaborators include ODFW and Oregon State University.
 - **Hypoxia crab pot sensors** - collaboration to expand the collection of ocean oxygen data through the use of and examining the effects of oxygen levels on crab populations (funded through a NOAA CHRP grant); collaborators include Oregon State University, local Oregon fishing fleet (both recreational and commercial), and ODFW.
 - **OA and eelgrass in estuaries** - collaboration to determine the pH buffering capacity of key Oregon and WA estuaries; collaborators include ODFW and Oregon State University.
 - **Intertidal pH monitoring** - collaboration to increase OA intertidal monitoring along the Oregon coast and within the Oregon Marine Reserves Oregon; collaborators include Oregon State University, ODFW, Surfrider Foundation, along with a team of dedicated citizen scientists.
 - **Crab larval monitoring** - collaboration to understand the distribution and abundance of larval Dungeness crabs in Southern Oregon, and the potential impacts of OA and food availability on survival (several ongoing projects); collaborations include University of Oregon, Oregon Institute of Marine Biology, and ODFW.

2. Ocean Fisheries Monitoring and Research

ODFW provides data on fisheries harvest and species abundance for stock assessments, conservation, and to assess the impacts of human activities and development. ODFW has taken on the role of integrating current climate and ocean change data into how we manage our State's commercial and recreational fisheries. Examples include:

- **Commercial Fisheries-Dependent Monitoring** is on-going and informs stock assessments and also allows for early detection in changes in catch amounts or species and unusual species (e.g., southern species outside their range), and includes extensive communication with fishermen who are often the first to notice changes in ocean conditions. Example data streams include:

- Commercial finfish sampling (length/weight/sex/age/maturity of individual fish species)
- Commercial shellfish sampling (e.g., crab, shrimp, urchin, clams)
- Commercial fishing logbooks (spatial information and catch per unit effort data)
- Fish tickets (total catch) from commercial fish processors)
- **Recreational Fisheries-Dependent Monitoring** is on-going and provides data for stock assessments and also information for early detection in changing ocean conditions especially in nearshore regions where the commercial fleets tend not to harvest. Example projects include:
 - Ocean Recreational Boat Survey (ORBS) sampling
 - Recreational shellfish (Dungeness crab, razor clam, bay clam) sampling
- **Fisheries-Independent Stock Assessments and Surveys** include research and surveys that are designed by researchers, and are independent of commercial/recreational fishing activity but that target species that are commonly harvested in Oregon. Example data collections include:
 - Fisheries Research – video and acoustics data particularly of rockfish and nearshore rocky reef habitats.
 - Shellfish Assessments – stock assessments for razor clams, urchins, abalone and bay clams, among others; shellfish are specifically sensitive to OAH and ocean change

3. Mitigating Co-Stressors

ODFW has responsibility to review the impacts from ocean and coastal development and use permits on marine resources and habitats. ODFW staff have worked collaboratively with our sister agencies to ensure that permitting is informed by our current knowledge of OAH and changing ocean conditions and how those relate to potential exacerbation of OAH impacts for specific proposed coastal and ocean projects. Examples include:

- [Oregon Territorial Sea Planning](#) (lead agency DLCDC) – ODFW assists the Oregon Department of Land Conservation and Development (DLCDC) and the [Ocean Policy Advisory Council](#) (OPAC) in updating the [Rocky Shores Habitat Management Strategies](#), and other parts of this plan.
- **Federal Consistency** (lead agency DLCDC) – ODFW coordinates with sister agencies on responses to the federal government on marine development and use in federal waters, which could have direct impacts on management of actions in State waters. Current issues include:
 - At-sea fisheries processing plants
 - Ocean renewable energy development
 - Offshore aquaculture
- [Clean Water Act/Integrated Reports](#) (lead agency DEQ) – ODFW contributes harvest data and provides oceanographic expertise to inform the DEQ’s development of Integrated Reports (including the recent 2018/2020 Integrated Report), in compliance with the US EPA Clean Water Act biennial report requirement. The 2018/2020 Report included the first

listing for state waters on OA (through biocriteria), Harmful Algal Blooms (impairment of shellfish harvest), and hypoxia (through oxygen).

- **Removal-Fill Law and Permitting** (lead agency DSL) – ODFW works with DSL and other sister agencies to review permit applications to remove or fill material in wetlands or waterways (per ORS 196.795-990). The law applies to all landowners, whether private individuals or public agencies. The purpose of the multiagency review is to ensure protection and the best use of Oregon’s water resources for home, commercial, wildlife habitat, public navigation, fishing and recreational uses.
- **Oyster Aquaculture plat review** (lead agency ODA) – ODFW works with ODA to review proposals for new oyster aquaculture development in estuaries. An important part of these reviews is to evaluate oyster aquaculture impacts on eelgrass beds.

4. Climate-Ready Fisheries Management

ODFW’s mission and authorities require sustainable resource management, which balances use and conservation. ODFW has identified climate and ocean change as a major challenge to sustainable management of fish and wildlife across Oregon’s landscape and ocean. In order to secure future harvest access through sustainable ocean fisheries, ODFW has been active in the state and regionally to identify threats and solutions. Examples include:

- **Pacific Fisheries Management Council (PFMC) leadership** – ODFW staff represent Oregon on the PFMC, which manages federal fisheries across the West Coast through 5 management plans, one of which is the Fishery Ecosystem Plan (FEP). Under the FEP, ODFW staff lead the current FEP initiative (Climate and Communities Initiative, or CCI) to identify risks and vulnerabilities of the PFMC-managed species and fisheries, to changing ocean conditions. The initiative is centered around scenario planning, to determine which fisheries and fishing industries may be most affected by climate and ocean change, and how to improve fisheries management to prepare for our uncertain future.
- **Adaptive fisheries regulations and developing new fisheries** – ODFW is committed to managing Oregon’s marine resources through changing ocean conditions using flexible management that allows the agency to act quickly. This has been an ongoing process, and ODFW has implemented a number of adaptive fisheries management measures. A diverse portfolio of fishery opportunities is essential for harvesters weathering climate shifts in both species and species abundance. ODFW is dedicated to providing access to fishing opportunities and developing new fisheries/gear, as possible.

New fishing opportunities include -

- Recreational long-leader fishing – midwater rockfish
- Recreational flatfish fishery promotion
- Commercial market squid fishery
- Commercial deep-set buoy gear (DSBG) for swordfish

Adaptive regulations include -

- Pink shrimp sustainability measures based on sea state and reproduction patterns.

- Dungeness crab – biotoxin evisceration measures (with Oregon Department of Agriculture)
- Dungeness crab – whale entanglement risk reduction measures

5. Climate-Resilient Communities and Ecosystems

ODFW is dedicated to working with partners in Oregon and across the West Coast to address and respond to potential impacts of changing ocean conditions. ODFW has been working diligently with our partners to help us to ensure our coastal communities and ecosystems remain resilient and have to tools to adapt. Examples include:

- **Oregon Shellfish Task Force:** formed by the Oregon’s legislature to develop recommendations to the legislature to support and protect Oregon’s valuable shellfish industry and wild shellfish resources. ODFW participated as a non-voting advisory member. The Task Force recommended that the legislature formalize the Oregon Shellfish Initiative and pursue allocation of \$2.9 million in support of research on OAH impacts, engaging with the shellfish industry to address OAH, increase monitoring of wild populations, expand chemical monitoring capabilities, and restore and protect native shellfish resilient to OAH. The Task Force sunset in 2016.
- **Ocean Harmful Algal Bloom and Biotoxin Monitoring:** ODFW is a key partner in a West Coast grant-funded HABs and biotoxins monitoring consortium. HABs are documented as increasing in frequency and toxin production, correlated with climate/ocean change. Funding for this program ends at the end of 2022 and there is no identified source to replace that funding, for the program to continue beyond that point.
- **Estuary Habitat Mapping** is being conducted by the MRP Shellfish Program and includes eelgrass beds, which are projected to play a significant role in mitigating local effects of OAH.
- **Human Dimensions Research** explores how human communities (including stakeholders and regional economies) interact with marine resources; particular focus is to determine how coastal fishery stakeholders are affected by implementation of marine reserves. Part of the marine reserves work is to evaluate the role marine reserves are playing in Oregonians understanding of climate change impacts on marine resources. Information from these surveys will help inform future agency policies and directives.
- **Invasive Species Surveys and Research:** Invasive species success can indicate changing ocean conditions and related shifts in food webs, predator/prey structures, and habitat use. ODFW is engaged in collaborative invasive species research including:
 - *Didemnum* (a type of colonial sea squirt) monitoring and eradication
 - Invasive mud blister worm in oysters monitoring and research
 - Green crab monitoring and eradication
 - Japanese eelgrass (mapping surveys in priority bays and estuaries)
- **Pinniped Stock Assessments:** ODFW conducts fisheries-independent surveys of pinniped abundance and health routinely at key oceanic sites along Oregon’s coast. Additionally, ODFW conducts anti-predation monitoring and removals in the Columbia and Willamette Rivers, to protect vulnerable salmonid and sturgeon stocks. As a result of changing ocean conditions,

many stocks of salmonids are reducing in abundance, and are favored forage of Pinniped populations (e.g., California and Steller Sea Lions) who have expanded their ranges upstream into key river ways in Oregon as a result of prey migration patterns.

6. Public Communications and Outreach

ODFW strives for effective and clear communications with the public producing web-based materials, printed materials, media releases, and in-person outreach to address key issues, including OAH and ocean change. ODFW provides important information to stakeholders and all Oregonians on these issues. Examples include:

- **Newsletters** are an important electronic form (and limited printed) of information distribution that uses to update our constituents and customers about fisheries regulation, research data updates, new projects, and many other news. Most newsletters are sent out annually, but some are more frequent. Newsletters are distributed via the web, USPS, email and list serv. For example:
 - [Commercial pink shrimp fishery newsletter \(2020\)](#)
 - [Commercial Dungeness crab fishery newsletter \(2020\)](#)
 - [Sport bottomfish fishery newsletter \(2019\)](#)
 - [Marine Reserves newsletters](#)
- **Websites** are critical platforms for ODFW dissemination of a wide array of information, regulations, closures, and contact information for project staff. Websites that have information related to OAH and ocean change include:
 - [ODFW Homepage](#) (with project specific tabs)
 - [MyODFW.com](#)
 - [Oregon Ocean Information](#)
 - [Oregon Marine Reserves](#)
- **Printed Outreach Materials** (e.g. one-pagers and handouts) have been developed by ODFW with assistance from communications and graphics experts to be effective tools for communication with the public. Examples include:
 - OAH Council handouts
 - Marine reserves fact sheets
 - Shellfish brochures (for priority bays and estuaries)
- **Social Media and Visual Media** -
 - [ODFW Facebook](#)
 - [ODFW Instagram](#)
 - [ODFW Marine Instagram](#)
 - [ODFW Marine Twitter](#)
 - [ODFW podcasts](#) (*The Beaver State Podcast*)
 - **Videos** (e.g., *halibut fisheries, commercial fishing in OR*)
- **Public Meetings and Outreach** are a key way for ODFW to personally connect with our constituents and customers, provide real time feedback and answer their questions and concerns. Public events range in format from community tabling (e.g., State Fair, Hatfield

Marine Science Day, Sportsman’s shows) to public lectures (e.g. watershed councils), to educational trainings (e.g., fishing demonstrations, sea grant expansion workshops). Also includes fishery management meetings and other public meetings such as the OAH Council.

- MRP’s target audience spans all ages, demographics, and locations (both along the coast and inland).

7. Agency Planning and Regional Leadership

ODFW has an important role in coordinating actions for adaption and mitigation for current and future climate and ocean changes. The Marine Program is a key collaborator with state and federal agencies, Tribal governments, and many other partners, raising awareness about ocean change issues. Examples include:

- **[Oregon Ocean Acidification and Hypoxia Council \(OAH Council\)](#)** is a multiagency and - stakeholder council that was created by the Oregon legislature in 2017 ([SB1039](#)) and was tasked with providing recommendations to the State biennially on OAH mitigation, adaptation, and research. ODFW and OSU Co-Chair this council and support the development of the OAH Biennial Reports. In September 2018, the OAH Council submitted its first report to the legislature, which is a foundational document with 38 recommendations and actions for the State to consider, to address OAH. This report and the subsequent report in September 2020, are important resources for actions by the State and our partners.
- **[Oregon Ocean Acidification and Hypoxia Action Plan \(2019\)](#)** was developed by the OAH Council at the request of Governor Kate Brown. The Action Plan outlines specific steps for actions, timelines and required resources, covers the 3-biennium period from 2019-2025. It will be revised every 6 years, as Oregon makes progress on our commitments. Additionally, the Action Plan was submitted to the International Alliance to Combat Ocean Acidification, as part of Oregon’s commitment to our regional and international partners.
- **[Pacific Coast Collaborative \(PCC\)](#)** is a regional team of government officials from British Columbia, Washington State, Oregon, and California who, through a Governor-level agreement, have set goals to combat climate and ocean change through clean energy initiatives, lowering carbon outputs, food waste initiatives, and OAH actions. ODFW staff serves on the PCC’s OA working group.
- **[International Alliance to Combat Ocean Acidification \(OA Alliance\)](#)** grew from the regional efforts by the PCC, expanding into a national and international organization of over 80 countries, tribal, state, and local governments as well as partnering universities and other NGOs. The ongoing goal of the OA Alliance is to educate governments, and other actors around the world, on how they can make a difference to reduce and mitigate the effects of OA in their region, and encourage them to submit OA Action plans as part of the government’s commitments. ODFW represents Oregon on the OA Alliance Executive Committee.
- **[West Coast Ocean Alliance \(WCOA\)](#)** is a regional partnership of State and tribal governments focused on enhanced coordination on ocean management among governments of the US West Coast. The WCOA started in December 2018, building from the partnerships of the then defunct West Coast Regional Planning Body and the West Coast Ocean Partnership. ODFW is a member of the WCOA and represents the PFMC and West Coast fisheries on the WCOA.

- [West Coast Ocean Data Portal \(WCODP\)](#) is a regional collaboration of west coast marine resource managers and scientists, is associated with the WCOA, and is dedicated to collecting, formatting, and disseminating ocean information and data that informs West Coast ocean management. ODFW collaborates with the WCODP both through the WCOA and independently as a NR agency. As part of their work, the WCODP has a new initiative to develop an Ocean Health Score Card (including metrics for OA, hypoxia, and temperature) for a unified way to assess climate effects along the West Coast. Similar efforts have been conducted in other regions and are valued sources of information for managers (e.g. [University of Maryland’s Center for Environmental Science](#)).
- [Ocean Policy Advisory Council \(OPAC\)](#) is a legislatively mandated marine policy advisory body to provide, among other statutory charges, advice to the Governor, state agencies and local governments on ocean policy and resource management matters. OPAC membership includes representatives from coastal community interests, state agencies, conservation interests and the general public. ODFW is a non-voting member of OPAC.

Opportunities for Augmenting ODFW Programs and Actions

As described above, ODFW is already implementing actions consistent with the OAH Action Plan, the Climate Adaptation Framework and Executive Order 20-04. While many actions are possible to achieve within existing capacity (e.g. monitoring activities, regional coordination/leadership, communications/outreach on ocean change, etc.), there are others that require specific investment through additional funding. The following table lists initiatives and program elements for which the agency recommends additional funding (through state funding, grants, or outside partners).

ODFW Table of Initiatives: New programs, regulatory authorities, and outreach/science/other activities

Task, Activity, or Mandate	Program, Division, or Team	Resources Needed	OAH Report Theme/Section
<p>The current Shellfish stock assessment team (SEACOR) assesses specific estuaries every 8-10 years. By augmenting the shellfish assessment team, we increase the frequency of stock assessment and habitat surveys, providing greater temporal resolution of population trends, information for permitting decisions, etc.</p>	<p>Marine Resource Program (Marine)</p>	<p>\$680,000 (per biennium)</p> <p>Funds will support three FTE and S & S</p> <p>This builds on and maximizes an <u>existing program</u></p>	<p>Theme 1: Understanding</p>
<p>Harmful algal blooms (HAB) emergence in fisheries management is on-going, and increasing. Oregon shellfish fisheries are particularly at risk. By adding a small HAB sampling team, we would increase our ability to detect emerging blooms and safeguard human health, as well as more effectively manage our fisheries.</p>	<p>Marine</p>	<p>\$415,000 (per biennium)</p> <p>Funds will support two FTE and S & S</p> <p>This builds on and maximizes an <u>existing program</u></p>	<p>Theme 1: Understanding</p>
<p>Addressing climate change and ocean acidification requires significant changes in public behavior, activities, adjustments in regulations and policies, and public support. This will involve a multi-year, coordinated communications effort involving multiple agencies, partners and stakeholders. Adding a Climate Communications Coordinator would increase awareness of climate and ocean change issues, understanding and support for actions necessary to address climate change and ocean acidification, and greater support of the State’s climate adaptation and mitigation programs.</p>	<p>Information & Education Division, or Marine</p>	<p>\$225,000 (per biennium)</p> <p>Funds will support one FTE</p> <p>Additional funding will be needed to develop and execute coordinated communications and outreach strategies.</p> <p>This would be a <u>new directive in the agency</u></p>	<p>Theme 4: Awareness</p>

Task, Activity, or Mandate	Program, Division, or Team	Resources Needed	OAH Report Theme/Section
<p>Addressing climate change and ocean acidification requires significant increase scientific understanding of climate and ocean change impacts on Oregon’s nearshore ecosystem, including kelp forests, rock reefs, and fisheries stocks. This project would include a survey research team to provide long-term trend data to inform management decisions, provide rapid response capacity to monitor and measure ocean change events (e.g. HABs, marine heatwaves, etc.), and collaborate with academic, Tribal and partner agency researchers on climate and ocean change (both archived and new data).</p>	<p>Marine</p>	<p>\$1,200,000 (per biennium)</p> <p>Funds will support four FTE, as well as significant S & S funding to support contracts and ocean-based surveys</p> <p>This would be a <u>new directive</u> in the agency</p>	<p>Theme 1: Understanding</p>
<p>As climate and ocean change occurs, many of our important coastal fishery species are experiencing changes in the species and abundance available for harvest. By <u>adding a climate-resilient fisheries</u> specialist, we will be able to more quickly respond to new harvest opportunities and help fisheries managers build climate-resilient strategies into existing fisheries management.</p>	<p>Marine</p>	<p>\$300,000 (per biennium)</p> <p>Funds will support one FTE, to lead this initiative.</p> <p><i>Additional funding</i> will be needed to develop and execute resilience strategies.</p> <p>This builds on and maximizes an <u>existing program</u></p>	<p>Theme 3: Adaptation</p>



DEPARTMENT OF LAND CONSERVATION AND DEVELOPMENT (DLCD)

“The mission of Department of Land Conservation and Development (DLCD) is to help communities and citizens plan for, protect and improve the built and natural systems that provide a high quality of life. In partnership with citizens and local governments, we foster sustainable and vibrant communities and protect our natural resources legacy.”

Climate change is manifesting itself in multiple ways in our ocean environment, and is ultimately a result of increased greenhouse gas emissions from human activities. The work of DLCD can, through land use planning practices and principles, help our communities reduce future emissions. DLCD coordinates land use planning in the state and houses Oregon’s federally approved Coastal Zone Management program (OCMP). The OCMP recognizes and supports the strengthening of OAH science, monitoring, and research in order to be able to clearly identify how human activities may be contributing to the exacerbation of OAH effects on marine environments. The OCMP administers the Coastal Goals, including Statewide Planning Goal 19, the Ocean Resources Goal. Goal 19 provides the foundation for state policy related to Ocean Resources, which is founded on the protection of the ecosystem, the organisms, and the ecological functions and connections that maintain the long-term ecological, economic, and cultural values of the ocean and its benefits for future generations of Oregonians. Better understanding of the status and trends of OAH will allow the state to develop and implement policies that will reduce the factors that cause or exacerbate OAH.

Authority and Nexus with Climate/Ocean Change

DLCD has broad agency authority to impact greenhouse gas emissions through planning, policy development, and technical guidance for the cities and counties of the state as part of the land use planning program, and through actions associated with implementation of the state’s ocean resources management framework. The OCMP, within DLCD, contributes to the State’s OAH response through coordination and development of ocean policy, administration of the State’s ocean management framework (the Territorial Sea Plan), and implementation of the federal consistency authority provided by the Coastal Zone Management Act. The department is organized into interrelated divisions, all of which work collaboratively to accomplish the work of the agency.

Program Elements that Relate to Climate/Ocean Change and OAH Action Plan Goals

The bullets below provide a description of the programs within DLCD and their complementary OAH Action Plan theme(s), most of which have either a direct or indirect connection to the reduction of carbon emissions through agency practices or program implementation. There are 4 key program areas that complement the 5 themes in Oregon’s OAH Action Plan:

1. Ocean and Coastal Services (Themes 1-5 – Understanding, Mitigation, Adaptation, Awareness, Coordination)
2. Planning Services (Themes 2, 3 – Mitigation and Adaptation)
3. Community Services (Theme 2 – Mitigation)
4. Administrative Services and Data Management (Theme 4, 5 – Awareness and Coordination)

1. Ocean and Coastal Services

DLCD oversees Oregon's federally approved coastal zone management program, provides planning grants, delivers data and technical assistance to coastal communities relating to: coastal hazards and resilience, climate change adaptation, estuary management planning, public access, and Territorial Sea Plan implementation. Examples include:

- **[The Territorial Sea Plan \(TSP\)](#)** was established through the Oregon Ocean Resources Management Program (ORS 196.475), and is used to coordinate the Ocean Policy in the state. The TSP is administered by the Land Conservation and Development Commission (LCDC) in concert with the **[Ocean Policy Advisory Council \(OPAC\)](#)**, Oregon's legislatively established policy advisory body for ocean management issues (ORS 196.470). Examples of ocean policy development related to OAH include:
 - **[The Rocky Habitat Management Strategy](#)** - State policy has been drafted to recognize the value of submerged aquatic vegetation and limit disturbance to those habitats in the territorial sea and rocky intertidal zones. That policy is on track for adoption when the TSP amendment for Part Three concludes in 2021 (Specifically addressing the 2018 Report Recommendations 3.1.b.i).
 - **[Marine Renewable Energy Development Plan](#)** was amended (TSP Part Five) in 2019 to add a chapter about the development of marine renewable energy within state waters.
 - **[Prohibition of Oil and Gas Leasing on Oregon State Waters](#)** in 2018 Oregon provided a comprehensive 35-page letter to BOEM that had comments from each affected state agency. DLCD is responsible for coordinating Oregon activities and will continue to participate in the BOEM leasing process. Our priority is for regulated activities to align with Oregon's ocean policies. Through a statutory moratorium, Oregon prohibits oil and gas development within the Territorial Sea.
- Climate Change Adaptation Framework, developed by multiple state agencies and coordinated by DLCD's coastal division to ensure that adaptation to climate change is addressed in state policies, programs, and services.

2. Planning Services

DLCD provides technical expertise and services relating to transportation and growth management, natural hazards, climate change mitigation and property rights. The OCMP depends upon networked agency capacity to ensure that state agency authorities and administrative rules that relate to OAH water quality impacts or standards are upheld, and consistent with the Statewide Land Use Planning Goals. Examples include:

- **[Coastal Zone Management Act](#)**, created by the U.S. Congress recognized the importance of meeting the challenge of continued growth in the coastal zone by passing the Coastal Zone Management Act (CZMA) in 1972. The OCMP has the ability to use the federal consistency provisions provided in the CZM to ensure that decisions affecting ocean resources are consistent with Oregon's Territorial Sea Plan, the Oregon Ocean Resources Management Plan, and the state statutes and authorities that have been approved by the National Oceanic and Atmospheric Administration, the CZMA administering federal agency.

- **Federal Consistency Reviews** are conducted through coordination and networking with the agencies whose authorities and administrative rules contain enforceable policies that have been recognized by the National Oceanic and Atmospheric Administration (NOAA) as part of Oregon's program. The Department has recognized and sought to improve and maintain state policy expertise related to OAH science, adaptation, and mitigation priorities of importance to the state. Use of the federal consistency provisions of the CZMA allow the state to respond to proposed federal changes which would weaken rules or laws that the state depends upon to maintain healthy ocean ecosystems and the human economies that depend upon them. DLCD coordinates with the agencies that are networked within the OCMP through agency authorities and regulatory programs, including the ODFW, ODA, ODF, DEQ, Oregon Department of Parks and Recreation, and the DSL. Examples include:
 - At-sea discharge of fish processing waste on a EPA federal permit for the whiting fishery
 - Offshore Aquaculture
 - Marine Renewable Energy Development
 - Undersea Cable Siting
 - Dredge Material Disposal Siting
 - Navigational Projects (channel maintenance and improvements)
- **Carbon emission reductions through planning** - Addressing climate change, Executive Order 20-04 directed DLCD to identify current and potential actions within its authority that reduce greenhouse gas (GHG) emissions and mitigate climate change impacts (EO 20-04, Section 3D). Among other things, Section 3D directs agencies to prioritize rulemakings and policy efforts that reduce greenhouse gas emissions and mitigate the impacts of climate change. DLCD was instructed to look broadly at their operations and programs for additional opportunities to address climate change. DLCD prioritized several actions for implementation during the 2019-2021 biennium to address the provisions of the Executive Order, including:
 - A project to scope whether and how the Statewide Planning Goals and other implementing rules can be revised to incorporate climate mitigation, adaptation and sequestration;
 - An update (with 25 agencies) to the 2010 Climate Change Adaptation Framework;
 - **Statewide Transportation Strategy** - A 2050 Vision for Greenhouse Gas Reduction, along with other actions to reduce greenhouse gas emissions from transportation related activities.
- Working in conjunction with the **Oregon Global Warming Commission** (OGWC), DLCD plans to support implementation of Section 12 of Executive Order 20-04 to submit a proposal that considers the adoption of state goals for carbon sequestration and storage by Oregon's natural and working landscapes (including wetlands and the State's estuaries).

3. Community Services

DLCD delivers technical assistance to local governments and state agencies regarding urban and natural resources issues including but not limited to, housing and economic development, local plan amendment reviews for consistency with the statewide planning goals, provision of planning grants and participation on Regional Solutions Teams. Examples include:

- **Ocean Policy Advisory Council** is a legislatively mandated marine policy advisory body to provide, among other statutory charges, advice to the Governor, state agencies and local

governments on ocean policy and resource management matters. OPAC membership is diverse and made up of representatives from coastal community interests, state agencies, conservation interests and the general public. The Department provides staffing capacity for the coordination of ocean policy development by OPAC, LCDC, and other state coordination entities that need to be consistent with Goal 19.

- [West Coast Ocean Alliance](#) is a regional partnership of State, Federal, and Tribal governments focused on the enhanced management and coordination for the ocean along the West Coast of the U.S. The Alliance started in December 2018, and included membership from the West Coast Regional Planning Body and the West Coast Ocean Partnership, building on previous regional coordination activities. The WCOA has implemented a new initiative to develop an Ocean Health Dashboard (including metrics for OA, hypoxia, and temperature) for a unified way to assess climate effects along the West Coast.
- [West Coast Ocean Data Portal](#) is a regional collaboration of west coast marine resource managers and scientists who are dedicated to improvements in data discovery, curation, and disseminating of coastal and marine related data. Similar efforts have been conducted in other regions (e.g. [Northeast Ocean Data Portal](#) and [Mid-Atlantic Ocean Data Portal](#)). DLCD staff currently provide leadership for the development of the WCODP.
- [Pacific Marine and Estuarine Fish Habitat Partnership](#), staff at DLCD participate in efforts to better understand and map fish habitats as they relate to OAH impacts and science regarding mitigation and adaptation strategies. As an example, DLCD staff contributed to the identification and mapping of submerged aquatic vegetation (eelgrass and canopy forming kelp), as a potential mitigation factor for buffering the effects of acidification within marine and estuarine environments.

4. Administrative Services and Data Management

DLCD provides external communications, maintains the department's computer infrastructure, manages policy direction and Tribal liaison responsibilities, and provides business-related support to agency programs and customers. Examples include:

- [Oregon Ocean Information Website](#) was created to support policy decision making and changes to Oregon's Territorial Sea Plan. It also serves as a single go-to site for other ocean-related activities, councils, GIS data and online mapping tools, like [Oregon SeaSketch](#). The web site hosts the Ocean Policy Advisory Council and the Ocean Acidification and Hypoxia Coordination Council web pages, while allowing staff from multiple agencies to maintain and develop content to support both Councils.

Opportunities for Augmenting DLCD Programs and Actions

DLCD has begun the process of integrating actions that are consistent with the implementation of the OAH Action Plan. While many actions are possible to achieve within existing capacity (e.g. regional ocean planning, ocean data management, ocean policy coordination, etc.), there are others that require specific investment through additional planning and/or resources. The following table lists initiatives and program elements the agency recommends.

DLCD Table of Initiatives: New programs, regulatory authorities, and outreach/science/other activities

Task, Activity, or Mandate	Program, Division, or Team	Resources Needed	OAH Report Theme/Section
<p>Consideration of OAH in the regulation and permitting of the at-sea processing of fish waste; ocean aquaculture, oil/mineral exploration, and other such uses that could stress ecosystems and exacerbate the regional impacts of OAH.</p>	<p>Ocean & Coastal Services</p>	<p>1 FTE & Research Grant Funding</p> <p>for coordinating and overseeing research grants to conduct the baseline analyses and models for conducting impacts assessments from development proposals</p> <p>This builds on and maximizes an <u>existing program</u></p>	<p>Theme 2: Mitigation</p>
<p>Incorporate an ecosystem evaluation framework into the Territorial Sea Plan, Part Two, for the consideration of OAH stressors via creation of a state OAH open data hub, establishment of ocean health indicator metrics in as part of the West Coast Ocean Alliance</p>	<p>Ocean & Coastal Services</p>	<p>1 FTE for coordination of ocean health indicator metrics with the WCOA</p> <p>Leverage existing staff capacity for creation of the OAH data hub, and TSP incorporation.</p> <p>This builds on and maximizes an <u>existing program</u></p>	<p>Theme 2: Mitigation</p>
<p>Information Technology related support for the web hosting and development of content on the web that provides information about OAH to the public. Allows the creation of effective communication and messaging regarding OAH monitoring, impacts, mitigation, and awareness.</p>	<p>Ocean & Coastal Services</p>	<p>0.5 FTE of new capacity</p> <p>leverages existing staff capacity and infrastructure</p> <p>This builds on and maximizes an <u>existing program</u></p>	<p>Theme 4: Awareness</p>

Task, Activity, or Mandate	Program, Division, or Team	Resources Needed	OAH Report Theme/Section
<p>Work with local governments to strength local planning efforts, particularly to OAH and the following planning goals: Oregon Statewide Planning Goals: 5 – Natural Resources, Scenic and Historic Areas, and Open Spaces, 17 – Coastal Shorelands, 18 – Beaches and Dunes, 19 – Ocean Resources, 16 - Estuary Management.</p>	<p>Ocean & Coastal Services, Community Services</p>	<p>2 FTE for 3-5 yrs</p> <p>Staff would coordinate and implement a grant program for local governments to meet new OAH planning standards</p> <p>This would be a <u>new Agency directive.</u></p>	<p>Theme 5: Coordination</p>
<p>2021 Oregon state agency climate change adaptation framework coordination</p>	<p>Ocean & Coastal Services</p>	<p>1 FTE + Funding (for Vulnerability Assessment)</p> <p>This builds on and maximizes an <u>existing program</u></p> <p>2021 POP (recommended in GRB)</p>	<p>Theme 2, 4: Mitigation, Awareness</p>
<p>Statewide Land Use Planning Goal revisions to address climate change</p>	<p>Ocean & Coastal Services, Community Services</p>	<p>FTE to be determined.</p> <p>Would require extensive rulemaking and goal revisions with many hearings and extensive outreach effort.</p> <p>This would be a <u>new Agency directive.</u></p>	<p>Theme 2: Mitigation</p>



OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)

“The mission of Oregon Department of Environmental Quality (DEQ) is to be a leader in restoring, maintaining and enhancing the quality of Oregon’s air, land and water.”

DEQ carries out its mission in order to protect public health and the environment for all Oregonians. DEQ administers federal and state laws designed to limit air, water and land pollution in order to protect public health and the environment. The U.S. Environmental Protection Agency (EPA) authorizes the agency to implement federal environmental programs in Oregon, including the Clean Water Act that requires: water quality planning; permitting or addressing point source and non-point source pollution; and developing clean water plans for water bodies that are not meeting water quality standards. In addition to its responsibilities under federal law, DEQ also implements state programs protecting public health and the environment including the Cleaner Air Oregon air toxics program, waste management and recycling, groundwater protection, environmental cleanup from contaminated sites, and greenhouse gas reduction programs.

Authority and Nexus with Climate/Ocean Change

DEQ administers federal and state laws that are implemented through Oregon Administrative Rules (OARs) adopted by the Environmental Quality Commission, a five-member citizen commission whose members are appointed by the governor, subject to confirmation by the Senate. DEQ’s agency structure is based on three media-specific divisions – Air, Land and Water, each administering a variety of programmatic functions based out of agency headquarters. Local implementation of programs is carried out by administrative and field offices in three distinct geographical regions of the state (NWR, WR, and ER). In addition, the Laboratory and Environmental Assessment Division and the Office of Compliance and Enforcement provide centralized services supporting all programs statewide.

The Water Quality Division has a variety of programs that support OAH monitoring, prevention and mitigation efforts. Federal and state laws require that Oregon’s rivers, streams, lakes and ocean waters be clean – clean enough so that fish and other wildlife thrive, and that people can swim and drink water without harming their health. The EQC sets specific water quality standards designed to achieve these outcomes for freshwater bodies, as well as marine and estuarine waters, of the state. DEQ monitors water quality across the state and, where data show that standards are not met, develops plans (also known as clean water plans, or Total Maximum Daily Loads (TMDLs)) that show what must be done to meet standards. DEQ also administers more than 3,800 permits that limit wastewater discharges, including both large municipal and industrial treatment systems, stormwater, and septic system and other on-site sewage treatment and disposal systems. DEQ works closely with the Oregon Department of Agriculture, the Oregon Department of Forestry, the Oregon Watershed Enhancement Board, and the Oregon Department of Fish and Wildlife, as well as the U.S. Forest Service and the federal Bureau of Land Management to control pollution from land and water uses.

The Air Quality Division carries out federal and state laws designed to ensure that all Oregonians are breathing healthy air, and that air quality is not harming our environment. DEQ monitors air quality

across Oregon to ensure that it meets or exceeds national health-based standards. In the few areas where national standards are not met, DEQ works with local partners to develop and implement programs that address the causes of non-attainment. Of particular importance to climate change response and OAH mitigation efforts, the Air Quality Division is also helping Oregonians reduce greenhouse gas emissions through several programs including: the Employee Commute Option program, and regulating methane emissions from landfills.

Additionally, in order to coordinate work on policies and programs to reduce greenhouse gas emissions, DEQ has established an Office of Greenhouse Gas Programs. This Office includes a statewide program collecting greenhouse gas emission data from most sources in Oregon, a program requiring the reduction in lifecycle greenhouse gases in Oregonians' transportation fuels, and a new climate policy team currently focused on developing a program to set greenhouse gas limits on some of the largest sources and sectors in Oregon.

Specific DEQ responsibilities related to OAH, as identified in Appendix D of the 2019 Action Plan, include:

- Evaluate and update approaches within water quality programs to effectively address the control of pollutants relevant to causes of ocean acidification and hypoxia, especially near coastal regions and/or river basins that empty into coastal regions that are near OAH sensitive habitats/species/communities
- Review approach to permits and for non-point sources to take into account coastal regions and/or river basins that empty into coastal regions that are near OAH sensitive habitats/species/communities
- Prioritize and/or ensure that development of total maximum daily loads (TMDLs) in coastal basins also address nutrients and other relevant water quality goals that may contribute to OAH.

Program Elements that Relate to Climate/Ocean Change and OAH Action Plan Goals

DEQ has multiple program areas that contribute directly or indirectly to various actions identified in the 2018 OAH Report and the 2019 OAH Action Plan. Specific program areas that complement one or more of the themes identified in Oregon's OAH Action Plan include:

1. Water Quality: pollution prevention and watershed restoration (Theme 1, 2 – Understanding and Mitigation)
2. Action on Climate Change (Theme 2 – Mitigation)
3. Public Outreach and Education (Theme 4 – Awareness)
4. Coordination and Partnerships (Theme 5 – Coordination)

1. *Water Quality: pollution prevention and watershed restoration*

The DEQ Water Quality Program implements state and federal laws to protect, restore, and improve water quality for Oregon's streams, rivers, lakes, groundwater, estuaries and territorial ocean waters. Protecting water quality keeps these waters safe for a multitude of beneficial uses, including protecting fish and other aquatic organisms, recreation, and the ability to consume fish safely. The Water Quality Program has a critical role in achieving the department's mission through policy development, collection and analysis of water quality data, and implementing various pollution control and restoration program activities. DEQ staff deliver critical core work by issuing permits and certifications, conducting inspections, carrying out compliance and enforcement, awarding grants and loans for clean water projects, and working with sister agencies and local partners to improve and protect water resources.

Examples of water quality program areas with a nexus to OAH management include:

- **Water Quality Standards:** The DEQ uses water quality standards to assess whether the quality of Oregon's rivers, streams, lakes and ocean waters is adequate for fish and other aquatic life, recreation, drinking, agriculture, industry and other uses. DEQ also uses the standards within regulatory tools and processes to prevent pollution of the state's waters. [The Clean Water Act](#) requires states to adopt water quality standards designating beneficial uses of the state's waters and set criteria designed to protect those uses. States submit their standards to the federal Environmental Protection Agency for approval. The Clean Water Act requires states to periodically review and revise water quality standards and hold public hearings about those proposed changes. These changes are needed to incorporate new environmental scientific information, meet federal requirements or improve clarity and program implementation. Some changes are required by decisions made by U.S. EPA, the National Marine Fisheries Service and U.S. Fish and Wildlife Service, and courts. Other priority standards revisions will allow DEQ to make decisions based on site specific conditions, environmental effects, and appropriate uses of waterbodies.

DEQ has recently completed various standards revisions and review projects that were identified in the 2017 Triennial Review process and undertaken as part of the [2018 – 2020 Program Priorities](#) plan. DEQ is currently initiating the next review process aimed at identifying priority projects the agency should pursue in the next three to five years. The [next Triennial Review](#) is anticipated to be completed in mid-2021 and will seek input on prioritizing agency efforts for the 2021-2024 time period. Projects under consideration include a review of OAH related parameters such as marine DO, pH, or other indicators of ocean acidification.

- **Water Quality Monitoring:** provides critical information for understanding how well water quality goals are being met and for identifying emerging water quality concerns, planning wastewater and industrial permit limits, assessing compliance with environmental regulations, developing effective watershed pollution reduction strategies and understanding trends in water quality statewide. Oregon DEQ's Water Monitoring Program meets these needs by:
 - Planning and coordinating environmental data collection efforts to ensure the right data is collected to answer the question at hand.
 - Collecting representative, valid environmental data through physical, chemical and biological sampling and assessment.
 - Managing environmental data to ensure availability of accurate and complete data for agency programs and the general public.
 - Analyzing and interpreting water quality related data to produce reports which identify water quality conditions, identify threats to water quality.

DEQ's on-going ambient water quality monitoring program includes multiple sites in coastal watersheds. This program monitors nutrients, bacteria, pH and dissolved oxygen among other parameters in rivers and streams that drain into the coastal ocean and estuaries. Specific monitoring efforts that may inform OAH management and mitigation include:

- *Tillamook Bay OAH project* - DEQ is a contributing partner in gathering nearshore coastal and estuarine water quality information as part of the Oregon Ocean Acidification Monitoring Group (OOMG). OOMG is statewide network of researchers, managers, and citizens who are interested in conducting OAH monitoring. This includes Tillamook Bay monitoring efforts associated with the [National Estuary Program \(NEP\)](#) implemented

- through the [Tillamook Estuaries Partnership](#) supported by an [Oregon Watershed Enhancement Board](#) (OWEB) grant with ODFW, Oregon State University and other regional partners. Tillamook Bay project leverage existing efforts by the EPA Newport research staff currently monitoring OAH related water chemistry and ecosystem processes in the estuary.
- *Monitor the waters along Oregon's coastline for enterococcus bacteria* - DEQ partners with the Oregon Health Authority (and 3rd party volunteer monitoring programs) to, monitor coastal marine waters from a variety of sources such as streams and creeks, storm water runoff, animal and seabird waste, failing septic systems, sewage treatment plant spills, or boating waste. Results from these efforts can provide information about discharges or other activities that contribute anthropogenic nutrient loading to the near-shore coastal zone.
 - [National Aquatic Resource Surveys](#) - DEQ participates in the National Coastal Condition Assessment every five years. This random survey samples sites along the Oregon coast to evaluate conventional water quality parameters and biological communities as well as toxic pollutants.
- **Water Quality Assessment:** Every two years, DEQ is required to assess water quality and report to the U.S. Environmental Protection Agency on the condition of Oregon's waters. DEQ prepares an [Integrated Report](#) that meets the requirements of the federal Clean Water Act for Sections 305(b) and 303(d). Section 305(b) requires a report on the overall condition of Oregon's waters. Section 303(d) requires identifying waters that do not meet water quality standards and where a Total Maximum Daily Load pollutant load limit needs to be developed. The Integrated Report includes an assessment of each water body where data are available, and the list of waters identified under Section 303(d) as water quality limited and needing a TMDL. Waters may be added to the 303(d) list based on evaluation of new data, application of new or revised water quality standards, or information showing water quality has declined.

Before each reporting cycle, DEQ updates the assessment methodology that describes how each assessment unit will be evaluated and puts out a call for data to gather all available data and information in Oregon that will be evaluated and used in the assessment process. DEQ has identified multiple methodology update needs that may be evaluated as part of future Report cycles, including methods related to OAH. Specifically, DEQ has begun conversations with sister agencies about exploring methods to assess the impacts of marine hypoxia and ocean acidification with the objective of developing assessment methodologies for marine territorial waters for future Integrated Reports.

- **Watershed Management:** Clean Watershed Plans (otherwise known as [Total Maximum Daily Loads](#), or TMDLs), are a science-based approach to cleaning up polluted waterways so that state water quality standards are achieved. A TMDL is a numerical value that represents the highest amount of a pollutant a surface water body can receive and still meet the standards. The federal Clean Water Act requires states, or the U.S. Environmental Protection Agency, to develop a TMDL for each water body on the state's polluted waters list, also known as the 303(d) list (Integrated Report). The TMDL process is a framework to clean up polluted waters. DEQ is responsible for development of TMDLs, often referred to as Clean Watershed Plans, which then must be approved by EPA. Under most circumstances, TMDL implementation relies upon landowners and land managers within a river basin, often involving watershed councils, soil and water conservation districts, and federal, state or local agencies identified as Designated Management Agencies (DMAs) in TMDLs to carry out actions to meet the objectives of the

TMDL implementation plans. Examples of watershed management priority projects underway at DEQ that may have implications for OAH management or mitigation include:

- [Coquille Basin TMDL and Water Quality Management Plan](#) (DO, nutrients, organic carbon, bacteria, pH, temperature)
 - [Upper Yaquina TMDL and Water Quality Management Plan](#) (DO, nutrients, bacteria, temperature)
 - [TMDL Implementation for the North Coast, Rogue, and Umpqua TMDLs](#): supporting DMAs work including Oregon Department of Agriculture to address nonpoint sources of pollution
 - Support evaluation and potential revisions of elements of [Forest Practices Act](#) that relate to TMDL implementation
 - Updating the DEQ [Harmful Algae Bloom Response Strategy](#) (freshwater HABs)
- **Nonpoint Source Pollution Prevention:** The goal of DEQ's Nonpoint Source Program (NPS) is to prevent and address water pollution from nonpoint sources in all waterbodies in the state. Through control of pollutant sources for all waterbodies, DEQ's goal is to meet water quality standards that protect human health and aquatic life. Oregon's NPS Program is an important part of the state's water pollution control programs because for some pollutants, including nutrient loading that may exacerbate OAH conditions, nonpoint sources of pollution may be the major source of a pollutant to a waterbody.

Oregon's Nonpoint Source Program is implemented by land use type in order to leverage partnerships and voluntary stewardship opportunities aimed at addressing water quality issues on agricultural lands; state, private, or federal forest lands; and in urban areas. Implementation of the program relies on many agency programs and regulatory authorities, including the federal Clean Water Act; state water quality standards, the total maximum daily load rule, the Coastal Zone Act Reauthorization Amendments (section 6217-Coastal NPS Control Program), the National Estuary Program, the Forest Practices Act, the Oregon Plan for Salmon and Watersheds, the Agricultural Water Quality Act, and the State Land Use Planning Program.

Under Section 319 of the Clean Water Act, EPA provides grants to states to implement nonpoint source programs. These federal grants require a 40 percent state match (of cash or in kind services). Grants are used for high priority TMDL development and implementation activities, technical assistance and public outreach and education on watershed protection and improvement projects. The amount of annual funding and grant eligibility is subject to EPA's budget. Overall federal appropriations to states for the 319 grant program have declined roughly 30 percent (not accounting for inflation) since federal fiscal year 2003.

In 2015, the National Oceanic and Atmospheric Administration (NOAA) and the United States Environmental Protection Agency (EPA) concluded that the State of Oregon had not submitted a fully approvable [Coastal Nonpoint Pollution Control Program](#) as required by section 6217(a) of the [Coastal Zone Act Reauthorization Amendments of 1990 \(CZARA\)](#). Specifically, NOAA and EPA found that the State had not adopted additional management measures applicable to forestry that are necessary to achieve and maintain applicable water quality standards under Clean Water Act section 303 and to protect designated uses. As a result, EPA has been withholding approximately 23% of Oregon's annual CWA Section 319 grant appropriation (about \$500,000 per year) since Fiscal Year 2016 as a penalty until NOAA and EPA determine that

Oregon has provided sufficient indication that the state is taking steps to address shortfalls in its Coastal Nonpoint Pollution Control Program.

- **Water Quality Permitting:** [DEQ's Water Quality Permitting Program](#) issues permits that regulate pollution from point sources discharging to Oregon's surface water and groundwater through federal National Pollutant Discharge Elimination System (NPDES) permits and state Water Pollution Control Facilities (WPCF) permits. The term "point source" generally refers to wastewater or stormwater discharged into water or onto land through a pipe or a discernible channel.

Specific types of permits includes permits for industrial wastewater, domestic wastewater, application of biosolids, use of recycled and gray water, operation of pretreatment facilities, discharge of stormwater to surface waters, and discharge to underground injection control systems. DEQ also regulates the siting, design, installation, and ongoing operation and maintenance of onsite septic systems and is responsible for evaluating federally licensed or permitted activities to ensure that proposed activities are certified to meet state water quality standards.

There are a variety of regulated discharges and activities that may contribute nutrients or otherwise effect estuarine or nearshore coastal environments in ways that could contribute to or exacerbate OAH conditions. Combined, the Water Quality Program issues over 5,000 permits – either as "individual" permits or to activities eligible as classes or categories of discharge covered under a "general" permit. Individual and general permits are issued for a fixed period of time not to exceed five years for federal NPDES permits or ten years for state WPCF permits. DEQ's permitting and program development program must ensure that issued and renewed permits protect or improve the quality of receiving waters, and protect the beneficial uses of those waters (such as drinking, swimming, fishing, and aquatic habitat). In addition, the program is responsible for carrying out inspections and compliance assurance activities related to permitted facilities, provided technical assistance, and take prompt and appropriate enforcement actions when violations occur.

- **Clean Water Loan and Financial Assistance Funding:** The Oregon [Clean Water State Revolving Fund](#) (CWSRF) helps protect public health and restore natural areas by offering below market loans for the planning, design and construction of water pollution control activities. Eligible public agencies include tribal nations, cities, counties, sanitary districts, soil and water conservation districts, irrigation districts, various special districts and certain intergovernmental entities. This is a critical funding source in the state, supporting tens of millions of dollars each year in pollution reduction and infrastructure improvements across the state.

DEQ's Clean Water State Revolving Fund Clean Water State Revolving Fund also offers below-market rate loans to finance a variety of nonpoint source water quality projects for public entities. Loans can finance stormwater management efforts, watershed partnership efforts, protecting and restoring streamside areas, wetlands and floodplains, and acquisition of riparian land, wetlands and conservation easements. CWSRF offers a Local Community Loan, which allows a public agency to make loans to private entities like homeowners and farmers for the repair and replacement of failing decentralized systems. Other eligible projects include agricultural best management practices such as building manure containment structures,

manure digesters and fences to protect riparian resources, capture and convert methane and purchase calibrated application equipment.

DEQ also seeks to facilitate low-interest loans to Oregon property owners and small businesses that need to repair or replace failing onsite septic systems. This has been achieved via pass-through grant funding to support non-profit community development financial lending institutions or through loans from the Clean Water State Revolving Fund.

2. Action on Climate Change

Meeting statewide emissions reduction goals adopted by the Oregon Legislature in 2007 and additional science-based goals established in Governor Brown’s recent executive order 20-04, means Oregonians have to do our part to avoid the most catastrophic effects of climate change. Governor Kate Brown signed Executive Order 20-04 on March 10, 2020 directing multiple state agencies to take action to reduce greenhouse gas emissions and avoid the worst effects of climate change, including OAH. The executive order directly supports the Oregon Department of Environmental Quality’s mission of protecting and enhancing Oregon’s environment. The executive order established science-based reduction goals for Oregon:

- Reduce emissions to at least 45 percent below 1990 levels by the year 2035
- Reduce emissions to at least 80 percent below 1990 levels by the year 2050

The order directs a number of state agencies, including the Environmental Quality Commission and the DEQ to take a variety of actions within existing authorities to reduce emissions and include climate change in agency planning. Each agency is conducting its own process to implement the executive order and is coordinating with other agencies for a statewide effort to take action on climate in Oregon. In addition to the executive order, many agencies have been and will continue to develop and run programs to reduce emissions, transition to cleaner energy, and do so in a just and equitable way. One specific directive in the executive order is for the EQC and DEQ to “cap and reduce” greenhouse gas emissions.

The order includes a directive to the Environmental Quality Commission and DEQ to take actions necessary to cap and reduce greenhouse gas emissions consistent with science-based emissions reduction goals. Sectors and sources of emissions listed in the order are large stationary sources, transportation fuels, including gasoline and diesel, and all other liquid and gaseous fuels, including natural gas. [DEQ’s Office of Greenhouse Gas Programs](#) will be leading efforts to develop a new program or programs to cap and reduce emissions from those sectors. Examples of other DEQ programs that aim to reduce greenhouse gas emissions and the impacts of climate change, including OAH.

Examples include:

- **Clean Fuels Efforts:** Launched in 2016, the Oregon Department of Environmental Quality's [Clean Fuels Program](#) is designed to decrease the amount of greenhouse gases created during the life cycle (i.e., the production, processing, transportation, and consumption) of fuel used in Oregon. Clean fuels have lower carbon emissions, or carbon intensity, which help improve air quality and public health. Objectives of the programs include: decreasing the amount of pollution allowed from transportation fuels used in Oregon by 25% by 2035 (compared to 2015

levels); providing incentives to create demand for cleaner fuels in the marketplace; and encouraging the use of cleaner fuels such as electricity, ethanol, biodiesel and renewable diesel.

- **Landfill Methane Reductions:** [Methane emissions from landfills](#) represent an important element of Oregon’s overall greenhouse gas (GHG) emissions. In 2017, six of the twenty-five largest stationary sources of GHG emissions in Oregon were landfills. One of the specific actions that is directed by Executive Order 20-04 is for the EQC and DEQ to “take actions necessary to reduce methane gas emissions from landfills that are aligned with the most stringent standards and requirements for reducing methane gas emissions from landfills adopted among the states having a boundary with Oregon.” To implement this section of EO 20-04 DEQ first will complete an initial documentation of the specific standards and requirements in adjoining states that are the most stringent (in terms of emissions reductions, including emissions avoidance) and then develop rules to be considered for adoption by the EQC.

3. Public Outreach and Education

DEQ aims to provide clear and effective communication to its stakeholders and to be an honest broker of information on the state of the environment and climate science through various outreach and general education efforts. This includes public meetings, webinars, printed materials, electronic media and in-person outreach. The agency has placed increase emphasis on the importance of providing timely and accurate information to all Oregonians through various media, including:

- **DEQ Website and affiliated social media** are critical platforms for disseminating program specific regulatory information, as well as timely information on environmental policy developments. These include:
 - [DEQ Homepage](#) (with project specific tabs)
 - [Your DEQ Online](#) (Environmental Data Management system/portal)
 - [DEQ Climate Change Programs Homepage](#)
 - [DEQ Facebook](#)
 - [DEQ twitter](#)
- **Outreach Materials** (e.g. one-pagers and handouts) DEQ employs communications and graphics experts to develop effective tools for communication with the public.
 - Fact sheets
 - Program brochures

4. Coordination and Partnerships

Through DEQ’s work participating in partnerships at local, regional and national levels, DEQ is dedicated to supporting a sustained, long-term approach to addressing factors that may be contributing to OAH conditions. DEQ is actively in engaged in various efforts that seek to improve climate and environmental policy coordination and supports multiple collaborative efforts that may directly or indirectly influence OAH management opportunities for our state.

Examples include:

- [Environmental Council of States \(ECOS\)](#) – DEQ represents the state on ECOS, a national organization that works to improve the capability of state environmental agencies and their leaders to protect and improve human health and the environment across the US.

- [Association of Clean Water Administrators \(ACWA\)](#) – DEQ’s Water Quality Program is an active participant in ACWA, an organization that provides a national voice for State clean water program concerns, interests, and priorities and fosters the collaboration needed for sound public policy on watershed protection and restoration efforts.
- [Environmental Justice Task Force](#) – DEQ is an active participant in promoting development and progress of the state’s Environmental Justice Task Force (EJTF), which was created by the Legislature to help protect Oregonians from disproportionate environmental impacts on minority and low-income populations. The EJTF encourages state agencies to give all people knowledge and access to improve decisions that affect environment and the health of all Oregonians.
- [Ocean Policy Advisory Council \(OPAC\)](#) – DEQ participates as an ex-officio member of OPAC, a legislatively mandated marine policy advisory body to provide, among other statutory charges, advice to the Governor, state agencies and local governments on ocean policy and resource management matters ([ORS 196.433](#)).
- Implementation of many critical water pollution control efforts, including those that involve agricultural and forest lands, depends on partnerships where DEQ contributes staff expertise, technical assistance or otherwise provides an oversight or coordination role. In striving for watershed protection and enhancement, DEQ partners with other state, local and federal agencies, tribes, landowners, and NGO’s to support various efforts that aim to reduce nonpoint source pollution that may contribute to OAH conditions. Partnership examples include [Strategic Implementation Areas \(SIAs\)](#), Coordinated Streamside Management (CSM) and [Conservation Effective Partnerships \(CEP\)](#).

Opportunities for Augmenting DEQ programs and Actions

DEQ has begun the process of integrating actions that are consistent with the implementation of the OAH Action Plan. While many actions are possible to achieve within existing capacity, there are others that would be enhanced or expedited through specific investment of additional funding. It may be worth noting that many core work activities at DEQ, particularly in water quality programs, may have co-benefits to OAH management. As such, program enhancements aimed at generally improving capacity and efficacy of program implementation (e.g. WQ standards, assessment, permitting or TMDLS) may support OAH management objectives. The following table identifies program elements and initiatives DEQ may consider prioritizing in future budget cycles that contribute to OAH management.

DEQ Table of Initiatives: OAH related program activities with recent resource requests (denied, partial, or pending) or are under consideration for future requests

Task, Activity, or Mandate	Program, Division, or Team	Resources Needed	OAH Report Theme/Section
Update WQ Standards for marine waters	Water Quality Division – Standards and Assessment	Additional resources TBD (under consideration) This builds on and maximizes an <u>existing program</u>	Theme 1: Understanding
Develop methodology and conduct water quality assessment to determine if Oregon marine waters are meeting WQ standards for DO/OA	Water Quality Division – Standards and Assessment	Coordination with regional experts This builds on and maximizes an <u>existing program</u>	Theme 1: Understanding
Enhanced Estuarine Monitoring	Laboratory and Environmental Assessment Division	Additional funding to modernize instrumentation and maintain existing analytical equipment This builds on and maximizes an <u>existing program</u>	Theme 1: Understanding
Continuation of Tillamook Bay Estuarine Monitoring Project	WQ Division - Watersheds Management Section (NWR)	Additional resources (TBD) for field instrumentation; This builds on and maximizes an <u>existing program</u>	Theme 1: Understanding
Maintain and enhance DEQ Laboratory Infrastructure and Support Services (secondary co-benefits to OAH)	Laboratory and Environmental Assessment Division	Additional resources (TBD) for maintenance, repair or replacement of ageing analytical instrumentation; data management support (note: \$550k requested in DEQ 2021-23 ARB - POP 160) This builds on and maximizes an <u>existing program</u>	Theme 1: Understanding

Task, Activity, or Mandate	Program, Division, or Team	Resources Needed	OAH Report Theme/Section
Increased capacity for TMDL development and implementation efforts	WQ Division – Watershed Management	Additional resources (TBD) needed for prioritization of estuarine and coastal watershed TMDL development and implementation projects This builds on and maximizes an <u>existing program</u>	Theme 2: Mitigation
Address factors contributing to CZARA penalties in order to fully restore CWA Sec. 319 Grant Funding (secondary co-benefits to OAH)	WQ Division – Watershed Management	Additional resources (TBD) may be needed for TMDL implementation; inter-agency coordination This builds on and maximizes an <u>existing program</u>	Theme 2: Mitigation
Improve Harmful Algae Bloom Prevention and Risk Reduction Efforts (secondary co-benefits to OAH)	Laboratory and Environmental Assessment Division and WQ Division – Watershed Management	Additional resources for cyanotoxin and nutrient analyzer instrumentation; lab personnel for data collection and analysis; WQ analyst resources for predictive modeling and watershed management planning. (note: 2021 House Water Committee Bills) This builds on and maximizes an <u>existing program</u>	Theme 2: Mitigation
Increased capacity for issuance, technical assistance compliance assurance, and enforcement of wastewater permits (secondary co-benefits to OAH)	WQ Division – Permitting Program	Additional resources (TBD) (6.0 FTE identified in DEQ 2021-23 ARB – POP 120) This builds on and maximizes an <u>existing program</u>	Theme 2: Mitigation

Task, Activity, or Mandate	Program, Division, or Team	Resources Needed	OAH Report Theme/Section
Re-establish Onsite Septic System Repair/Replace Loan Funding (secondary co-benefits to OAH)	WQ Division – Onsite Loan Program	Appropriation of pass-through grant funding to support septic system repair/replace loans to low-income Oregonians. (note: 2021 House Water Committee Bill) <u>This re-establishes an authorized but currently unfunded program</u>	Theme 2: Mitigation
Establish and implement Greenhouse Gas cap and reduce program, per EO 20-04.	Office of Greenhouse Gas Programs	Bridge funding to support program efforts that didn't have carry through funding from E-board 2020 – until fee revenue is generated. (resources recommended in 2021/23 GRB include 2 FTE;\$2 Million General Fund) <u>This builds on and maximizes an existing program</u>	Theme 2: Mitigation



OREGON DEPARTMENT OF AGRICULTURE (ODA)

“The mission of Oregon Department of Agriculture is to ensure healthy natural resources, environment, and economy for Oregonians now and in the future through inspection and certification, regulation, and promotion of agriculture and food.”

Changing ocean conditions matter to the ODA because of this agency’s key role in supporting food production within Oregon. ODA is uniquely positioned in terms of its role to both promote the agricultural sector as well as to ensure foods produced and processed within the state are safe and wholesome for consumers. ODA finds itself fulfilling both of these roles in both upland and inland environments somewhat remote from the Pacific Ocean, to marine aquaculture operations (mariculture) right on the frontline of where OAH impacts are being felt.

For these reasons, it is important for ODA to gain better metrics and appreciation of the contributions of OAH to the shellfish industry to state and regional economics as well as the vulnerability of it to the ongoing effects of OAH. In addition, ODA strives for enhanced understanding and quantifying the impact of runoff from agricultural lands use, and learning more about the interplay between harmful algal blooms (HAB) biotoxins and OAH in crab and shellfish health are critical to the mission of ODA of ensuring healthy natural resources and a resilient natural resource economy now and into the future.

Agency Authority and Nexus with Climate/Ocean Change

The Oregon Department of Agriculture comprises of five major functional programs; Food Safety and Animal Health, Internal Service and Consumer Protection, Market Access and Certification, Natural Resource, and Plant Protection and Conservation. OAH issues have a key nexus with the Natural Resources program and the Food Safety program. The Natural Resource Program includes the agricultural water quality program and is responsible for developing plans to prevent and control water pollution from agricultural activities and soil erosion on rural lands. The Natural Resource Program is responsible for ensuring that farmers and ranchers help achieve riparian and landscape conditions to attain water quality standards and meet the agricultural pollutant load allocations assigned by the Department of Environmental Quality (DEQ) in their Total Maximum Daily Loads (TMDLs).

ODA demonstrates leadership across Oregon to local food systems, production agriculture, livestock husbandry, aquaculture, natural resources, and related sectors. That leadership is rooted in sound public policy, best available science, and efficient management. ODA’s vision statement calls upon our department to remain “able to serve the changing needs of Oregon’s diverse agricultural and food sectors to maintain and enhance a healthy natural resource base and a strong economy in rural and urban communities across the state.” Climate change has the potential to confound ODA’s efforts to meet these core obligations and responsibilities to every Oregonian. All seven key objectives of ODA’s Strategic Plan can be applied to articulate the opportunities and challenges associated with the State’s GHG emission reduction goals, climate change adaptation, and mitigation planning. The Strategic Plan calls for ODA to capitalize on opportunities to “Ensure healthy natural resources, environment, and economy for Oregonians now and in the future.”

Program Elements that Relate to Climate/Ocean Change and OAH Action Plan Goals

ODA contributes to many actions identified in the 2018 OAH Report and the 2019 OAH Action Plan. There are 4 key programmatic areas that complement the 5 themes in Oregon’s OAH Action Plan:

- 1) Limiting and understanding OAH co-stressors – land based agriculture practices and water quality practices around shellfish farms. *(Theme 2 – Mitigation)*
- 2) Seafood Health Monitoring – maintain healthy Oregon seafood in light of changing ocean conditions including HABS. *(Theme 2 – Mitigation)*
- 3) Habitat protections – eelgrasses and native oyster restorations and protections and considerations for habitats when siting shellfish farms. *(Theme 3 – Adaptation)*
- 4) Agency Planning and Regional Leadership – work around multi agency or stakeholder taskforces/councils/groups dealing with ocean and climate change – including coordination with the seafood commodity commissions. *(Theme 5 – Coordination)*

1. Limiting and Understanding OAH Co-stressors

ODA’s Agricultural Water Quality Program has a core mission to prevent and control water pollution from agricultural activities. Agricultural activities can result in water pollution from nutrient loading, soil erosion, pesticide runoff and other causes. These pollutants can eventually make their way to the estuaries of Oregon and the Pacific Ocean and have the potential to influence OAH in the environment. Since Oregon has an extensive and diverse agricultural industry, different agricultural operations represent different OAH risks. ODA has a critical role in regulating agricultural operations and ensuring pollution to waterways is prevented and controlled. Examples include:

- **ODA’s water quality program** implements the statewide [Strategic Implementation Areas \(SIA\)](#) initiative that has four main components:
 - Ensure compliance with Oregon’s agricultural water quality regulations.
 - Engage landowners in voluntary incentive based conservation to improve fish and wildlife habitat.
 - Collaborative partnerships to solve local water quality concerns.
 - Monitoring to track water quality and land conditions.
- **The SIA process includes** an evaluation of agricultural lands that identifies opportunities for water quality improvement. [Local Soil and Water Conservation Districts \(SWCD\)](#) along with local partners work to engage landowners in voluntary incentive-based conservation. The SWCD is available to offer technical assistance to all landowners in the SIA to help address water quality concerns, provide conservation planning and technical resources, support on the ground project design, and assist in applying for incentive-based funding where available. Once this work is completed ODA initiates the compliance process where potential water quality concerns remain. If a compliance investigation is opened, ODA’s compliance process is followed.
- **Agricultural lands** are prioritized for SIA work based on ODEQ’s list of impaired waterbodies for water quality parameters such as stream temperature, bacteria, nutrients, and sediment and ODFW’s native fish habitat priorities. Additionally, SIA work is conducted where opportunities exist to align with local partner priorities and programs to optimize results. From 2015, when the initiative began, to 2020, seven SIAs have been implemented along the coast where agricultural lands drain to the Pacific Ocean.

- **Downstream monitoring** is key to interstate commerce of molluscan shellfish. Among these regulations is the requirement to evaluate water quality in any body of water shellfish are grown that will eventually enter into interstate commerce. This evaluation comprises an initial pollution assessment and survey to generate an overall pollution classification, and thereafter ongoing regular monitoring of water quality in that growing area. The ODA Food Safety Program routinely collects three environmental parameters in the seven commercial shellfish growing areas in the state. Data are collected either monthly or every other month for temperature and salinity manually at the time of collection, and then later through lab analysis for the fecal coliform group. Samples have been collected at this frequency and from these locations for over 20 years, and will continue to be sampled per Federal government requirements for commercial shellfish growing areas.
- ODA’s agricultural water quality program works to reduce pollutants that can contribute to OAH and make permanent improvements in water quality through:
 - The Compliance Program that enforces Agricultural Water Quality Area Rules that regulate pollution from agricultural activities (address TMDL load allocations).
 - Local Agricultural Water Quality Management Area Plans (Area Plan) developed to describe activities and regulatory and voluntary measures for the goal of controlling and preventing water pollution from agricultural activities. Area Plans encourage voluntary actions to improve fish and wildlife habitat.
 - [ODA’s Strategic Implementation Area and Focus Area Initiatives](#)
 - Confined Animal Feeding Operation permitting program for livestock owners to manage manure so it does not pollute ground and surface water.
 - Pesticide Program investigates pesticide complaints and determines compliance with the Oregon Pesticide Control Act and initiates any administrative actions deemed necessary.
 - Pesticide Stewardship Partnership (multiagency partnership led by ODA)
 - Identify potential concerns and improve water quality affected by pesticide use around Oregon.
 - Combine local expertise in water quality sampling results to encourage voluntary changes in pesticide use and management practices.
 - Find ways to reduce pesticide levels while measuring improvements in water quality and crop management.
 - Work toward measurable environmental improvements, making Oregon waters safer for aquatic life and humans.

2. Seafood Health Monitoring

The Food Safety Program of ODA licenses, certifies and inspects shellfish mariculture activities, as well as other seafood processors in the state with the goal of ensuring safe and wholesome food is produced by these marine farms and seafood processors. Both of these sectors of the seafood industry in the state are susceptible to OAH threats. These are extremely significant contributors to the Oregon economy with Dungeness crab alone representing the 16th most important agricultural commodity in the state. Examples include:

- **HAB analyses conducted on molluscan shellfish tissue:** ODA maintains a lab that follows methods and protocols that have been accredited by the US Food and Drug Administration (FDA) for analysis of marine biotoxins. Maintaining this accreditation is required for Oregon to

ship molluscan shellfish products within interstate commerce. The FDA requires that states producing molluscan shellfish entering into interstate commerce be able to ensure these products are free from HAB's that could be injurious to public health.

- In order to satisfy this requirement, the ODA routinely collects various molluscan shellfish samples in the field. These samples are collected throughout the year and from across the length of the Oregon coastline. The monitoring program provides a comprehensive and stable set of data that could be used and expanded upon for OAH research goals. One samples are tested for marine biotoxins, they are then discarded but could possibly be shared with researchers or analyzed by ODA or other partners for OAH indicator parameters.
- [Crab Evisceration Protocols](#) Along with molluscan shellfish, a similar program exists within ODA to ensure crab food products are free from the marine biotoxin domoic acid. This program is maintained for the testing of Dungeness crab, which is another very important natural resource commodity contributing to the Oregon economy. Crab samples from the length of Oregon and from various depths are tested prior to the season opening and regularly thereafter depending on HAB activity. As with shellfish, OAH indicator analysis could be conducted concurrently with the same sample set that is used for domoic acid monitoring. In fact, in the case of crab, most of the sample is unused by the lab since the domoic acid test only requires the viscera of crab to be analyzed, and on occasion, some of the leg meat. In most samples collected, all of the crab meat and shell is discarded and could be used for OAH research.
- [Shellfish HAB Hotline](#): The ODA strives to make all of the extensive HAB monitoring it conducts available and usable to the public and industry alike. All results are posted on the ODA website, and that data is accessible for anyone to view. Changes in status of shellfish harvesting or crab fishing are posted on the website, as well as being updated on a 1-800 number hotline. For those that sign up, crab updates are sent out as a text alert so that interested parties can receive real time updates on the fishery status from their smartphone. Results of monitoring are also displayed graphically on the ODA website. A map of the coastline can be viewed clearly indicating what areas are open for what shellfish and crab, and which areas may be closed.
- [The ODA shellfish page](#) represents a well-respected and heavily accessed website that provides a range of HAB related data and information. Should OAH information become available for the wider public, the ODA shellfish page could make an ideal location to disseminate this information. The ODA shellfish page reaches a wide audience and could be a dynamic and valuable tool for sharing OAH information and bringing OAH issues to the attention of people that already have a vested interest in the health of the Oregon marine environment.

3. Habitat Protections

ODA has a critical role in maximizing potential environmental benefits resulting from responsible shellfish mariculture, while at the same time minimizing negative impacts. In many respects, modern shellfish aquaculture operations simulate early human interactions with the estuarine environment through sustainable, low impact harvesting of shellfish. A healthy shellfish population within the bays and estuaries of Oregon can help maintain healthy ecosystems and ultimately can have a buffering effect on OAH. Most shellfish mariculture operations in the state are conducted on publicly owned tidelands, and are granted the ability to farm on this land by ODA through leases. ODA carefully manages shellfish leases to unsure aquaculture operations are conducted in a way that protects the

environment as well as local cultural and natural resources. ODA is the State agency with the sole statutory authority to grant shellfish aquaculture leases on publicly owned tideland. From this position of responsibility, ODA takes a collaborative approach to approving leases through solicitation of both regulatory and public comments. Comments received this way are used to inform a decision to grant public land for mariculture use. Based on the decision, a lease grant certificate is issued that sets forth provisions and agreements that the mariculture operation must follow. These provisions and agreements are in large part designed to protect the natural environment and ensure that the commercial activity being conducted has either a neutral or hopefully positive effect on the overall health of the bay and adjacent marine environment. Examples include:

- **Soliciting collaborative input is key in making sound land use decisions** that ensure Oregon mariculture works in harmony with the environment and other land uses. In the process of approving tidelands for commercial mariculture, ODA reviews testimony provided by both partner government agency regulators at the State and Federal level, as well as public comment by interested parties at the community level.
- **The impact of mariculture on the estuarine environment** such as eelgrass density is a primary consideration in granting land for commercial shellfish growing. In many instances, responsible mariculture has been seen to benefit the estuarine environment in ways that mirror the natural oyster reefs that have existed historically throughout Oregon. Operational mariculture leases are observed and monitored for adherence to lease conditions by ODA staff to ensure that they are being farmed responsibly and sustainably.

4. Agency Planning and Regional Leadership

ODA's role as not just a regulator but also an advocate and liaison between industry and government and academia in the OAH field should also be recognized. A number of issues and vulnerabilities that the shellfish industry confronts have in recent times involved a possible OAH component. ODA staff perform a crucial role in these situations and are able to help industry bring real world OAH challenges to the attention of researchers and other partners in the OAH community. Examples include:

- **ODA Food Safety inspectors** have regular contact with shellfish mariculture operators and are often the 'face of government' that the shellfish industry see.
- **ODA has held a key role on the Shellfish Task Force** and Oregon Shellfish Initiative. This initiative signed into law envisioned as a multi-year, collaborative and cooperative effort that focuses the activities of state and federal agencies, coastal tribes, local governments, private shellfish growers, academia, non-governmental organizations and public stakeholders to achieve mutual benefits with regard to shellfish resources. The Task Force developed a set of specific recommendations for each of the following areas:
 - Encouraging collaboration and state agency leadership
 - Enhancing shellfish production
 - Developing best management practices
 - Understand the impacts of ocean conditions
 - Evaluating socioeconomic costs and benefits
 - Increases to public education
 - Outreach and enhance recreational opportunities
 - Assessments of wild shellfish stocks

- Restoration of native shellfish
- **Partner in OAH field monitoring.** ODA currently conducts regular monitoring of three environmental parameters in seven shellfish growing bays in the state. ODA could collect additional samples or take additional environmental readings at the same time as the regulatory samples are collected as part of enhanced OAH monitoring efforts.
- **Better quantification of the industry.** The role of the shellfish mariculture industry in the state and local coastal economies is not well understood. Some of the shellfish production data that ODA collects could be used to characterize the size and scope of shellfish mariculture in Oregon more accurately. Better or more consistently applied metrics for production data are needed to get a better handle on the overall productivity of the shellfish industry now, and as an accurate baseline to compare with in the future.
- **Sharing and communication between industry and academia.** Partner with OAH researchers to survey industry on issues they are facing which may be the result of OAH changes. To name a few very concerning trends the industry is seeing that ODA is aware of in the past couple of years are:
 - Proliferation of burrowing shrimp and loss of oyster growing habitat
 - *Polydora* worm infestation of oysters
 - Mass die offs of up to 70% in oyster beds during the summer

Opportunities for Augmenting ODA Programs and Actions

ODA has begun the process of integrating actions that are consistent with the implementation of the OAH Action Plan. While many actions are possible to achieve within existing capacity, there are others that require specific investment through additional planning and/or resources. The following table lists initiatives and program elements for which the agency recommends.

ODA Table of Initiatives: New programs, regulatory authorities, and outreach/science/other activities

Task, Activity, or Mandate	Program, Division, or Team	Resources Needed	OAH Report Theme/Section
<p>Collaborative work with OSU to research soil health and carbon sequestration potential in agriculture. OSU is already collaborating with federal partners to build a profile of soil health in the state and we look forward to supporting additional work to establish a baseline of soil health.</p>	<p>ODA Natural Resources Programs</p>	<p>\$250,000 requested in ODA 21-23 ARB and GRB</p>	<p>Theme 1, 5: Understanding, Coordination</p>
<p>Continue implementing ODA’s climate change plan by educating staff and stakeholders about the goals of the plan, identifying ways that climate change can be built as a consideration into existing programs, and pursue resources in future biennia to address climate change mitigation and adaptation opportunities for Oregon agriculture and food industries.</p>	<p>Applies to all ODA programs</p>	<p>Specific resource needs will be identified as part of the budgeting process for future biennia</p>	<p>Theme 2: Mitigation</p>
<p>Continue and if possible, expand water quality improvement work in strategic areas. Considerations for selection of strategic work areas include water quality and fish habitat priorities as well as local concerns such as harmful algal blooms and local drinking water intake sites.</p>	<p>ODA Agricultural Water Quality Program; local Soil and Water Conservation Districts; other agency partners including DEQ, OWEB and ODFW</p>	<p>Continue identifying opportunities for the program to reduce other administrative work to allow for maintenance and expansion of SIA work; pursue additional resources in future biennia as needed</p>	<p>Theme 1, 2: Understanding, Mitigation</p>

Task, Activity, or Mandate	Program, Division, or Team	Resources Needed	OAH Report Theme/Section
Continuously improve Oregon’s early detection of and rapid response to aquatic noxious weeds and other invasive aquatic species.	ODA and partner agencies including DEQ and ODFW	Support and prioritize resources within the ODA Noxious Weed program to continue addressing aquatic invasive; pursue additional resources in future biennia as needed	Theme 3, 5: Adaptation, Coordination
Help Oregon’s shellfish industry identify additional shellfish growing areas and apply to grow shellfish in existing areas.	ODA and partner agencies including DLCD	Coordination services for new prospective applicants; pursue additional resources in future biennia as needed	Theme 3, 5: Adaptation, Coordination



DEPARTMENT OF STATE LANDS (DSL)

"The mission of Department of State Lands is to ensure a Common School Fund legacy through sound management of our trust responsibilities and the protection of waters of the state."

Ocean acidification and hypoxia affect the health of Oregon's offshore lands, coastal tidelands, and delicate estuary ecosystems, impacting public uses of, and benefits from, Oregon's coastal areas. Healthy coastal areas are crucial for coastal economies, water quality, protection from storms, and thriving ecosystems. The Department of State Lands protects state waters and lands as part of our public trust responsibilities to ensure Oregonians have access to publicly owned places for recreation, fishing, navigation, and commerce now and for years to come. Scientific evidence is a keystone to such work. As a state partner to South Slough National Estuarine Research Reserve, the Department supports continued scientific research on the impacts of OAH on Oregon's coastal habitats and native species. Science informs the Department's work and policies to limit the impact of human activities on environmental systems. For example, permitting required to remove or fill materials in waterways or wetlands protects streams where salmonid species, like Coho salmon and steelhead trout, develop before traveling to the ocean. At the same time, science leads us to recognize the value of human interventions, like eelgrass restoration, on ecosystems. The Department is a committed state partner and leader for OAH issues and will continue to work within its role to educate and communicate to the public, while aiding to develop thoughtful policy.

Authority and Nexus with Climate/Ocean Change

DSL organizes itself into distinct programs to fulfill its mission. The Aquatic Resource Management Program (ARM) has been created to protect waters of the state. The mission of the ARM is to conserve, restore and protect the waters of the state and the ecosystem services they provide through implementation of the state's removal-fill and wetlands planning and conservation laws; and to manage state-owned waterways to preserve the public trust rights of navigation, fishing, and recreation. DSL is also the state partner to the South Slough National Estuarine Research Reserve (South Slough Reserve), which is a 5,900-acre natural area located in the Coos estuary on the south coast of Oregon. The South Slough Reserve encompasses a mixture of open water channels, tidal and freshwater wetlands, riparian areas, and forested uplands. The Reserve supports and coordinates research, education and stewardship programs that serve to enhance a scientific and public understanding of estuaries and contribute to improved estuarine management.

Program Elements that Relate to Climate/Ocean Change and OAH Action Plan Goals

DSL programs contribute to many actions identified in the 2018 OAH Report and the 2019 OAH Action Plan. There are 4 key program areas that complement the themes in Oregon's OAH Action Plan:

1. Research and Monitoring – supporting coastal and estuarine science to understand, adapt to, and mitigate OAH impacts (*Theme 1 – Understanding*)
2. Promote Adaptation and Resilience – working together to support ecosystems (*Theme 3 – Adaptation*)

3. Education and Community Outreach – raising awareness to strengthen collaborative solutions (*Theme 4 – Awareness*)
4. Policy Development and Coordination – building capacity to support action (*Themes 5 – Coordination*)

1. Research and Monitoring

- The South Slough Reserve works to study aquatic ecosystems, including submerged aquatic vegetation (SAV) and sensitive marine life. This includes work to expand and implement monitoring to track the biological responses to OAH, to inform state natural resource decisions and management activities. Priorities for biologic monitoring include but are not limited to organisms prioritized by research as scientifically valuable for providing biological indices for Oregon’s coastal ecosystem. Examples include:
 - The Reserve’s research works directly to understand native oyster beds and eelgrass throughout South Slough and the Coos estuary.
 - Reserve projects related to eelgrass include mapping its distribution, monitoring eelgrass density and percent cover at long-term eelgrass sites in South Slough, and collaborative research to understand the drivers of recent eelgrass declines in South Slough.
 - Reserve projects related to native oysters include studies to measure recruitment success at different locations, past restoration projects, and involvement in a West Coast-wide assessment of restoration methods (<https://olympiaoysternet.ucdavis.edu/>).
 - The Reserve is also partnering on a collaborative project with a research team from University of Oregon to understand the influence of hydrology of the Coos estuary and South Slough on distribution of native oyster and eelgrass beds.
 - The Reserve also maintains the longest running historical data set on the Oregon Coast of key ocean metrics, including water temperature, salinity, and dissolved oxygen. These data sets are publicly available from the National Estuarine Research Reserve System’s Centralized Data Management Office: <https://cdmo.baruch.sc.edu/>.
 - Through intermittent grant-funded and collaborative projects the Reserve has also augmented this long-term data set by installing sensors to measure high resolution pH and pCO₂ data in South Slough.
- Support continued funding of South Slough water quality monitoring stations, to ensure continuance of long-term data sets that couple observation of oceanographic and biological response metrics.
 - The South Slough Reserve is part of the National Estuarine Research Reserve System (NERRS), a national network of 29 coastal reserves, coordinated by the National Oceanic and Atmospheric Administration (NOAA). A central program of the NERRS is its System-Wide Monitoring Program (SWMP) for standardized collection of long-term water and meteorological data. The Reserve supplements NOAA’s support for its water quality monitoring efforts by partnering with the Northwest Association of Networked Ocean Observing Systems, which facilitates the sharing of near real-time water quality data on its online data visualization system (<http://www.nanoos.org/>). While these programs

have supported the ongoing collection and dissemination of SWMP data, the Reserve must continually seek funding to support the collection and study of additional important carbon chemistry metrics needed to track trends in OAH.

- The Reserve participates in the Oregon OAH Monitoring group, which is working to address the need of an OAH monitoring network along the Oregon Coast.

2. Promote Adaptation and Resilience

Through both the Department's ARM program operations and work being done at the South Slough Reserve, DSL supports activities and initiatives that promote adaptation and resilience to OAH condition, for Oregon's human communities and ecosystems. Examples include:

- Saltmarsh preservation – prioritization of regions with the potential for carbon sequestration and/or that are within regions sensitive to OAH.
 - The Reserve is a member of the Pacific Northwest Blue Carbon Working Group (<https://www.pnwbluecarbon.org/>) and encompasses field sites for its collaborative research projects to quantify carbon stocks and greenhouse gas emissions in estuarine wetlands across the region and to assess environmental drivers and land use impacts on carbon sequestration potential.
- Promote SAV conservation and restoration strategies and opportunities to achieve short term buffering, carbon sequestration, and ecosystem benefits.
 - The Reserve has partnered on recent projects to measure blue carbon stocks in eelgrass beds within South Slough and understand the relationship between carbon chemistry parameters associated with OAH and the presence of eelgrass/macroalgae. In addition, the Reserve is currently implementing a pilot project within South Slough to evaluate the effectiveness of transplanting eelgrass to inform future restoration work.
- The South Slough Reserve is currently working on several grant-funded research projects. After projects are completed, the Department intends to use research outcomes to inform appropriate siting and permit conditions, within the regulatory program.
 - The Reserve supports this OAH initiative through its involvement on the Pacific Marine and Estuarine Fish Habitat Partnership. The Reserve is currently partnering with the Friends of South Slough and the Pew Charitable Trusts on an assessment of eelgrass restoration work along the West Coast to identify best practices and guidance for coastal managers and restoration practitioners. Outcomes of this project will hopefully be used to help the Department understand what constitutes successful eelgrass compensatory mitigation such that appropriate siting and permit conditions can be established and applied within ARM programs. This is only one example of how the collaboration between the South Slough Reserve and the Department can promote native ecosystem resilience in management decisions, and we look forward to future projects as funding becomes available.

3. Education and Community Outreach

The South Slough Reserve helps to support this theme through research and education partnerships with universities, colleges, and K-12 schools. These investments in Oregon's intellectual capacity support OAH research priorities and help to engage tomorrow's scientific leaders. Examples include:

- Participation in the Oregon Coast STEM hub.
- Incorporating OAH concepts into teacher trainings and workshops, including the NERRS Teachers on the Estuary (TOTE) program.
- Incorporating OAH concepts in internship and undergraduate student projects.

4. Policy Development and Coordination

Through the Department’s work in maintaining policy expertise relating to OAH science, adaption, and mitigation, DSL supports a sustained, long-term approach to addressing OAH. Examples include:

- DSL is committed to supporting policy development to further OAH priorities. These efforts include setting a moratorium on the commercial harvest of kelp because of the unknown effects of changing ocean conditions, including OAH, on native kelp populations. The Department also maintains a list of aquatic resources of special concern, including eelgrass that have higher barriers to overcome in the permitting process and additional requirements for mitigation.
- The Department works directly with OPAC to support long-term planning outcomes, including updating Oregon’s Territorial Sea Plan – most recently the Rocky Habitat Management Strategy. Through this process the agency has worked collaboratively to increase protections for SAV. While the Rocky Habitat Management Strategy has not been finalized, consideration is being given by the working group and OPAC to increase restrictions on kelp harvest and add additional consideration of SAV into DSL’s permitting process.
- DSL has appointed a staff member to specialize in ocean issues across agency programs. A single point of contact on ocean issues will build capacity and expertise within the agency and will support further integration of ocean acidification and hypoxia into long-term planning efforts. The appointed staff member will help to ensure that operations staff is up to date on new and ongoing ocean issues so the agency has the best available information to guide our work.
- Additionally, the Department provides administrative support to the [Oregon Ocean Science Trust](#).

Opportunities for Augmenting DSL Programs and Actions

DSL has begun the process of integrating actions that are consistent with the implementation of the OAH Action Plan. While many actions are possible to achieve within existing capacity, there are others that require specific investment through additional planning and/or resources. The following table lists initiatives which the agency intends to move forward.

DSL Table of Initiatives: New programs, regulatory authorities, and outreach/science/other activities

Task, Activity, or Mandate	Program, Division, or Team	Resources Needed	OAH Report Theme/Section
Support grant-funded research and monitoring efforts throughout the South Slough to further our understanding of OAH.	South Slough National Estuarine Research Reserve (SSNERR)	Grant funding through the National Estuarine Research Reserve System Science Collaborative--Understanding sedimentation and temperature effects on native species restoration in the South Slough National Estuarine Research Reserve and the Coos estuary.	Theme 1: Science
Conduct grant-funded research and support visiting researchers conducting research on SAV.	South Slough National Estuarine Research Reserve (SSNERR)	Continued state and federal funds to support SSNERR staff for monitoring, research, and coordinating visiting researchers.	Theme 1 & 3: Science, Adaptation
On-going monitoring and mapping of eelgrass in South Slough.	South Slough National Estuarine Research Reserve (SSNERR)	Grant funding to support mapping efforts and targeted research projects.	Theme 1 & 3: Science, Adaptation
Use research outcomes to understand what constitutes successful salt marsh and eelgrass compensatory mitigation such that appropriate siting and permit conditions can be established and applied within DSL's permitting process.	Aquatic Resource Management Division (ARM)	Continued funding of the Department's current operating budget. Additional resources may be needed to support new elements of this initiative.	Theme 3: Adaptation

Task, Activity, or Mandate	Program, Division, or Team	Resources Needed	OAH Report Theme/Section
Work to incorporate the best available information into Departmental policies and practices to protect waters of the state.	Aquatic Resource Management Division (ARM)	Continued funding of the Department’s current operating budget. Additional resources may be needed to support new elements of this initiative.	Theme 5: Coordination
Continue to provide staff resources to state-wide ocean policy management efforts.	Aquatic Resource Management Division (ARM)	Continued funding for the Department’s current operating budget. Additional resources may be needed to support new initiatives.	Theme 5: Coordination



OREGON DEPARTMENT OF FORESTRY (ODF)

“The mission of Oregon Department of Forestry (ODF) is to serve the people of Oregon by protecting, managing, and promoting stewardship of Oregon’s forests to enhance environmental, economic, and community sustainability.”

Oregon’s forestlands occupy roughly fifty percent of the state’s land mass, more on the west-side where watersheds feed directly to the Pacific Ocean. These watersheds provide habitat, spawning grounds, and resources to species like salmon, steelhead, and bull trout, some of which also utilize the ocean environment. Impacts from ocean conditions, including acidification and hypoxic zones, can create cascading trophic changes in the forest environment. Addressing the interconnected environment and climate change is important for maintaining functioning forest ecosystems and all the benefits to fish, wildlife, and humans that they provide.

Authority and Nexus with Climate/Ocean Change

The department is committed to maintaining long-term water quality goals on non-federal forestland, which in turn, affects ocean conditions. ODF has a unique structure where it represents a land manager (State Forest Division), a regulatory agency (Private Forest Division), and an emergency management agency (Protection Division) with one board overseeing and integrating policy decisions over all. Additionally, the Partnership and Planning Program is housed in the Administration side of the department and is responsible for climate change planning and cross agency coordination. As related to OAH, the State Forest Division and Private Forest Division may influence OAH actions the most. Management actions that occur on these lands fall under the [Forest Practices Act \(FPA\)](#) and the State Forest Division manages about three percent of the state’s forestland. Long-term, OAH is closely related to climate change and the department’s goals for increasing carbon sequestration and storage in Oregon’s forests for climate mitigation.

Program Elements that Relate to Climate/Ocean Change and OAH Action Plan Goals

ODF programs contribute to many actions identified in the 2018 OAH Report and the 2019 OAH Action Plan. There are 2 key program areas that complement the 5 themes in Oregon’s OAH Action Plan:

1. [Forested Aquatic and Coastal Habitat Management](#) – science, monitoring, as well as carbon mitigation and storage (*Themes 1 & 2 – Understanding & Mitigation*)
2. [Policy Development and Coordination](#) – coordination (*Themes 5 – Coordination*)

1. [Forested Aquatic and Coastal Habitat Management](#)

Addressing long-term habitat stability and conservation is a part of management of Oregon forestlands. The department is actively working towards ensuring that there is long-term vitality of the state’s forested ecosystems. Examples include:

- The State Forest Division will be completing a Habitat Conservation Plan and accompanying Forest Management Plan. These will ensure environmental stewardship to achieve long-term sustainability of these habitats over the projected life span of the plans. These plans directly

affect the forested coastal watersheds that the department manages for greatest permanent value. At the time of this report both the HCP and the FMP are in draft process with completion expected in 2022.

- The carbon mitigation and offset programs under the Partnership and Planning program are part of on-going policy work within the department and for the policy making Board of Forestry. The program is looking at mechanisms that would provide increased sequestration and storage over time including incentivizing climate-smart forestry, potentially longer rotations, and preventing and reducing the risk of wildfire.
- Maintain and reduce levels of non-point source pollution and sediment into the waters of the State through continual enforcement and monitoring of the Forest Practices act. Continue collaborating with other state agencies with an interest in the forest environment and water quality to continue producing the highest water quality in Oregon.
- Work to enhance Oregon’s carbon sequestration and climate change mitigation efforts through voluntary measures and forest regulations that promote additional sequestration measures. These may include, among others, incentives:
 - Storing carbon in trees
 - Increasing stream buffers
 - Changing harvest practices

2. Policy Development and Coordination

The department is responding to direction made through Executive Order 20-04 through policy development as well as continuing to work with sibling agencies on research, policy direction, and project implementation across the state. Examples include:

- The Department of Forestry will be completing a climate action plan that will work to place Oregon forestry as a leader in climate-smart forestry in the region and nation. This includes:
 - Efforts to mitigate and adapt to climate change through modifying current practices
 - Incentivizing climate-informed forest management
 - Increasing urban tree canopy cover
 - Adapting to the effects of an increasingly severe fire seasons and larger
 - More impactful fires in areas not accustomed to such events
- The Private Forest Division will be working to complete a literature review of the riparian structure and desired future conditions of western Oregon streams. This work will provide important information to policy makers as they consider any future rule changes or development. The review will be on forested riparian areas, including riparian stand structure and composition and contribution of large woody debris to streams. The literature review expected completion date is early 2022.
- The department will be working towards full implementation of Executive Order 20-04 by implementing the Forest Carbon Offset Program set in statute in the 2001 legislative session (HB2200). This work will be an important part of the Departments climate change mitigation

efforts and will move ahead when there is adequate staff capacity to do so, hopefully following the 2021 legislative session.

- Recent legislation (SB 1602, 2020 first special session) has implemented changes to the FPA; expanded riparian buffers, changes to distances from waterways and structures for helicopter applied herbicides are both in effect as of January 1, 2021.

Opportunities for Augmenting ODF Programs and Actions

ODF has begun the process of integrating actions that are consistent with the implementation of the OAH Action Plan. While many actions are possible to achieve within existing capacity, there are others that require specific investment through additional planning and/or resources. The following table lists initiatives and program elements for which the agency recommends in the following three areas:

- Complete and implement an aquatic habitat centric Habitat Conservation Plan for State Forest lands
- Complete analysis of riparian structure and function in western Oregon
- Rulemaking and beginning Forest Carbon Offset Program

ODF Table of Initiatives: New programs, regulatory authorities, and outreach/science/other activities

Task, Activity, or Mandate	Program, Division, or Team	Resources Needed	OAH Report Theme/Section
<p>Complete the work behind the HCP as directed and approved by the Board of Forestry. This will include specifics on management of forest lands for long term sustainability of aquatic habitat within the managed area.</p>	<p>State Forest Division</p>	<p>Continuation of ongoing work project Underway as priority work for the State Forest Division</p>	<p>Theme 3: Adaptation</p>
<p>Complete literature review on desired future condition and large woody debris recruitment.</p>	<p>Private Forests Division</p>	<p>Continuation of ongoing program work Underway as priority work for Private Forests Division</p>	<p>Theme 1: Understanding</p>
<p>Develop and implement the Forest Carbon Offset Program as laid out in Oregon Statute. Will require rulemaking on through the Board of Forestry.</p>	<p>Partnership and Planning Program</p>	<p>Additional staff capacity for rule development and program implementation are needed. Integrated in to agency request budget as a policy option package for the 2021-23 budget and a part of the climate action plan.</p>	<p>Theme 3: Mitigation</p>



OREGON HEALTH AUTHORITY (OHA)

“The mission of the Oregon Health Authority (OHA) is to ensure all people and communities can achieve optimum physical, mental, and social well-being through partnerships, prevention, and access to quality, affordable health care.”

Oregonians depend on a web of natural and social systems to maintain our health. These systems are continuously shifting, interacting and responding to stressors. From time immemorial, indigenous people have understood that human health relies on the vitality of our living systems. Climate change brings new conditions that affect our access to clean air, clean water, livable temperatures and fertile land for plants, fish and wildlife. We are challenged not only by the direct effects to our health, such as hotter summers leading to higher risks of heat-related illness, but also through many indirect pathways that are harder to track and predict.

To accurately assess the risks associated with climate change, we must acknowledge the complex dynamics that arise across natural and social systems. Instead of focusing solely on hazard events, climate and health adaptation involves working to understand and address cross-cutting risk pathways. Economic disruptions in climate-affected sectors can create job loss across multiple industries and will especially affect the health of families already living in poverty. Decreased access to First Foods will continue to affect physical, social and spiritual health of tribal and indigenous peoples. Exposure to an increase in frequency and severity of climate-related disasters will increase toxic stress, anxiety, depression, trauma and other mental health effects. Lack of safe housing and disaster-driven displacement will place extreme burdens on families and the social service providers attempting to support them. These are some of the cross-cutting climate impacts OHA has identified as particularly relevant to OAH impacts to coastal communities, but they do not capture the full breadth of climate and health causal pathways or the complex interactions between climate and non-climate stressors.

Authority and Nexus with Climate/Ocean Change:

The Oregon Health Authority roles related to OAH have a nexus with themes in the Oregon OAH Action Plan related to understanding the socioeconomic vulnerabilities associated with OAH, and supporting activities and initiatives that promote adaptation and resilience to OAH. The Oregon Health Authority’s Climate and Health Program is in the OHA Public Health Division and provides state-level assessments, analyses, and recommendations as well as technical assistance to state agencies and the public health system. Oregon’s public health system includes the Oregon Health Authority, local county and tribal health departments and many community partners.

Program Elements that Relate to Climate/Ocean Change and OHA Action Plan Goals:

OHA programs contribute to many actions identified in the 2018 OAH Report and the 2019 OAH Action Plan. There are 2 key program areas that complement the 5 themes in Oregon’s OAH Action Plan:

1. Community Resiliency – climate adaptation and planning (*Theme 3 – Adaptation*)
2. Regional Partnerships – coordination (*Theme 5 – Coordination*)

1. Climate and Health Capacity through Public Health Modernization

Reduce climate-related health risks and promote Oregon community resilience, especially among people and communities who are disproportionately affected. Examples include:

- **Public Health Modernization**, launched at the direction of the Oregon Legislature in 2015, established a new framework for governmental public health to ensure that all people in Oregon have the best possible opportunity to be healthy. Public Health Modernization recognizes environmental health as a foundational public health program with a significant gap in capacity at all levels of the public health system. Governor Kate Brown’s **2021 recommended budget request for public health modernization** includes funding for environmental health modernization investments with a priority on climate impacts. If included in the legislatively adopted budget, environmental health investments will support collaboration among governmental public health and community partners to 1) identify populations disproportionately impacted by climate change and 2) develop plans and formulate strategies to build climate resilience and reduce risks from climate hazards. Funding in future biennia will support implementation actions.

2. Regional Partnerships

The public health system will have to work in partnership with academic and state agency partners once they are able to generate research and data connecting OAH to socioeconomic impacts. As the public health system at the state, tribal and local level acquires environmental health capacity, it will be able to assess health risks using available public health data, identify priority populations most at risk from OHA-related impacts, and collaborate with community partners serving priority populations to formulate public health interventions. Examples include:

- OHA is beginning preparation of a new five-year **Climate and Health Resilience Plan** for implementation starting in 2022, an update of the **2017 Plan**. All of this planning references ocean acidification as a climate risk and identifies tribal and indigenous, rural and fishing communities as affected populations and associated direct and indirect impacts to health.
- As capacity grows, OHA will work with local and tribal public health authorities to develop climate adaptation plans based on local risk assessments that would consider OAH impacts in coastal areas. These may take the form of stand-alone plans or climate-focused updates to Community Health Assessments and Community Health Improvement Plans.

Opportunities for Augmenting OHA Programs and Actions:

OHA has begun the process of integrating actions that are consistent with the implementation of the OAH Action Plan. The following table lists initiatives and program elements the agency recommends.

OHA Table of Initiatives: New programs, regulatory authorities, and outreach/science/other activities. Over time, the public health system is expected to make progress toward the following climate and health priorities (*as described in the Climate and Health in Oregon 2020 report*).

Task, Activity, or Mandate	Program, Division, or Team	Resources Needed	OAH Report Theme/Section
Promoting climate mitigation that maximizes health co-benefits	OHA Public Health Division – Environmental Public Health Section; local and tribal public health authorities; community based organizations	Program staff and other capacity to engage in greenhouse gas reduction, land use, transportation, building code and other climate-related state agency rulemaking, policy and program development	Theme 3: Adaptation
Collaborating across all levels of local, state and tribal government and with community partners to advance equitable climate adaptation	Agencies implementing Oregon Climate Change Adaptation Framework	Resources for training and facilitating ongoing collaboration among state agency staff on climate equity best practices contained in the <u>Oregon Climate Equity Blueprint</u>	Theme 5: Coordination
Building environmental health capacity in the public health system to identify and address emerging environmental health threats, including threats to workers	OHA Public Health Division – Environmental Public Health Section; local and tribal public health authorities	Environmental epidemiology and health risk assessment staff	Theme 4: Awareness

Task, Activity, or Mandate	Program, Division, or Team	Resources Needed	OAH Report Theme/Section
Increasing understanding of mental health effects on individuals and the role of social resilience in fostering a community’s capacity to adapt	OHA Public Health Division – Environmental Public Health Section; local and tribal public health authorities; community based organizations	Agency research and program staff and community based organization staff to engage local populations to identify and implement effective social resilience strategies.	Theme 3: Adaptation
Supporting climate-related strategies in OHA’s State Health Improvement Plan, <i>Healthier Together Oregon</i> .	OHA Public Health Division – Environmental Public Health Section; local and tribal public health authorities; community based organizations	Program staff and other capacity to engage in greenhouse gas reduction, land use, transportation, building code and other climate-related state agency rulemaking, policy and program development	Theme 3: Adaptation



OREGON DEPARTMENT OF ENERGY (ODOE)

ODOE's Vision is a safe, equitable, clean, and sustainable future.

"The mission of the Oregon Department of Energy is to help Oregonians make informed decisions and maintain a resilient and affordable energy system. We advance solutions to shape an equitable clean energy transition, protect the environment and public health, and responsibly balance energy needs and impacts for current and future generations."

Energy is critical to the daily lives of every Oregonian, and different forms of energy have different impacts on the environment and public health. For example, society's combustion of fossil fuel to serve various energy uses emits large volumes of greenhouse gases (GHGs) into the earth's atmosphere. Large volumes of GHGs in earth's atmosphere are contributing to rising global temperatures and rising intensities of OAH events and impacts. GHGs attributable to Oregon's use of energy have direct causal links to climate change, and OAH more generally. ODOE recognizes this and works to help reduce GHG emissions that occur as a result of Oregon's use of energy, and also to educate and raise awareness of the impacts and risks of climate change.

Authority and Nexus with Climate/Ocean Change

ODOE is organized across several divisions and programs to fulfill its mission. Divisions with a nexus to climate change include: Energy Planning & Innovation (P&I), Energy Development Services (EDS), and Energy Facility Siting (Siting). The Siting division's primary duty is staffing Oregon's Energy Facility Siting Council (EFSC), and the P&I division, amongst many other duties, provides staff to the Oregon Global Warming Commission (OGWC). Each of these divisions work to reduce GHG emissions in different ways and each contribute to ODOE's Biennial Energy Report.

The following section contains more details about ODOE's divisions and how these divisions support ODOE's program areas that affect GHG emissions and climate change. ODOE's Biennial Energy Report, OGWC reports, and ODOE's Climate Change program are areas of ODOE work where OAH is sometimes specifically mentioned or discussed – typically to raise awareness that OAH is one of myriad impacts resulting from large volumes of GHGs in earth's atmosphere.

Program Elements that Relate to Climate/Ocean Change and OAH Action Plan Goals

ODOE programs targeted toward climate change and GHG reductions contribute to several actions identified in the 2018 OAH Report and the 2019 OAH Action Plan. ODOE has four key program areas that complement themes 2 and 4 in Oregon's OAH Action Plan:

1. Energy Education (Theme 4 – Awareness)
2. Climate Change Planning (Theme 2 & 4 – Mitigation & Awareness)
3. Supporting Energy Efficiency (Theme 2 – Mitigation)
4. Supporting Cleaner Energy Technology and Policy (Theme 2 – Mitigation)

1. Energy Education

- **ODOE's Biennial Energy Report**

Every two years, ODOE provides the legislature with a comprehensive report on the energy sector. In addition to including a myriad of energy technology and policy briefings, this report includes a summary of energy's role in producing GHG emissions, a summary of the impacts of climate change, and updates on Oregon's progress toward meeting its GHG reduction targets. See 2020 report briefings on [Climate Update](#) and [Climate Vulnerability Assessment](#), as well as the 2018 report's [Chapter 2 on Climate Change](#).

2. Climate Change Planning

- **Oregon Global Warming Commission**

P&I serves as primary staff to the OGWC. OGWC issues biennial reports to the legislature to inform Oregon's efforts and progress toward state-wide GHG reduction targets and to provide recommendations on how to improve Oregon's efforts and progress. P&I staff provides analysis for all Commission reports and projects, reviews draft reports and presentations, and provides technical assistance and support to the Commission.

[ORS 468A.250 gives the OGWC a broad scope](#), which includes tracking and evaluating the economic, environmental, health, and social impacts of climate change. Under this authority, OGWC has included information about rising temperatures contributing to OAH in [its reports](#). OGWC reports and the ODOE Biennial Energy Report are the two primary areas of ODOE work where OAH is discussed.

The OGWC recently received a grant to help develop a Transformational Integrated Greenhouse Gas Emission Reduction (TIGHGER) Plan for the State of Oregon. The goal of the TIGHGER Plan is to advise the Governor and Legislature on the medium-term strategies for achieving the state's 2035 greenhouse gas emissions reduction goals, while continuing to grow Oregon's economy and enhancing equity and quality of life for all Oregonians. The TIGHGER Plan will build upon previous and on-going Oregon and regional studies, and result in a final plan with a suite of decarbonization actions and combinations of actions (pathways) needed to meet or exceed the state's GHG reduction target for 2035. The TIGHGER Plan will identify sector-based opportunities and provide actionable information for state policy makers to reduce GHG emissions. Once the analysis is completed, the OGWC, with technical support from staff at ODOE, will create a roadmap to help Oregon meet our statewide GHG emission reduction goals for 2035. Implementation of this Plan should help mitigate the impacts of OAH.

- **P&I Energy Technology and Policy Section**

Also relating to climate change, for example, the T&P Section is developing a comprehensive state-specific climate vulnerability assessment for the energy sector. A climate vulnerability assessment is a systematic process to analyze the degree of risk posed by different climate hazards (e.g., increasing air and water temperatures, shifting precipitation patterns, wildfires, raising sea levels, and increasing the frequency and intensity of extreme weather events such as heat waves, heavy downpours, and droughts) to various systems and assets – in this case, Oregon's energy systems and assets. The assessment will provide information about the magnitude and timing of climate threats at the geographic scale and level of detail that planners and policymakers need to identify to prioritize adaptation strategies and actions for high-risk

assets. Climate vulnerability assessments are generally the first step to prepare for climate hazards in what is typically known as climate adaptation planning. This study will help identify and anticipate the sector’s vulnerabilities, so that the energy sector may better meet its objectives to produce safe and reliable energy. The assessment should provide a strong foundation for identifying gaps and opportunities to make investments that maximize community energy resilience.

3. Supporting Energy Efficiency

- **P&I Energy Efficiency and Conservation Section**

This ODOE team focuses on reducing Oregon’s energy demand through the administration of programs, policy analysis, and technical assistance. This work supports energy efficiency and conservation efforts across many sectors, including: public and private buildings (e.g. schools, commercial buildings, and residential homes); equipment and appliances in buildings; industry; electric school buses; and agriculture. Reduced energy consumption translates into reduced GHG emissions.

- [Schools and Public Buildings](#)
- [Oregon Home Energy Scoring](#)

4. Supporting Cleaner Energy Technology and Policy

- **P&I Energy Technology and Policy Section**

This ODOE team focuses on [climate change](#), (see section 2. *Climate Change Planning*), cleaner energy supplies such as renewables, and [cleaner transportation](#) options for Oregon. It accomplishes this through the administration of programs (e.g., [Renewable Portfolio Standard or RPS](#)), conducting studies, policy analysis, planning, and technical assistance. Increasing the amount of clean renewable energy and clean transportation options translates into reduced GHG emissions.

- **ODOE’s Energy Development Services Division**

ODOE has a history of helping Oregonians complete energy-saving and renewable energy projects through state-authorized incentive programs. Most recently, this division administered the [Solar + Storage Rebate Program](#) for residential customers and low-income service providers in Oregon, and the [Renewable Energy Development Grant](#) program. Other previous incentive programs included: conservation, biomass, transportation, and residential and business tax credit programs. ODOE also has a small-scale energy loan program, which is not currently making loans.

- **Energy Facility Siting**

ODOE’s siting team serves as staff to the [Energy Facility Siting Council](#) (EFSC). EFSC is responsible for overseeing the development, operation, and decommissioning of large electric generating facilities, high voltage transmission lines, gas pipelines, and other projects. State-level oversight of energy facilities helps ensure that Oregon has an adequate energy supply while protecting Oregon’s environment and public safety. A proposed energy facility must undergo a thorough review and meet the council’s [siting standards](#) to receive a site certificate.

Standards cover issues such as: carbon dioxide emissions, land use, environmental impacts, noise concerns, and cultural and archeological artifacts. If the council approves a site certificate, the developer is authorized to construct and operate the facility. After issuing a site certificate, the council has ongoing regulatory authority over the construction and operation of the facility. Water and air quality standards are effectively controlled by Oregon Department of Environmental Quality, and are met by receiving appropriate DEQ permit approvals. Energy projects proposed in Oregon’s territorial sea are subject to permitting processes at multiple agencies including Oregon Department of State Lands and Oregon Department of Land Conservation and Development.

EFSC’s carbon dioxide standard requires GHG-emitting energy facilities to implement GHG emission offset projects or pay a fee to a third party (The Climate Trust) to acquire offset projects on their behalf.

Opportunities for Augmenting ODOE Programs and Actions

ODOE will continue to integrate actions into our work that are consistent with the implementation of the OAH Action Plan. The following table lists initiatives and program elements the agency plans to continue.

ODOE Table of Initiatives: Current programs, regulatory authorities, and outreach/science/other activities

Task, Activity, or Mandate	Program, Division, or Team	Resources Needed	OAH Report Theme/Section
Energy education on all of the below	Energy Planning & Innovation Division (P&I) Energy Development Services Division Energy Facility Siting Division	Continue these efforts under current budget.	Theme 4: Awareness
Conducting climate change studies and planning	P&I Energy Technology and Policy Section	Continue these efforts under current budget.	Theme 2, 4: Mitigation, Awareness
Supporting energy efficiency	P&I Energy Efficiency and Conservation Section	Continue these efforts under current budget.	Theme 2: Mitigation
Supporting cleaner supplies of energy	P&I Energy Technology and Policy Section Energy Development Services Division Energy Facility Siting Division	Continue these efforts under current budget.	Theme 2: Mitigation

CONCLUSION

Oregon’s wealth of natural resources is central to our history, culture and economy. Yet, future sustainability of these resources and Oregonians’ ability to rely on them, are uncertain in the face of projected future climate and ocean change. Considered community stress multipliers, climate and ocean change have the potential, if left unaddressed, to exacerbate differential impacts from social inequity. In 2020, we faced the nearly unthinkable COVID-19 pandemic that has demonstrated the fragility of Oregon’s social and economic fabric. Previously undetected vulnerabilities, including in our coastal seafood businesses and markets, underscore the need to build an approach for climate adaptation now that centers on resilience. Similarly to social change, climate and ocean change are expected to occur gradually, as well as in episodic and dramatic bursts. We must prepare and take action to build resilience to climate and ocean change, to sustain our coastal communities and our ability to access healthy, reliable food sources from the sea to feed our families, our economy, and our future.

Preparation for climate and ocean change requires:

- ***Planning***
- ***Budgeting resources***
- ***Action***

This Report describes a status update on the programs Oregon already has in place in 8 state agencies to address Science, Mitigation, Adaptation, Awareness and Coordination efforts to address ocean change. It also provides a preliminary roadmap for these agencies in planning, budget needs, and future actions, which will be part of each agency’s budget development considerations for the 2023-2025 biennial budget, which will begin development later this year. This Report is an important demonstration product in implementing the just-finalized 2021 Oregon Climate Adaption Framework, in that it has exercised the multiagency leadership structure described therein, in order to align agency work, reduce conflicts, and achieve coordinated benefits across Oregon’s natural resources, economies, and communities.

POLICY DOCUMENTS

STATEWIDE OAH POLICY DOCUMENTS

[West Coast OAH Science Panel Report \(2016\)](#) focused on making recommendations for science and monitoring efforts that would be informative for managers of natural resources who are determining how to manage for ocean acidification, hypoxia, and climate change.

[Oregon OAH Council First Biennial Report \(2018\)](#) the first biennial report from the OAH Council to the Legislature. The Council report makes recommendations on actions to take in five Theme Areas, each action shaped to help Oregon adapt to an uncertain future of change

[Oregon OAH Action Plan \(2019\)](#) was developed from 2018-2019 by the OAH Council as our State's roadmap for action, and submitted this roadmap to the International Alliance to Combat Ocean Acidification. As requested by Governor Kate Brown, the OAH Council was central to this public process, which used the 2018 OAH Council legislative OAH Report as a starting point to identify the first actions that Oregon will take over the next several years.

[Oregon OAH Council Second Biennial Report \(2020\)](#) shares Oregon's successes over the past two years, as well as plans and benchmarks for actions for the next 1-3 years.

STATEWIDE CLIMATE/OCEAN CHANGE POLICY DOCUMENTS

[Oregon Climate Adaptation Framework \(2010; revised 2021\)](#) is a state-wide plan that describes climate risks that are anticipated to affect the state in the coming decades. An updated framework has been developed as the [2021 State Agency Climate Change Adaptation Framework](#). Both frameworks goals cover agriculture, biodiversity, coasts and oceans, emergency preparedness, forestry, infrastructure, public health, and water – and outline a series of climate adaptation stratifies for the state to pursue for the next five years.

[Oregon Hazards Mitigation Plan \(2020\)](#) creates a disaster-resilient state of Oregon such that natural hazard events result in no loss of life, minimal property damage, and limited long-term impacts to the economy. The purpose of Statewide Planning Goal 7 is similarly, to protect people and property from natural hazards. DLCDC helps local governments and tribes implement Goal 7 by identifying and planning for the hazards they are most likely to face.

[Oregon Climate Equity Blueprint \(2021\)](#) provides guidance and resources for how to embed equity best practices across the enterprise. It is a high-level critical thinking tool to help state agencies center equity at the forefront of their climate adaptation work, not as an afterthought.

[5th Oregon Climate Assessment - OCAR5 \(2021\)](#) was prepared by the Oregon Climate Change Research Institute and reviews emerging understanding of observed and projected climate and ocean change in Oregon. The assessment documents science of the opportunities and risks that climate and ocean change poses to natural and human systems, and outlines resources for actions including but planning for mitigation of climate-related natural hazards.

[**Oregon Executive Order on Climate 20—04 \(2020\)**](#) is a policy from the Governor to all State agencies and programs aimed to sharply reduce State greenhouse gas emissions. The order updates the State’s carbon reduction goals, setting targets of a 45% reduction below 1990 levels by 2035, and an 80% reduction by 2050. The order also calls for agencies to alter building codes to prioritize energy efficiency, and to further ratchet down the carbon intensity of gasoline.

[**Oregon’s 100 Year Water Vision \(adopted in 2020\)**](#) address changes in climate and populations, across Oregon and how they impact state-wide water security. The report outlines tools that Oregonians could take care of our water to ensure we have enough clean water for our people, our economy, and our environment, now and for future generations. The report describes ways for the state to invest strategically in infrastructure and ecosystems across all regions to support resilient communities, vibrant local economies, and a healthy environment.

[**Oregon Global Warming Commission Annual Report \(submitted in 2020\)**](#) tracks trends in greenhouse gas emissions, recommends ways to coordinate state and local efforts to reduce emissions, and works to prepare communities for the effects of climate change.

POLICY DOCUMENTS SPECIFIC TO ODFW CLIMATE/OCEAN CHANGE

[**ODFW’s Climate and Ocean Change Policy \(developed in 2019, 2020\)**](#) provides overarching guidance on a coordinated, effective, and efficient response to the changing climate and ocean conditions. The goal of the policy is to coordinate the response to climate and ocean change with other state, federal, local, & tribal entities, incorporating climate and ocean change awareness into the Department’s science and resource management, preparing the Department’s assets and infrastructure for the impacts of a changing climate and ocean, and reducing the ODFW’s contribution to underlying causes.

[**The Oregon Conservation Strategy and Oregon Nearshore Strategy \(2005 and revisions\)**](#) is the ocean sub-component of the Oregon Conservation Strategy and provides strategic goals for ODFW’s management of nearshore marine resources. In addition, it includes the portions of estuaries where species depend on the saline waters that enter from the Pacific Ocean. The strategy sets priorities for conservation and management of nearshore marine fish and wildlife and their habitats, identification of current information gaps, research and monitoring needs for managing nearshore resources, and contains 16 actions to address priority nearshore issues.

[**Preparing Oregon’s Fish, Wildlife, and Habitats for Future Climate Change: A Guide for State Adaptation Efforts \(adopted in 2018\)**](#) was developed by the Fish, Wildlife, and Habitat Subcommittee (co-hosted by ODFW) of the [**Oregon Global Warming Commission**](#). This subcommittee is no longer active. This guide outlined principles to address climate change – the maintenance and restoration of key ecosystem processes, the establishment of an interconnected network of lands and waters that support fish and wildlife adaptation, acknowledgement and evaluation of the risks of proposed management actions in the context of anticipated climate conditions, and coordination across political and jurisdictional boundaries.

[**ODFW Strategic Plan \(2018-2023\) \(adopted in 2018\)**](#) overall 6-year plan, and which identifies climate as a key area of work the agency must address to prepare for the future.

POLICY DOCUMENTS SPECIFIC TO DLCD CLIMATE/OCEAN CHANGE

The Oregon Ocean Resources Management Plan (1990) commonly referred to as the Ocean Plan was approved by the DLCD Commission and states that the Territorial Sea Plan shall be based on the policies and recommendations of the Oregon Ocean Resources Management Plan.

POLICY DOCUMENTS SPECIFIC TO DEQ CLIMATE/OCEAN CHANGE

Oregon Water Quality Assessment Report (2018/2020) every two years, DEQ is required to assess water quality and report to the U.S. Environmental Protection Agency on the condition of Oregon's waters. DEQ prepares an Integrated Report that meets the requirements of the federal Clean Water Act for Sections 305(b) and 303(d).

Water Quality Program Plan (2020) developing and implementing water quality standards and clean water plans, regulating sewage treatment systems and industrial dischargers, collecting and evaluating water quality data, providing grants and technical assistance to reduce nonpoint pollution sources, and providing loans to communities to build treatment facilities.

POLICY DOCUMENTS SPECIFIC TO ODA CLIMATE/OCEAN CHANGE

Oregon Shellfish Taskforce Report (2016) advance the policy of the state to enhance and expand cultivated shellfish production; conserve, protect and restore wild populations of native shellfish; and improve water quality and the health of aquatic and marine habitats by developing the framework and recommendations for an Oregon Shellfish Initiative.

Coastal Strategic Implementation Areas (2019) focus was to implement as many agricultural water quality improvement projects as possible and document those accomplishments. Efforts focused on outreach and technical help to create projects that would achieve immediate water quality benefits and build the foundation for strong partnerships in the future.

POLICY DOCUMENTS SPECIFIC TO DSL CLIMATE/OCEAN CHANGE

South Slough National Estuarine Research Reserve Management Plan (2017) includes several actions the Reserve is implementing to monitor and better understand OAH in nearshore and estuarine waters.

POLICY DOCUMENTS SPECIFIC TO ODF CLIMATE/OCEAN CHANGE

History of Climate Policy in Oregon – As it relates to Forestry (2019) includes summary of the effects of climate change on Oregon's forests, and actions taken by the department.

POLICY DOCUMENTS SPECIFIC TO OHA CLIMATE/OCEAN CHANGE

Climate and Health in Oregon (2020) was prepared in response to Governor Kate Brown's Executive Order 20-04. This report updates information on risks and vulnerable populations and identifies priorities, challenges, and successes in building community resilience to the health effects of climate change in Oregon.

Modernizing Oregon’s Public Health System (2020) the public health modernization successes identified in this report provide a pathway for expanding early accomplishments into long-term system change.

Oregon Climate and Health Profile Report (2014) identifying health risks from climate change and the populations most vulnerable to these risks.

Oregon Climate and Health Resilience Five-year Plan (2017) outlines tools to help communities and the public health system build climate resilience. This plan builds off of the findings in the profile report, outlining a set of recommendations for our state’s public health system that includes the Oregon Health Authority’s Public Health Division, local health departments, and our many diverse partners working to improve quality of life in Oregon.

Healthier Together Oregon (2020) provides OHA an integrated climate resilience strategies related to economic drivers of health in the five-year state health improvement plan.

POLICY DOCUMENTS SPECIFIC TO ODOE CLIMATE/OCEAN CHANGE

ODOE’s Biennial Energy Report (BER) (2020) occur every two years, ODOE provides the legislature with a comprehensive report on the energy sector. In addition to including a myriad of energy technology and policy briefings, this report includes a summary of energy’s role in producing GHG emissions, a summary of the impacts of climate change, and updates on Oregon’s progress toward meeting its GHG reduction targets. See 2020 BER briefings on **Climate Update** and **Climate Vulnerability Assessment, as well as the 2018 BER Chapter 2 on Climate Change**.

OGWC Reports occur every two years. Generally, the Commission uses the reports as a platform to educate and inform legislators and the public about current critical climate facts, policies, and strategies. The **2009 OGWC Report** was the Commission’s first full report. The first mention of OAH by the OGWC was in its **2011 OGWC Report**, “IV. Progress in Preparing For and Adapting to Climate Change in Oregon,” pp. 81-82. Importantly, OAH was most recently called out again in the **2020 OGWC Report**, “Impacts of Climate Change in Oregon,” p. 7.