Oregon Ocean Resources and the Blue Economy Market Analysis (Full Report)

Background

The Oregon coastline spans over 363 miles. The coast, as well as connected estuarine and riverine areas that are integral to the blue economy, is home to more than one million people across nine counties (Figure 1).[1] The state also is home to incredibly rich and biodiverse marine and coastal ecosystems, which provide the natural and cultural resources that many businesses and industries within the blue economy rely upon. Oregon's blue economy, which generated an estimated gross domestic product (GDP) of $3.1 billion in 2019, plays a key role in the ecological and socioeconomic sustainability of ocean industries and the coastal and rural communities that depend on them (National Oceanic and Atmospheric Administration [NOAA], 2022). The blue economy is important not only locally, but also nationally–NOAA released a Blue Economy Strategic Plan for 2021-2025 that helps pave a for new and innovative ways to advance blue economies across the nation, as well as strengthen the global blue economy (NOAA, 2021). While Oregon has a growing blue economy sector, it is not as developed as other states, such as Washington and Alaska, when it comes to aspects such as jobs, relative contribution to the overall market, and established industries. Opportunities exist to strengthen investments in Oregon's blue economy and catalyze new innovations in areas such as marine transportation, ocean exploration, seafood competitiveness, and coastal resilience (Business Oregon's Industry Advisory Committee, 2022).

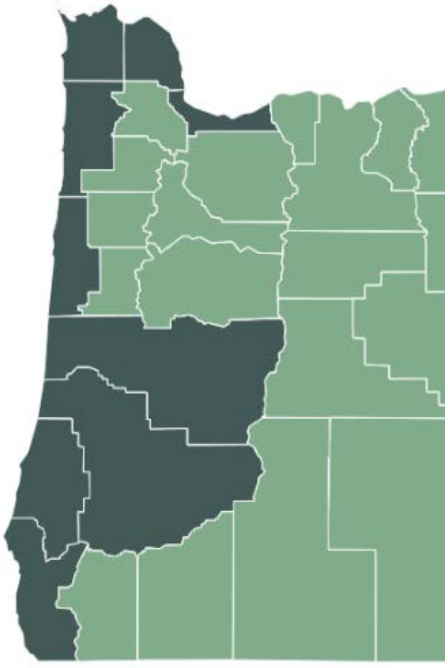


Figure 1. Oregon coastal counties.

Purpose and Overview of This Report

The 2022 Oregon Legislature directed Business Oregon to conduct a market analysis of Oregon's ocean resources and blue economy sector. Business Oregon commissioned Eastern Research Group, Inc. (ERG), to develop this comprehensive analysis on growth trends, emerging industry sectors, and opportunities. The goal of this report is to inform a coordinated vision, priorities, and actions that can shape the state's blue economy approach and increase overall investments on the Oregon coast.

To guide report development, ERG engaged representatives with knowledge in the blue economy through four main avenues: an Advisory Committee, a project Steering Committee, key informant interviews, and a blue economy industry representative survey. ERG analyzed all data and used inductive and deductive coding to identify key themes and trends across respondents. Interview and survey findings informed this final report. For more details on the engagement methods, please see Appendix A. Engagement Methods.

Defining Oregon's Blue Economy

Oregon's blue economy comprises the many sustainable economic activities, innovations, and emerging markets that depend on the ocean, shoreline, and estuaries directly along the Oregon coast. The blue economy also includes activities that are geographically and economically linked to ocean, coastal, and estuarine businesses, and industries, such as transport of goods, entrepreneurship, and advanced manufacturing occurring in interconnected riverine systems and ports. Industries within Oregon's blue

[1] For the purposes of this project, the market analysis considered 363 miles of coastline, in addition to connected estuarine and riverine miles that are integral to the blue economy for Clatsop, Columbia, and Multnomah counties. See the section on 'Regional Demographics' for more details all data analyzed in relation to populations—encompassing the seven coastal counties (including Lane and Douglas county populations for the coastal zip codes that west of the Coastal Mountain Range), as well as Columbia and Multnomah counties.

economy—such as aquaculture, energy, fishing, food production and processing, research and development, marine transportation, and tourism—emphasize ocean stewardship and diverse economic benefits to coastal communities.

Note for the purposes of cross-state *Comparative Market Analysis* section later in this report, ERG used two different terms (ocean economy, coastal economy) because these terms have definitions based on existing data sources that allowed for some level of similar comparison aspects between states:

- *Coastal economy:* All activities and industries reported by the Bureau of Labor Statistics (BLS) for coastal counties.
- *Ocean economy*: Made up exclusively of industries and activities considered completely ocean dependent, as defined by NOAA's Economics: National Ocean Watch (ENOW).[2]

Unique Characteristics of Oregon's Ocean and Coast

There are many ecological, social, research, and economic strengths that make Oregon unique when it comes to the blue economy. Based on interview and survey responses, below are some examples of current unique characteristics Oregon should consider building on and leveraging to move its blue economy efforts forward:

Community, People, and Culture: The Oregon coast is made up of many close knit, small, and rural communities. Residents within these communities are willing to collaborate (especially with reputable partners, such as Oregon State University), and community members tend to care about the environment, ocean and estuaries, and the benefits associated with ecosystem services. From Tribes to industries to fisheries and forestry, there is a culture of resource stewardship; Oregonians tend to value ensuring Oregon's natural resources are sustainable and healthy. There is both a local consumer base and tourist consumer base that use and /or consume the diverse products produced locally in the state.

Academic and Research Institutions: There are many world class academic and research institutes on the Oregon coast, including Oregon State University (ranked #5 for top schools in the world in oceanography in 2022 by Academic Ranking of World Universities), University of Oregon's Institute of Marine Biology, Oregon Sea Grant, and Oregon Coast Aquarium, as well as community colleges (e.g., Oregon Coast Community College, Clatsop Community College, Tillamook Bay Community College, Southwestern Oregon Community College) that are leading the way in demonstrating and training and educating students in techniques to sustain Oregon's ocean resources and technology. In addition to these local institutions, federal agencies such as NOAA, U.S. Department of Agriculture, U.S. Department of Energy, and U.S. Economic Development Administration, have established or invested in research and development in Oregon coastal communities. Together, these institutions lead Oregon in research and innovation around areas including offshore wind and wave energy technology, aquaculture techniques, collaborative fisheries research, climate resilient genetics/breeding, and computational modelling, in addition to exceling in sharing knowledge and best practices. The academic institutions in Oregon help set the entrepreneurial mindset and spirit in the state and provide a broad range of opportunities for innovation and sustainability.

[2] Ocean and Great Lakes Economy Sectors and Industries by NAICS code (Crosswalk Table): https://coast.noaa.gov/data/digitalcoast/pdf/enow-crosswalk-table.pdf

Natural Resources and Geographic Characteristics: With its long history of reliance on and stewardship of its natural coastal resources, Oregon continues to enjoy a relatively healthy ocean environment, in addition to abundant offshore renewable energy resources such as strong ocean winds and waves compared to other parts of the world. The state's unique and varied coastal features, ecologically rich and diverse wildlife, public beaches, port access, working waterfronts, sustainable fisheries and aquaculture, and connected estuaries (including for carbon sequestration) all contribute to the myriad of opportunities available from the ocean and coast to the rivers and streams. Although the coastline is vast, each community, from the north to the south, also has its own unique and dynamic geographic characteristics.

Existing Industries and Businesses: Tourism, fisheries and aquaculture, seafood processing and production, ports, shipping, timber and logging, recreation, maritime equipment supply, food and beverage, and hospitality are all examples of existing industries and businesses that are dependent on aspects of the Oregon coast and its economy. Many of these businesses are still family-owned, and there is a sense of collaboration among the communities. For example, the seafood industry in Oregon works closely together and tends to share similar understanding and goals around the importance of Oregon and what the state stands for in terms of sustainability. Relating to sustainability, Oregon has some existing small-scale renewable ocean energy development and research activities led by OSU for the testing of prototype wave energy technologies. Yet to exist offshore Oregon are floating offshore wind energy projects, however they are beginning to emerge elsewhere in the world at large, commercial scales. There are blue economy supply/demand interlinkages such as fisheries depending on the demand of restaurants, which in turn depend on tourism and recreation. Many of these sectors depend on the success of one another.

Market Analysis of Oregon's Blue Economy

Industry Sector

The industry structure overview discusses trends in regional demographics and the blue economy at the state and county levels. Based on our research findings, as we continue our research, we will be seeking to answer the following questions about Oregon's blue economy:

- **Growth**: What is the likely trajectory of growth for the demand and supply of the ocean, shoreline, and estuarine resources and blue economy? Which sectors can we expect to grow at the fastest pace?
- **Investment**: What investment strategies and level of investment do public and private partners need to leverage to grow Oregon's blue economy in the near, mid, and long term? What are the most promising opportunities for private investments to catalyze growth? What are the risks facing investors?
- **Emerging innovation**: What emerging ocean-dependent industries, technologies, career pathways, or other areas represent opportunities for Oregon?
- **Lasting Impacts:** How has the COVID-19 pandemic affected Oregon's ocean-dependent industries?
- **Barriers and Lessons Learned**: What types of barriers and obstacles exist to growing Oregon's blue economy? How could these be addressed through investment, policies, or other actions? What lessons learned or best practices from other states could Oregon use to guide its actions?
- **Sustainability, Resiliency, and Inclusivity:** What are the challenges to developing a sustainable, equitable, and resilient blue economy? What opportunities exist to foster sustainability, inclusivity, and resilience in Oregon's blue economy?

Blue Economy Data Gaps and Limitations

In the market analysis sections presented below, we discuss existing data related to Oregon's blue economy. There are, however, numerous gaps in our understanding of Oregon's blue economy. Despite significant data collection efforts, existing blue economy data is limited and certain data useful to characterizing the blue economy are simply not collected. Many gaps in Oregon's blue economy data are called out in the text below, along with opportunities to fill existing blue economy data gaps. Appendix G. Recommended Additional Analyses and Data Compilation to Better Understand Oregon's Blue Economy contains a breakdown of opportunities to expand Oregon's understanding of its blue economy including additional analyses and data compilation efforts. Below, we present a list of the opportunities included in Appendix G. Recommended Additional Analyses and Data Compilation to Better Understand Oregon's Blue EconomyAdditional details and explanations related to the opportunities listed are available for review in Appendix G, which can be found at the end of this report.

Additional Analyses

- Economic valuations of non-ENOW industries in relation to the blue economy
- Economic Opportunities Assessment
- Status of Diversity, Equity, and Inclusion in the Blue Economy
- Perceptions about Opportunities within the Blue Economy
- Interlinkages between sectors

Data Compilation Efforts

- Parse out ocean-dependent government spending. Generally, government budgets are publicly available and relevant data can be extracted.
- Compile enrollment and demographic data for marine-focused college programs in Oregon
- Ocean-dependent electricity information hub
- Compile data on ocean-dependent and partially ocean-dependent activities at upriver ports in Oregon
- Emerging technologies information hub
- Coastal restoration project database
- Coastal community resilience- economic impacts tracking
- Manufacturing- blue economy metrics tracking
- Track consistent blue economy metrics across CA, WA, AK, and OR.

Regional Demographics

This section provides a brief overview of demographic trends in Oregon using U.S. Census Bureau data and the 2020 Census Summary Profile prepared by the Portland State Population Research Center which sources data from the U.S. Census Bureau, Bureau of Economic Statistics, Oregon Health Authority, American Community Survey (2015-19), National Vital Statistics System, and Address Count Listing File. Oregon has an estimated population of 4.2 million, a little over 1 percent of the U.S. total population. Its population is growing at an estimated rate of 0.6 percent, faster than the U.S. population growth rate. Table 1 shows population counts in each coastal county in Oregon. The coastal portions of Lane and Douglas counties included in Table 1 are geographically approximated by zip code tabulation areas west of the Coast Range summit. Multnomah County has the highest population of any county in Oregon, containing 815,000 individuals in 2020 and with a growth rate of 10.9 percent between 2010 and 2020. On average, coastal counties in Oregon experienced population growth of 6 percent between 2010 and 2020, while non-coastal counties experienced an average increase of 7.9%. Just over 12 percent of Oregon's population is living in poverty, slightly above the national

percent of the population living in poverty. The median household income in Oregon is $70,084, also slightly above the national median.

Table 1. 2010 and 2020 total population by coastal county and population percent change from 2010-2020.

County	2010 Total Population	2020 Total Population	2010-2020 Percent Change
Clatsop	37,039	41,072	10.9%
Columbia	49,351	52,589	6.6%
Coos	63,043	64,929	3.0%
Curry	22,364	23,446	4.8%
Coastal Douglas*	5,927	5,776	-2.5%
Coastal Lane*	16,327	16,968	3.9%
Lincoln	46,034	50,395	9.5%
Multnomah	735,334	815,428	10.9%
Tillamook	25,250	27,390	8.5%

Sources: U.S. Census Bureau and Portland State Population Research Center

*Populations of Coastal Douglas and Lane geographic areas were approximated using 2010 Decennial Census and 2020 American Community Survey data from the U.S. Census Bureau for zip code tabulation areas 97439, 97493, 97453, 97480, and 97430 for coastal Lane County and 97467, 97441, and 97473 for Douglas County.

Oregon's Coastal Counties

Table 2 shows an overview of the ocean economy in Oregon split by county using data related to the ocean economy from NOAA's Economics: National Ocean Watch (ENOW) data set and general employment data from the U.S. Census Bureau's County Business Patterns data set. The ENOW dataset contains economic data at the state and county level describing six sectors dependent on the ocean: living resources, marine construction, marine transportation, offshore mineral resources, ship and boat building, and tourism and recreation. NOAA has used NAICS codes to define a set of industries that fall within each ocean economy sector.[3] ENOW estimates are based in part on the definition of the industries themselves (for example, Deep Sea Freight Transportation) and in part on the geographic location of individual business establishments (for example, a hotel in a coastal town). Economic activity for a business establishment is included in ENOW when the establishment either is associated with an industry whose definition explicitly ties the activity to the ocean, or, in the case of the tourism and recreation sector, is partially related to the ocean and is located near the ocean (which ENOW defines as located in a shore-adjacent zip code). The ENOW dataset has been published annually from 2005 onward and covers about 400 coastal counties, 30 coastal states, eight regions, and the U.S. nation. ENOW collects its business establishments, employment, and wage data from the Bureau of Labor Statistics' Quarterly Census of Employment and Wages (QCEW) data. Totals for Gross Domestic Product (GDP) come from the Bureau of Economic Analysis' GDP-by-state statistics. As of November 2022, the most recently published year of data is 2019. The ENOW dataset has significant limitations. Many economic activities that are part of the blue economy or have strong ties to the blue economy are not reflected in the data. Local data is used throughout the report to supplement ENOW data where possible. The data presented in Table 2 are incomplete due to issues with data suppression at the county level. All Oregon counties suppress data for at least one ENOW sector so as not to violate the confidentiality of one or more businesses. Therefore, the numbers presented in Table 2 should not be regarded as a complete description of the ocean economy for any Oregon county.

[3] Ocean and Great Lakes Economy Sectors and Industries by NAICS code (Crosswalk Table): https://coast.noaa.gov/data/digitalcoast/pdf/enow-crosswalk-table.pdf

According to publicly available data, Multnomah County has the largest ocean economy in the state by a significant margin, accounting for 53 percent of ocean-dependent GDP across Oregon counties. Multnomah County is the most populous county in the state of Oregon, and home to the Port of Portland, Oregon's largest port and the site of much of the state's marine transportation and marine construction activities. More than 17 million tons of marine cargo move through the Portland metro region each year – 13 million tons of which moves through the Port of Portland's facilities (Port of Portland Marine Operations and Facilities, 2022).

Despite Multnomah leading Oregon in the size of its ocean economy, other counties are leaders within specific sectors of the ocean economy. Lincoln County has the highest employment in commercial fishing in Oregon, followed by Clatsop County (Knoder, 2022). Lincoln and Clatsop counties are generally leaders in Oregon's ocean economy, having high numbers of ocean-dependent establishments, employment, wages, and GDP relative to most other counties in the state. Douglas and Lane counties are state leaders in offshore mineral extraction[4].

Most ENOW data related to ship and boat building are suppressed at the county level in Oregon. Ocean waters adjacent to Coos Bay, located in Coos County, and Brookings, located in Curry County, have both been identified as areas for potential offshore wind energy leasing activities by the U.S. Bureau of Ocean Energy Management (BOEM). BOEM is currently undergoing efforts to gather public information and assess commercial interest related to offshore wind energy in these areas (BOEM, 2022).

Table 2: Ocean economy by county (2019).

County	Ocean Establishments	Ocean Employment	Ocean Wages ($ MM)	Ocean GDP ($ MM)	Total County Employment	% Ocean Employment[5]
Clatsop	337	5,490	155.2	331.8	17,762	30.9%
Columbia	93	1,370	32.2	64.1	22,601	6.1%
Coos	230	3,491	105.9	222.2	25,028	13.9%
Curry	147	1,301	28.1	56.7	7,617	17.1%
Coastal Douglas*	48	658	25.3	49.7	2,158	30.5%
Coastal Lane*	113	1,366	41.9	88	5,372	25.4%
Lincoln	385	5,117	137.1	300	19,011	26.9%
Multnomah	871	20,778	798.6	1341.7	452,939	4.6%
Tillamook	128	1,385	37.3	79.6	10,307	13.4%

MM = millions. Sources: NOAA, 2022 and U.S. Census Bureau. Values are in 2019 dollars.

**Employment in Coastal Douglas and Lane geographic areas are approximated using 2019 U.S. Census Bureau County Business Patterns data for zip code tabulation areas 97439, 97493, 97453, 97480, and 97430 for coastal Lane County and 97467, 97441, and 97473 for Douglas County.*

Data on Oregon's Blue economy

This industry sector profile of Oregon's blue economy relies heavily on data collected as a part of ENOW dataset. If ENOW data is not available or appropriate to characterize a sector, local data alone is used to describe economic activities.

[4] The offshore mineral extraction sector includes support activities such as geophysical exploration and mapping services and support activities for oil and gas operations. It may also capture establishments that are physically located in one state despite most of their activities taking place in another.

[5] ERG calculated the percentage of ocean-dependent employment in each coastal county by dividing ocean employment by total employment in each county.

Table 3 shows a broad overview of Oregon's ocean economy using NOAA ENOW data. Figure 2 and Figure 3 show the percentage of employment and wages by sector for 2019. Tourism and recreation made up the largest share (65 percent) of employment in Oregon's marine economy but composed a smaller share (43 percent) of the marine economy GDP.

Table 3. Ocean economy by ocean sector (2019).

Ocean Sector	Establishments	Employment	Wages ($ MM)	GDP ($ MM)
Marine Construction	45	561	43.3	71.3
Living Resources	278	2,468	115.5	241.7
Offshore Mineral Extraction[6]	24	513	36.4	80.5
Ship and Boat Building	47	1,813	142.9	241.4
Tourism and Recreation	1,903	28,132	676.3	1,441.9
Marine Transportation	172	9,685	555.3	1,027.0
All Ocean Sectors	2,469	43,172	1,569.7	3,103.9

MM = millions. Source: NOAA, 2022.Values are in 2019 dollars.

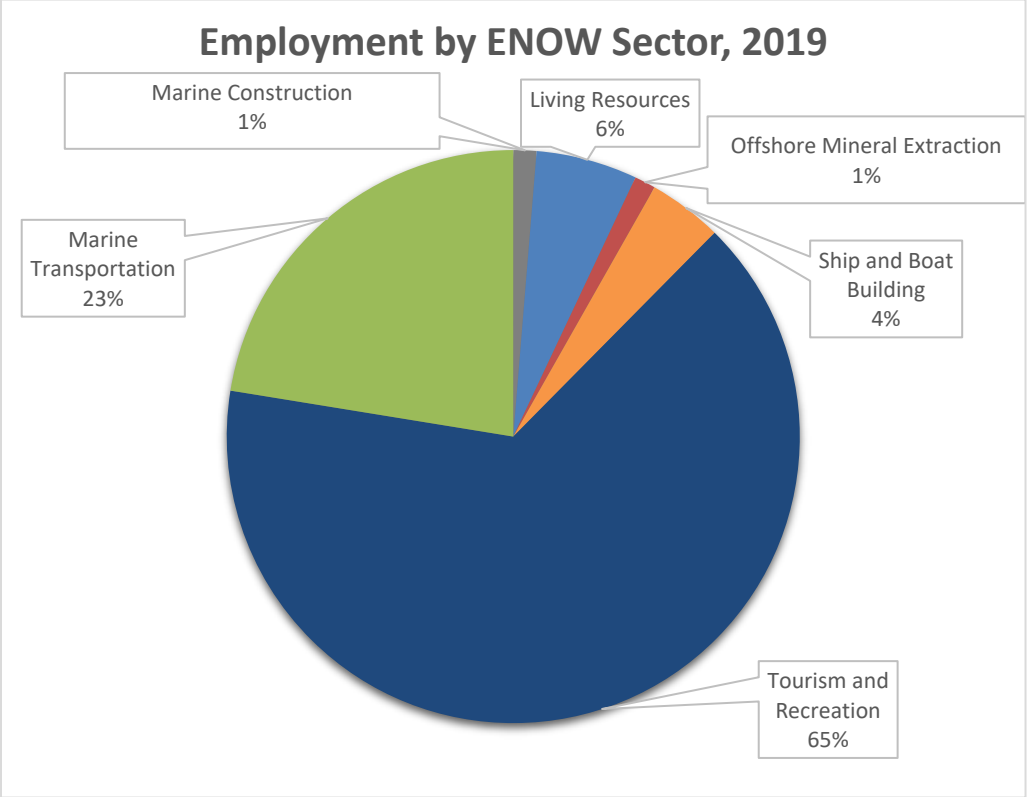


Figure 2.Oregon ocean economy employment by ENOW sector, 2019. Source: NOAA, 2022.

[6] The offshore mineral extraction sector includes support activities such as geophysical exploration and mapping services and support activities for oil and gas operations. It may also capture establishments that are physically located in one state despite most of their activities taking place in another.

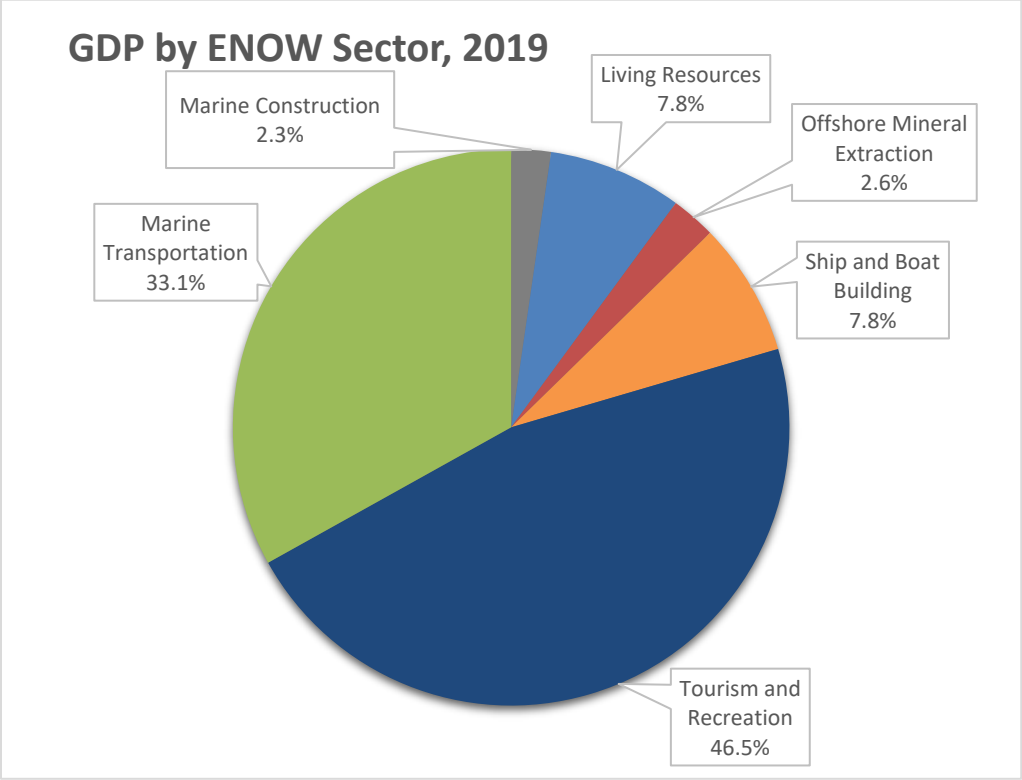


Figure 3. Oregon ocean economy GDP by ENOW sector, 2019. Source: NOAA 2022.

Oregon's blue economy generated an estimated GDP of $3.1 billion in 2019, making up just over one percent of Oregon's total GDP. Though ocean-dependent GDP may make up a small portion of the state's overall GDP, much of the Oregon coast is rural and lacking economic development compared to Oregon's more urban areas. Ocean-dependent GDP generation is likely to make up a significantly higher percentage of Oregon's coastal economy than Oregon's statewide GDP. Tourism and recreation accounted for the bulk of GDP generated by ocean-dependent sectors, accounting for about 46 percent of ocean-dependent GDP. Out of the 30 coastal states in the United States, Oregon's ocean economy ranks 22nd in terms of the value of its ocean-dependent GDP. Oregon's marine economy employed 43,174 individuals across 2,469 establishments in 2019; $1.5 billion in wages were paid out to these employees (an average of $36,400 per employee). GDP, employment, establishments, and wages have all increased since 2005 in sectors dependent on the ocean. From 2005 to 2019, Oregon's ocean-dependent GDP, employment, establishments, and wages have increased by 100.4 percent, 41.4 percent, 13.8 percent, and 112.4 percent, respectively. Figure 4 below describes employment trends within the six ENOW sectors in 2019 and in the years 2005-2019, while Figure 5 describes wage trends within the six ENOW sectors between the years 2005 and 2019. The marine transportation and tourism and recreation sectors have both experienced significant increases in sector employment between 2005 and 2019. The marine transportation, tourism and recreation, ship and boat building, and living resources sectors have all experienced increases in wages paid between 2005 and 2019.

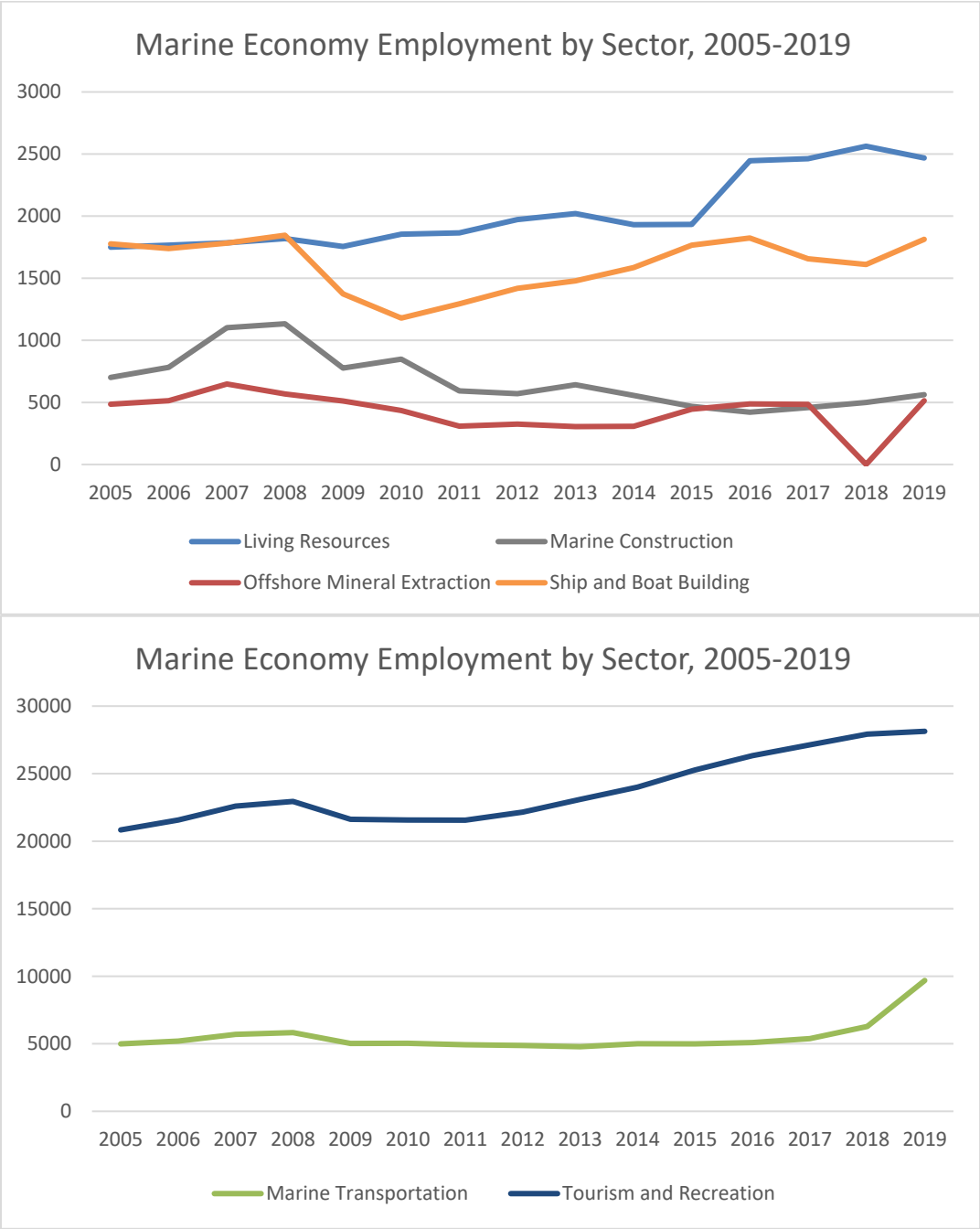
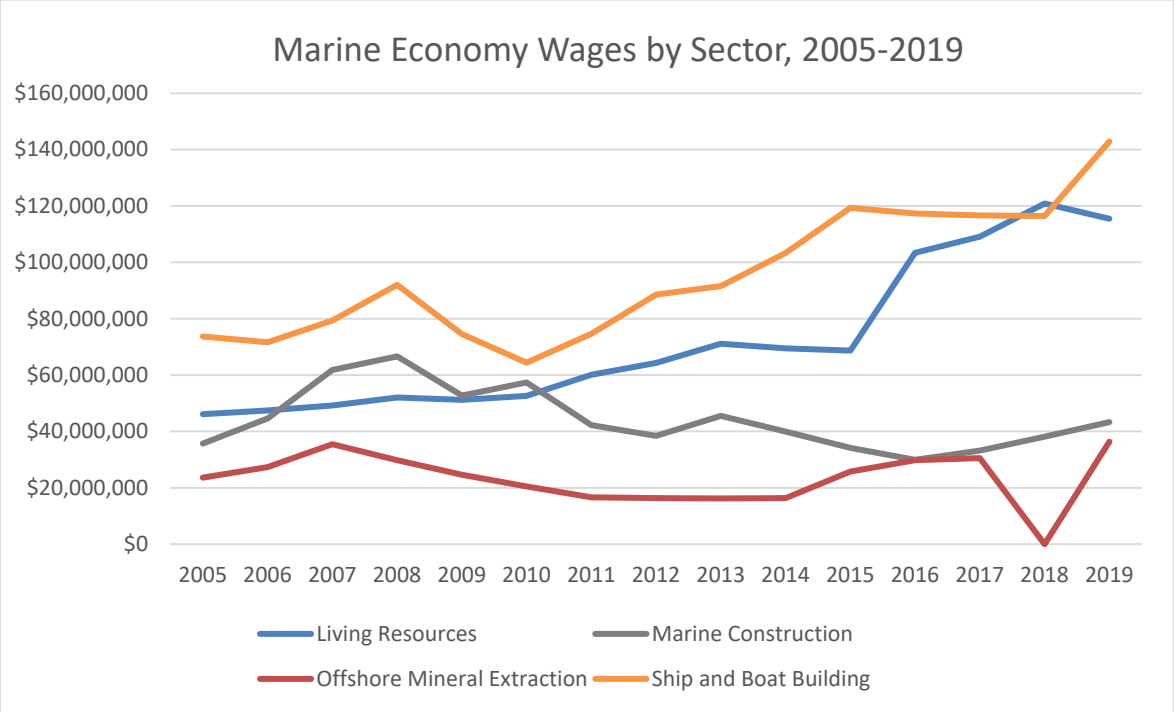


Figure 4. Marine economy employment by sector, 2005-2019. Source: NOAA, 2022.



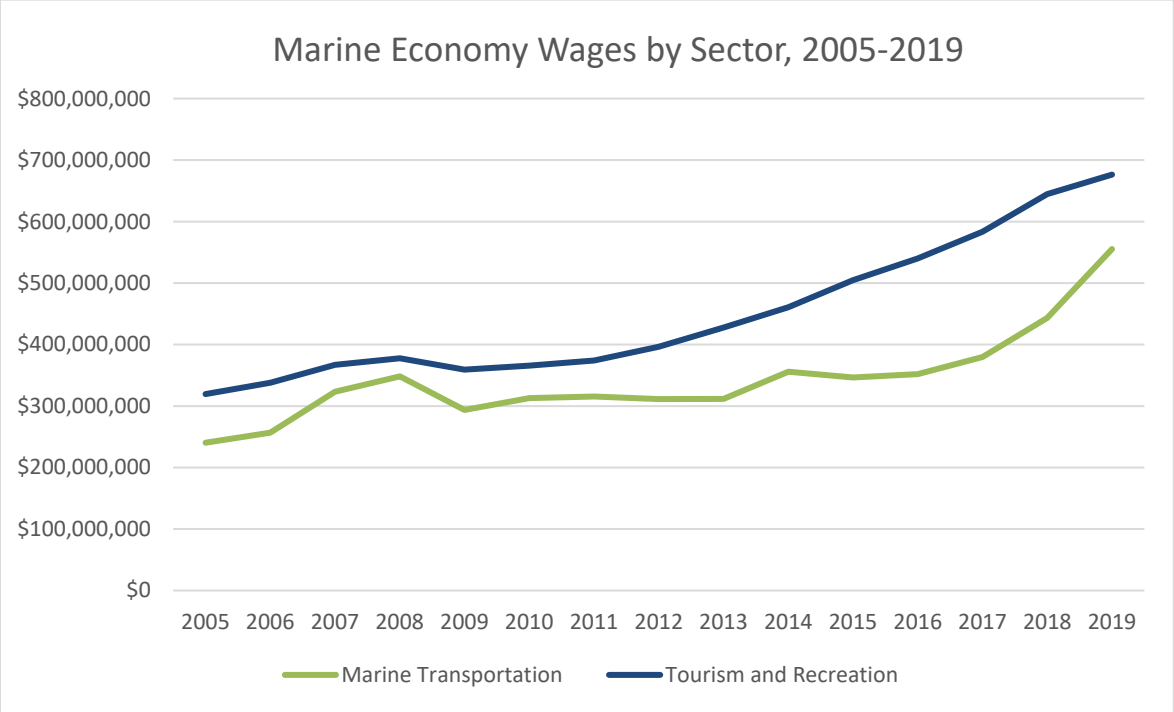


Figure 5. Marine economy wages by sector, 2005-2019 Source: NOAA 2022

Living Resources

As highlighted earlier in the *Unique Characteristics of Oregon's Ocean and Coast* section, Oregon's healthy ocean supports a thriving living resources sector. Oregon's Statewide Planning Goal 19 focus on ocean resources and "to conserve the long-term values, benefits, and natural resources of the nearshore ocean and the continental shelf" (Oregon Coastal Zone Management Program, 2019). The living resources sector covers aquaculture, commercial fishing, seafood processing, and wholesale and retail seafood markets. In 2019, the living resources sector accounted for 7.8 percent of ocean-dependent GDP ($241.7 million). 2,468 individuals

were employed across 278 establishments in the living resources sector. $115.5 million in wages were paid out to these employees ($46,800 per employee, on average). GDP, employment, establishments, and wages have all increased since 2005 in the living resources sector. 2016 saw a marked increase in employment (26.6 percent), wages (50.5 percent), and GDP (50.2 percent) in the sector, and the number of establishments also experienced a more modest increase (8.8 percent). Since 2016, the sector has not grown or declined significantly. The most important fisheries for employment in Oregon are Dungeness crab fisheries (Knoder, 2022). Fishery productivity is largely seasonal and many workers and businesses within the living resources sector rely on the success of multiple fisheries for their own success. When one fishery goes out of season, fishers, seafood processors, restaurants and more depend on the productivity of other in-season fisheries to generate revenue. Without other fisheries, or with damage done to them, much of the living resources sector could potentially suffer.

Marine Construction

The marine construction sector covers ocean-dependent heavy construction activities such as beach renourishment and navigation channel dredging. Marine construction was responsible for 2.3 percent of ocean-dependent GDP ($71.3 million) in Oregon in 2019. The marine construction sector employed 561 individuals across 45 establishments. $43.3 million in wages were paid to those employees (an average of $77,200 per employee). Though the number of employees and establishments in the marine construction sector has declined since 2005, wages and GDP have risen slightly within the sector since 2005. Increases in wages and GDP did not experience steady gains; trends indicate that the marine construction industry experienced a decline around 2008. Total sector GDP peaked in 2008 at $117.3 million dollars and then decreased steadily, possibly as a delayed response to the 2008 recession, until reaching a trough at $49.7 million dollars in 2016. 2019 was the first year since 2010 where estimated total GDP surpassed the total value of GDP in 2005. Wages and employment in the sector followed similar trend lines. The number of establishments experienced a marked decline in 2011 and has consistently remained at lower levels than in the years 2005-2010 since. Likely, these trends indicate that the marine construction sector was strongly impacted by the 2008 recession and the sector is still recovering from those negative impacts.

Ship and Boat Building

The ship and boat building sector accounts for construction, repair, and maintenance of ships, commercial fishing vessels, recreational boats, ferries, and other types of marine vessels. In 2019, the ship and boat building sector generated 7.8 percent of ocean-dependent GDP ($241.4 million). The sector employed 1,813 individuals across 47 establishments. $142.9 million in wages were paid out to these employees ($78,800 per employee, on average). Employment, wages, and GDP generated by Oregon's ship and boat building sector dipped substantially following the 2008 recession. The number of establishments also experienced a modest decline. Wages and GDP generated by Oregon's ship and boat building sector have both increased substantially since, with values significantly surpassing pre-recession levels. However, the number of employees and establishments in the ship and boat building sector have not experienced similar growth. In 2010, employment in the sector reached a low of 1,179 (down from 1,846 in 2008). In 2019, that number increased by 53.8 percent. Despite steady increases in employment since 2010, the number of individuals employed in the industry has not yet reached pre-recession levels. The number of establishments has slowly but steadily declined, falling from 59 establishments in 2005 to 47 establishments in 2019.

Marine Transportation

The marine transportation sector is comprised of businesses that report being engaged in deep-sea freight, marine passenger services, warehousing, marine transportation services, and the manufacturing of navigation equipment. The marine transportation sector accounted for 33.1 percent of Oregon's ocean-dependent GDP ($1 billion) in 2019. 9,685 individuals were employed across 172 ocean-dependent establishments in this sector. $555.3 million in wages were paid out to these employees ($57,300 per employee, on average). GDP, employment, establishments, and wages paid by Oregon's marine transportation sector all experienced modest declines in the wake of the 2008 recession between 2008-2009. Between 2009 and 2016, GDP, employment, wages, and establishments did not change substantially, seeing only small increases and

fluctuations. In 2017, the sector began to experience sharp increases in employment, wages paid, and GDP generated. Between 2017 and 2019, employment, wages, and GDP increased by 80.1 percent, 46.2 percent, and 38.7 percent, respectively. The number of establishments in the marine transportation sector has not experienced the same growth and has remained fairly steady. ENOW data only accounts for marine transportation activities taking place in ocean-adjacent counties. Some upriver activities in Oregon may be partially ocean-dependent, however, at this time Oregon ports do not record data metrics that differentiate between their ocean-dependent and ocean-independent activities.

Offshore Mineral Extraction

The offshore mineral extraction sector includes gas and oil production and exploration, as well as gravel, limestone, and sand mining. The sector also includes support activities such as geophysical exploration and mapping services as well as support activities for oil and gas operations. The sector may also capture establishments that are physically located in one state despite most of their activities taking place in another. The offshore mineral extraction sector generated 2.6 percent of Oregon's ocean-dependent GDP ($80.5 million) in 2019. 513 individuals were employed across 24 establishments in the offshore mineral extraction sector. $36.4 million in wages were paid out to these employees ($70,900 per employee, on average). The offshore mineral extraction sector experienced high values for GDP generation, employment, and wages paid in 2007 ($135.6 million, 648, and 35.4 million). From 2008 to 2011, the sector experienced a period of decline. From 2007 to 2011 employment, wages paid, GDP generation, and the number of establishments decreased by 52.5 percent, 53.2 percent, 62.9 percent, and 25 percent, respectively. Beginning in 2015, the industry began to experience newfound expansion. Between 2014 and 2017, employment, wages paid, GDP generation, and the number of establishments increased by 58.2 percent, 86.8 percent, 75.3 percent, and 9.5 percent, respectively. Data for the offshore mineral extraction sector is not available for 2018 in the ENOW dataset, but the sector seems to be continuing its expansion at a slower pace based on 2019 data.

Tourism and Recreation

The tourism and recreation sector includes a wide variety of businesses that support or attract ocean-based tourism and recreation. Ocean-dependent tourism and recreation economic activities include scenic water tours, aquariums, eating and drinking places, hotels and lodging, parks, boat dealers, marinas, recreational vehicle parks and campsites, and associated sporting goods manufacturing. Many of the activities associated with the sector are not always directly marine dependent (e.g., hotels and bars). To account for this, tourism and recreation businesses are only counted in ENOW data as ocean-dependent when they are located in shore-adjacent zip codes. The tourism and recreation sector accounted for 46.5 percent of Oregon's ocean-dependent GDP ($1.4 billion) in 2019, the greatest share of ocean-dependent GDP of any sector. 28,132 individuals were employed across 1,903 ocean-dependent establishments in the tourism and recreation sector. Relative to other ENOW sectors, a high number of tourism and recreation businesses in Oregon are small private businesses Additionally, a significant number of workers in the tourism and recreation sector are self-employed and thus not captured in ENOW data. $676.3 million in wages were paid out to these employees ($24,000 per employee, on average). This is the smallest average salary across the six sectors. Many workers in the tourism and recreation sector are employed part time and earn additional income through tips, which are not captured in wage data. Some higher-level positions within the sector (e.g., marketing directors, property managers, accountants, etc.) may report to NAICS codes that are not captured in ENOW and therefore are not represented in the ENOW dataset. The tourism and recreation sector has enjoyed steady growth since 2005 (with the exception of small declines in 2009 following the 2008 recession). Since 2005, GDP generation, employment, wages paid, and the number of establishments have increased by 148.6 percent, 35 percent, 111.7 percent, and 19.2 percent, respectively. Oregon's tourism and recreation sector has strong links to other sectors within Oregon's coastal economy. One prominent example is the relationship of the sector to coastal fishers and farmers. Coastal fishers and farmers rely substantially on the purchasing power of coastal restaurants and grocery stores. These restaurants and stores, in turn, depend on spending by tourists to generate a significant portion of their revenues. In 2020, mandatory closures of restaurants led to greatly reduced demand for local Oregon seafood and greatly impacted commercial fisheries (Oregon Sea Grant, 2020).

Oregon is working hard to create a sustainable tourism and recreation sector. In 2019, Travel Oregon reported the Oregon Coast to be the second largest tourist destination and Oregon. The report also estimated that 25 percent of visitors to the Oregon Coast were motivated to visit the area by outdoors attractions (Oregon Coast Visitors Association, 2019). Destination development tactics planned by Travel Oregon for the years 2020-2021 focused almost exclusively on further development of sustainable outdoor and agritourism attractions (Oregon Coast Visitors Association, 2019). Oregon Sea Grant employs staff specifically focused on providing applied research for communities and businesses, direct business training, and advising and consultations on the topics of sustainable coastal tourism and agritourism (Oregon Sea Grant, 2023). A report published by Earth Economics in 2021 estimated the value of economic output of outdoor recreation in Oregon to be $4.0 million dollars, support 47.5 thousand jobs, and generate over $200 thousand dollars in Oregon state and local tax revenue annually (Mojica et al., 2021). Oregon Sea Grant (2023) reports that household net worth of farm operators is higher on average when reporting income from recreation in addition to farming ($794,000 versus $457,000)[7].

Emerging Blue Technology

Blue technologies are technologies, systems, or platforms designed for marine use or application. Emerging coastal and maritime technologies represent robust economic opportunities for Oregon. Clean and renewable electricity generation (e.g., through offshore wind and wave technologies) and related research and education represent an area with substantial potential for economic growth. Ocean water has long been used in electric generation for cooling purposes. However, recent years have seen an expanding interest in alternative uses of the ocean in electricity generation such as offshore wind farms and other experimental methods of electricity generation such as wave and tidal energy. Offshore wind farms and wave and tidal energy generation technologies all face major challenges to implementation such as permitting conflicts, technology readiness, inadequate port infrastructure, and more. Additionally, there are concerns about the effects of each technology on coastal communities, existing industries, cultural resources, and the natural environment. Despite looming challenges and concerns, the market for clean and renewable energy sources is likely to grow rapidly in the coming decades to meet state policy goals and requirements. Oregon has implemented ambitious clean energy policy requirements (80 percent clean by 2030, 90 percent by 2035 and 100 percent by 2040) and economy-wide greenhouse gas emissions reduction goals (50 percent reduction by 2035 and 90 percent by 2050).

Additionally, the demand for clean and renewable energy in neighboring states is expected to grow rapidly. Washington and California have both implemented state policies requiring 100 percent clean electricity by 2045. Clean and renewable energy could be exported from Oregon to neighboring West coast states to generate revenue. Oregon State University (OSU) has been at the forefront of emerging ocean-dependent electricity generation technologies. Oregon State University is home to the O.H. Hinsdale Wave Research Laboratory: The largest nearshore experimental facility at any U.S. academic institution. The O.H. Hinsdale Wave Research Laboratory conducts research on coastal and nearshore processes and delivers testing, education, and outreach opportunities to develop innovative coastal infrastructure and create resilient and sustainable coastal areas. In February of 2021, the Bureau of Ocean Energy Management (BOEM) issued a lease to OSU for the first wave energy research project in federal waters offshore the Western U.S., the PacWave South Project. Oregon is likely to expand ocean-dependent electricity generation in the future. In April of 2022, as part of efforts to meet the Biden-Harris administration's goal to deploy 30 gigawatts of offshore wind energy by 2030, BOEM published a call for information and nominations to obtain public input on and evaluate commercial opportunity for potential offshore wind energy leasing activities in Oregon. OSU developed the Blue Innovation Hub (BIH) Initiative in 2019 to assess OSU’s ability to create partnerships intended to advance ocean research and commercialize emerging blue technologies. OSU aims to become an internationally recognized leader in emerging blue technologies through this initiative. Emerging blue technologies have great potential for economic benefits; however, each technology must be carefully evaluated

[7] Large farms (1,000+ acres) report the highest per farm median recreation income at $4,000. Medium size farms (250-999 acres) report the smallest recreational income at $2,500.

for negative environmental, economic, and social and cultural consequences. Oregon has implemented coastal statewide planning goals that are intended to find the balance between protecting natural resources and creating thriving, resilient coastal communities.

Oregon also has potential opportunities to expand its use of sustainable fuels within its maritime fleet. Based on interviews with key experts, Oregon is currently beginning to explore opportunities for hydrogen as a green fuel alternative. Beyond energy, new technologies related to aquaculture, underwater fiber optic cables, and development of marine-derived products represent additional areas of emerging blue technology. Collectively, these areas could represent opportunities for Oregon to grow its blue economy and generate a suite of new ocean-related jobs.

Coastal Restoration

Efforts to restore coastal habitats improve both local economies and local environmental quality. Restoration work can improve coastal economies by generating jobs, increasing the value of nearby homes (by reducing exposure to natural hazards like flooding, improving the quality of natural amenities, etc.), and stimulating total economic activity, and more. Restoration work can also improve environmental quality in coastal Oregon by improving water quality, improving habitat quality, reducing coastal erosion, and more. Environmental improvements support important fish and wildlife species that are culturally and economically significant to coastal communities. Improvements in coastal environmental quality generate improved coastal ecosystem services that support coastal economies such as provision of raw materials and food, erosion control, and coastal protection. The value of coastal ecosystem services to Oregon's blue economy has not been thoroughly assessed, however, these services are likely to provide significant economic benefits to the state. Many restoration projects are undertaken in the state of Oregon. Between 1995 and 2021, 6,175 coastal watershed restoration projects were completed in Oregon (Ecotrust, 2014). Watershed councils carry out many of the watershed restoration projects that take place in Oregon. A strategic plan published by The Network of Oregon Watershed Councils (NOWC) in 2018 named improving their financial resources and increasing support for public funding of watershed restoration projects as top strategic priorities (NOWC, 2018). NOWC publicizes funding opportunities that local Oregon watershed councils can apply for to pay for projects that improve the condition of local watersheds. These projects in turn support employment in the coastal restoration sector and lead to local spending on restoration work in coastal communities. Data related to the economic impact of watershed councils in Oregon is not reported in aggregate. Centralized reporting by NOWC or another agency involved with watershed councils of total funding of watershed council projects, spending on watershed council projects, or other economic impact metrics parsed out by watershed council would help Oregon to understand its coastal restoration economy. The EPA partners with two non-profit organizations to protect and restore the water quality and ecological integrity of significant Oregon estuaries as part of the National Estuary Program (NEP): The Tillamook Estuaries Partnership and the Lower Columbia Estuary Partnership. The Tillamook Estuaries Partnership reports completing 16 habitat enhancement and restoration projects since 2004 with each project requiring associated spending of between $60 thousand dollars and $2 million dollars. The Lower Columbia Estuary Partnership reports completing at least 9 habitat restoration projects since the 1990s and protecting more than 23 thousand acres of along the Columbia River and its tributaries. These partnerships also focus on engaging local communities in restoration initiatives, fostering a local culture of sustainability and restoration economy on Oregon's coast.

Estuarine and Broader Land Use Linkages to the Blue Economy

A unique feature in Oregon is the state's 22 major estuaries are zoned using a classification system that specifies the level of development allowed in each estuary, as aligned with the Oregon Statewide Planning Goal 16 and for lands bordering estuaries Goal 17 (Oregon Coastal Management Program, 2019). It is important to understand how land use in the state's estuaries and estuary management plans, as well as the broader land use system and management have implications on what can and cannot occur when it comes to blue economy efforts in the state.

Restoration projects are estimated to have substantial economic benefits for the states and local communities that they are undertaken in. In one study published in 2014, watershed restoration projects were estimated to

have supported up to 6,483 jobs (many of them highly skilled positions) and generated up to $977.5 million in economic output (Ecotrust, 2014). Another study published by the University of Oregon found that forest and watershed restoration contracting "leads to between 15.7 and 23.8 jobs per $1 million dollars of public investment and results in an additional 1.4 to 2.4 times the amount of economic activity as public dollars cycle through Oregon's economy" (Nielsen-Pincus and Moseley, 2010). Additionally, the research team found that every $1 million dollars of public investment in forest and restoration projects that allocate money towards both restoration contracting and other project spending supports between 14.7 and 23.1 jobs and every dollar of public investment in these projects is multiplied in economic activity between 1.7 and 2.6 times as it cycles through Oregon's economy (Nielsen-Pincus and Moseley, 2010). Furthermore, restoration dollars stayed local; $0.80 of every $1.00 spent on restoration projects stayed in the county where the project was located and $0.90 stayed in the state of Oregon (Nielsen-Pincus and Moseley, 2010).

2017 brought the completion of a 443-acre tidal wetland habitat restoration project called the Southern Flow Corridor (SFC) in Tillamook Bay, Oregon. The restoration project had a budget of over $11 million and aimed to create salmon habitat and decrease flooding. A socio-economic impacts analysis of the restoration project published by NOAA and the Tillamook Estuaries Partnership (TEP) in 2021 estimated that this project alone supported 108 jobs and generated $14.6 million in total economic output in Oregon. The study also found that the restoration work increased housing prices by 10 percent, stored up to 27 thousand tons of carbon, increased salmon populations, reduced flood events impacting a local highway and commercial corridor, improved water quality, and provided new recreational opportunities for residents and visitors of Tillamook Bay (Shaw et al., 2021). Since restoration dollars are estimated to be relatively immobile (Ecotrust, 2014), restoration work may provide a pathway to re-invest in low-income rural communities while also boosting both the quality of the local environment and the quality of life of coastal residents. The SFC project demonstrates the importance of restoration work to Oregon's coastal communities through economic and environmental benefits. Some data related to the economic impacts of coastal restoration is captured by NOAA ENOW data within the marine construction sector when the companies undertaking the restoration work report under the NAICS code "Other Heavy and Civil Engineering Construction" (237990). However, coastal restoration work done by governments and companies that do not report under NAICS code 237990 is not captured by NOAA ENOW data.

Coastal Community Resilience

Oregon's coastal communities face chronic natural hazards such as coastal change, sea level rise, flooding, storms, landslides, and climate change as well as acute natural hazards such as earthquakes and tsunamis. Oregon's Department of Land Conservation and Development (DLCD) is developing Estuarine Resilience Action Plans (ERAPs) in certain coastal jurisdictions. These plans identify and define needs, goals, and priority levels for natural infrastructure projects intended to promote local resilience to natural hazards in coastal communities. Previous coastal resilience projects have focused on individual counties; Oregon plans to unify resiliency efforts coordination across the state in hopes of strengthening coastal planning partnerships and bolstering the impact of planning efforts overall (DLCD, 2021). Oregon State University and Oregon Sea Grant fund the Oregon Coastal Futures (OCF) project which develops, applies, and assesses a framework for improving coastal community resilience and adaptation to acute coastal hazard exposure. That framework can then be applied to coastal Oregon communities to help improve their ability to be resilient and adaptable in the face of acute natural hazards. Like the ERAPs, the OCF project has recently transitioned from assessing localized resilience initiatives to focusing on improving adaptation planning along the whole of the Oregon coastline (OSSPAC, 2013). OCF project work is largely research-based and not applied, however, it has the potential to significantly inform future applied work. Additionally, spending on coastal-specific research creates opportunities in the marine research and education sector within the blue economy (discussed below).

Oregon's coastal communities are dependent on aging and under-funded infrastructure. Oregon's inadequate infrastructure makes it vulnerable to infrastructure failures, such as power outages and road closures, in the face of shocks and stressors from natural hazards. Failure of critical infrastructure such as electricity delivery systems, drinking water treatment and delivery systems, and major roads can endanger public health and

safety and halt many coastal economic activities. Improved infrastructure resiliency can help Oregon's coastal communities avoid dangerous and costly infrastructure failures during natural hazard events.

Some data related to the economic impact of coastal community resilience work is captured by NOAA ENOW data within the marine construction sector when the companies undertaking the resilience work report under the NAICS code "Other Heavy and Civil Engineering Construction" (237990). However, coastal community resilience work done by governments and companies that do not report under NAICS code 237990 is not captured by NOAA ENOW data. Aside from that data captured by NOAA ENOW, little other information exists related to measuring the economic benefits of coastal resilience work along the Oregon coast; however, the OCF project plans to model the response of the housing market to policy changes (e.g., tsunami hazard overlays) related to resilience efforts. Improved coastal community resilience can mitigate the negative physical and economic impacts of both acute and chronic natural coastal hazards. Investment in natural infrastructure such as coastal wetlands, coastal vegetation, and coral reefs may provide benefits to local natural ecosystems and offer improved recreational and commercial opportunities (e.g., improved opportunities for commercial fishing resulting from increased fish populations) as well.

Manufacturing

Manufacturing firms have an important role in the blue economy; these firms produce components of and assemble critical products for marine use. Manufacturing needs in the blue economy range from industrial to high-tech and are changing quickly. The industry is becoming more automated and increasingly requires individuals with certain certifications to operate and maintain machinery used in manufacturing processes, providing skilled jobs to workers. Manufacturing needs within the blue economy are also changing as technologies become more advanced and new blue technologies emerge. For example, freezing equipment that manufacturers provide to seafood processors is becoming increasingly high tech in recent years and requires more specialized labor to produce. The Inflation Reduction Act (IRA), passed in August of 2022, provides tax credits associated with manufacturing renewable energy components which may incentivize increased investment in clean and renewable energy production in Oregon. The emerging offshore wind industry depends on specialized manufacturing services to produce components necessary for potentially deploying floating offshore wind energy projects. For example, offshore wind energy products may require local manufacturing of floating platforms, towers, blades, turbines, power and mooring cables, and specialized marine vessels for transportation and installation of components necessary for offshore wind energy project deployment. The role of manufacturing firms in the blue economy is likely to continue to grow and change in Oregon as new blue technologies emerge. To date, little information exists about the economic output of manufacturing firms within Oregon's blue economy.

Supporting Industries

The industries described in the NOAA ENOW data require support from a variety of industries that are not ocean-dependent to supply critical inputs. These non-ocean-dependent suppliers include industries such as construction, professional and business services, and coastal utilities. ENOW industries use goods and services supplied by non-ENOW industries to build and maintain establishments, provide essential goods and services, and support day-to-day business operations. Spending by ocean-dependent ENOW industries helps to generate greater income for non-ocean-dependent industries in coastal communities and across the state. As a result, residents of coastal communities and local businesses can purchase additional goods and services, generating subsequent rounds of activity that increase total economic outputs. Currently, data evaluating the economic impact of ENOW industries on non-ocean-dependent industries locally and across Oregon are not available.

Marine Research and Education

As highlighted earlier in the *Unique Characteristics of Oregon's Ocean and Coast* section, the Oregon coast is home to many esteemed academic and research institutions. Oregon's academic and research institutions help workers across the state to develop new skills and attain better employment opportunities within the blue economy. Community colleges provide important opportunities for local training in coastal areas, creating skilled workers in underserved rural communities. Additionally, these institutions inject money into the Oregon

economy by providing and securing funding for marine research initiatives. Spending from marine research initiatives helps to generate higher incomes and additional employment opportunities in coastal communities. A report published jointly in 2013 by the Oregon Department of Fish and Wildlife and Port Orford Ocean Resources Team found that annual local spending from research projects carried out between 2008 and 2012 contributed $0.5 million in total personal income regionally (number includes multiplier effects), a significant economic contribution to the coastal community (The Research Group, LLC., 2013). Oregon's academic and research institutions also serve as catalysts promoting the discovery of new blue technologies. These institutions support the development of emerging blue technologies and improve the sustainability and resilience of coastal communities and existing blue technologies.

Government Spending

The effects of government spending decisions factor significantly into trends in the blue economy. A report published by NOAA in 2019 suggests that government spending decisions can often overshadow general economic conditions in the marine construction sector (NOAA, 2019). Government spending includes spending on ocean-dependent activities by state and federal agencies. At the state level, this includes spending on ocean-dependent activities by agencies such as the Oregon Department of Environmental Quality, the Oregon Department of Fish and Wildlife, the Oregon Department of Land Conservation and Development, and more. At the federal level, spending on ocean-dependent activities takes place within agencies like the U.S. Environmental Protection Agency, the National Oceanic and Atmospheric Administration, the U.S. Department of the Interior, and more. Government spending also includes spending on ocean-dependent national defense activities including many activities carried out in Oregon by the U.S. Coast Guard, the U.S. Navy, the U.S. Army Corps of Engineers, and other national defense agencies. In 2011, National Ocean Economics Program (NOEP) data indicated that 0.34% of the total Federal budget was allocated to ocean and coastal support, totaling more than $12.2 billion (NOEP, 2012). In 2022, the Oregon Department of Fish and Wildlife (ODFW) reported that nearly $1 million in state funding was in the process of making its way to ocean researchers across Oregon in the form of competitive grants (ODFW, 2022). In December of 2022, Oregon U.S. Senators Jeff Merkley and Ron Wyden announced Senate passage of major investments (hundreds of millions of dollars) in Oregon's coastal, fishing, and tribal communities intended to improve Oregon ports and waterways (Jeff Merkley U.S. Senator for Oregon, 2022). NOAA provides funding to Oregon's South Slough National Estuarine Research Reserve (NERR) which protects nearly 5,000 acres of coastal lands and water in southwest Oregon (NOAA, 2023), enhances coastal resiliency, and boosts coastal economies. The South Slough NERR spends money locally to support its operations including purchasing equipment, maintaining marine and land vehicles, paying staff, and more (Wiley et al., 2021). A study published by NOAA and ERG in 2021 estimated that spending by the Reserve supports over 56 jobs and adds over $5.3 million in revenue annually to Coos County[8] (Wiley et al., 2021).

Government spending is a major contributor to Oregon's blue economy; however, to date there is no central point of information or data set about government spending exclusively related to Oregon's oceans and coastal communities. Data related to government spending is generally in publicly available government budgets and this data could be parsed out to separate ocean-related from non-ocean-related spending. Identifying ocean-related government spending may require a moderate level of effort.

Impacts of COVID-19

The onset of the coronavirus disease (COVID-19) pandemic in 2020 resulted in severe economic contractions across many sectors, including those dependent on the ocean. Mandatory statewide closures caused many ocean-dependent businesses to close their doors. International lockdowns on markets, borders, and trade

[8] Results present the total economic contribution from direct spending by operational spending from the South Slough NERR, spending by South Slough NERR visitors, employment and spending of South Slough NERR partners, and spending by visitors of South Slough Reserve partners (Wiley et al., 2021)

caused severe disruptions of supply and demand chains. The living resources, tourism and recreation, and marine transportation sectors all faced major challenges as result of COVID-19 restrictions.

In an industry survey conducted by Oregon Sea Grant in 2020, 95% of respondents reported that they or their business had been impacted by COVID-19. Mandatory restrictions related to restaurant operations caused a disruption to the demand chain for Oregon seafood leading to decreased seafood sales and impacting Oregon's commercial fishing industries. The impact of COVID-19 on commercial fishing industries highlighted a market opportunity for local, small-scale artisanal processing of seafood for shelf-stable value-added seafood products (such as canned and vacuum sealed products).

Recent research on the COVID-19 pandemic (Arnaut, 2022) suggests that during the height of the pandemic, tourist visits to Oregon establishments in the food, service, and retail sectors were greatly affected by COVID-related restrictions. Significant decreases in visits to these establishments likely resulted in severe negative impacts to many establishments within Oregon's ocean-dependent tourism and recreation sector. Visits to Oregon's natural landmarks, like beaches, ports, and marinas, as well as to recreational goods rental stores were largely unchanged despite COVID-related restrictions.

The COVID-19 pandemic resulted in international trade disruptions. Oregon seems to have experienced disruptions within its marine transportation sector; research suggests that marine shipping activity in Puget Sound decreased by nearly 20 percent following the COVID-19 pandemic (Dahl & Harrington, 2021).

National projections for 2021-2030 estimate an overall slower growth than previous decade is expected due to COVID-19 recession recovery (BLS, 2022). Coastal economies continue to struggle with long-lasting effects of the COVID-19 recession. Most notably, coastal economies battle continuing staffing shortages that stunt businesses' ability to provide in-demand goods, services, and amenities. The blue economy is viewed nationally and by the state of Oregon as a potential way to boost economic recovery and develop a more sustainable economy.

Comparative Market Analysis

This section helps to contextualize Oregon's blue economy sector by examining its market position in relation to its neighboring West coast states based on existing economic data related to the ocean economies in Alaska, California, Oregon, and Washington and case studies of initiatives and opportunities pursued by the other states and countries. Note for the purposes of cross-state *Comparative Market Analysis* section, ERG used two different terms (ocean economy, coastal economy) because these terms have definitions based on existing data sources that allowed for some level of similar comparison aspects between states:

- *Coastal economy:* All activities and industries reported by the Bureau of Labor Statistics (BLS) for coastal counties.
- *Ocean economy*: Made up exclusively of industries and activities considered completely ocean dependent, as defined by NOAA's Economics: National Ocean Watch (ENOW)[9].

Oregon's Blue Economy in Relation to Other West Coast States

The U.S. West Coast is home to four coastal states: Alaska, California, Oregon, and Washington. NOAA estimates the coastal populations of Alaska, California, Oregon, and Washington to be 0.6 million, 26.3 million, 0.6 million, and 4.8 million, respectively (NOAA, 2023). Oregon's blue and ocean economies are relatively underdeveloped compared to other states on the West Coast.[10] Figure 6 shows estimations from the Oregon Ocean Innovation Hub of California, Oregon, and Washington's ocean sector GDPs. According to this figure, Oregon's ocean sector GDP lags Washington and California's ocean sector GDPs by $11.5 and $42.5 billion dollars, respectively. Oregon employs the lowest number of individuals in the ocean economy (43,175)

[9] Ocean and Great Lakes Economy Sectors and Industries by NAICS code (Crosswalk Table): https://coast.noaa.gov/data/digitalcoast/pdf/enow-crosswalk-table.pdf

[10] Little data related to the blue economy exists that is collected and published consistently and uniformly across Alaska, California, Oregon, and Washington (e.g., different states include different subsectors in their blue economy).

compared to Alaska (46,197), California (598,327), and Washington (143,029). As a percentage of the state's population, Oregon also has the lowest ocean economy employment. About 2.2 percent of Oregon's employed workforce is employed in the ocean economy, compared to about 14.3 percent in Alaska, about 3.4 percent in California, and about 4.2 percent in Washington.

Table 4 describes employment in the ocean and coastal economies in each West Coast state. Figure 7 shows the employment by ENOW sector across the West Coast states in a stacked bar graph. Please note that California is shown using a separate scale so as not to obscure the data visualizations for the other West coast states.

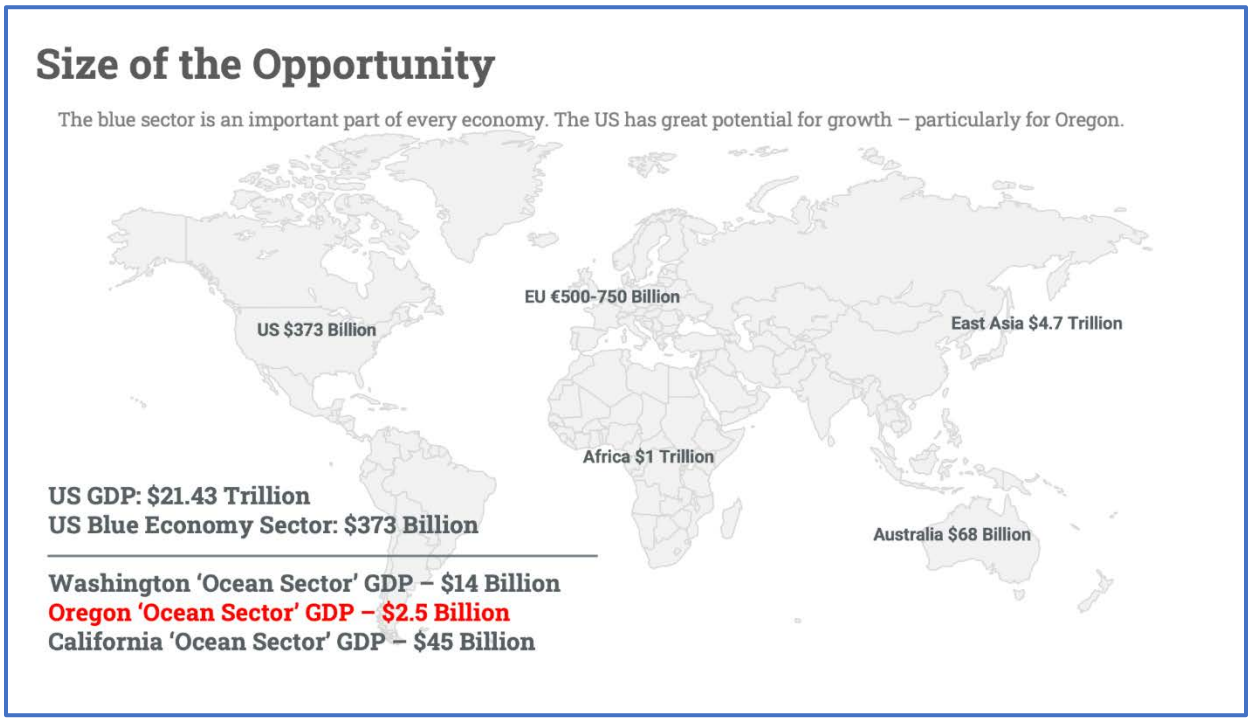


Figure 6. Potential for Oregon's blue economy growth. Source: Oregon Ocean Innovation Hub, N.D.

Table 4. Comparison of employment across the ocean, coastal, and state total economies by state, 2019.[11]

State	Ocean Economy Employment	Coastal Economy Employment	Total State Employment	% Ocean Employment	% Coastal Employment
Alaska	46,197	277,549	323,695	14.3%	85.7%
California	598,327	13,567,165	17,631,489	3.4%	76.9%
Oregon	43,175	806,558	1,953,467	2.2%	41.3%
Washington	143,029	2,497,822	3,439,158	4.2%	72.6%

Sources: NOAA ENOW 2021, National Ocean Economics Program 2021, Bureau of Labor Statistics Quarterly Census of Employment and Wages 2021. Values are in 2019 dollars.

[11] Total state employment is divided by ocean economy employment and coastal economy employment to calculate the percentage of employees in Oregon that work in ocean and coastal sectors, respectively.

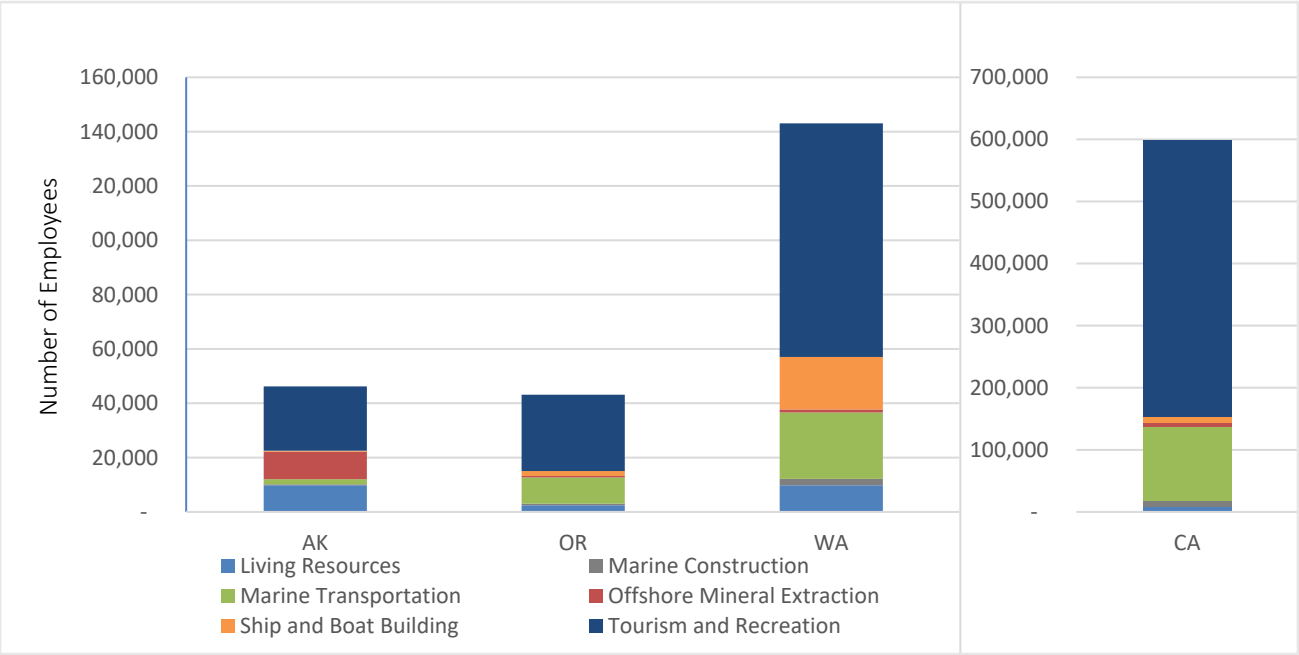


Figure 7. 2019 Employment by ENOW sector. Source: NOAA ENOW, 2021

Blue Economy Initiatives in the United States and Beyond

Many states and nations have begun to recognize the potential value in formalizing, measuring, and strengthening networks in the blue economy and have started projects and initiatives to capitalize on these opportunities. A few examples include:

- **The Port of San Diego's** Blue Economy Incubator focuses on the "creation, early development, and initial scaling of sustainable aquaculture and Port-related blue technology ventures" (Port of San Diego 2022).
- **Massachusetts's** Seaport Economic Council works to coordinate coastal community planning and investment to grow the Commonwealth's maritime economy. In 2022, the council awarded $10.8 million across 19 grants focused on commercial maritime industries, waterfront access, climate resilience, and more (Commonwealth of Massachusetts 2023).
- **Canada's** Ocean Super Cluster brings together multisector maritime partners nationwide to work on collaborative and innovative projects that will help develop solutions to maritime problems. Canada is also in the process of developing a nationwide blue economy strategy.
- **Iceland's** Ocean Cluster is recognized as one of the leading examples of a blue economy innovation cluster. Since its inception in 2012, the cluster has grown to encompass over 70 business, is financially self-sustaining, and offers a range of incubation, research, and other support services for maritime businesses (Conathan 2021).

Table 5 shows the national GDP and employment rankings of each West Coast state. As noted above, Oregon generates markedly less ocean-dependent GDP and employs significantly fewer individuals in the ocean economy than Washington and California. Oregon's ocean economy generates $3.1 billion in GDP, compared to $8.4 billion, $51.6 billion, and $15.7 billion generated in Alaska, California, and Washington, respectively. Measuring GDP generated per capita, Oregon's ocean economy generates about $329.7 per capita, compared to $1,637.8, $713.6, and $788.2 GDP generated per capita in Alaska, California, and Washington, respectively. Oregon outperforms Alaska across most sectors, apart from living resources and offshore mineral extraction sectors. California and Washington consistently outperform Oregon and Alaska in the marine transportation sector. These states are home to major shipping ports like the Port of Tacoma, Port of Seattle, and Port of

Long Beach that handle huge volumes of agricultural and consumer goods. Oregon and Alaska do not contain ports with the ability to process similar volumes of goods.

Table 5. National rank of ocean economies by state (out of 30 coastal and great lakes states) in west coast states, 2019.

GDP	Oregon	Alaska	California	Washington
Total Ocean Economy	22	11	2	5
Living Resources	16	4	2	1
Marine Construction	16	18	1	7
Ship and Boat Building	17	27	4	1
Marine Transportation	15	27	1	7
Offshore Mineral Extraction[12]	12	3	4	7
Tourism and Recreation	21	23	2	5
Employment	**Oregon**	**Alaska**	**California**	**Washington**
Total Ocean Economy	23	21	1	6
Living Resources	13	1	3	2
Marine Construction	15	20	2	7
Ship and Boat Building	17	26	7	2
Marine Transportation	15	28	1	7
Offshore Mineral Extraction[13]	8	3	4	6
Tourism and Recreation	22	23	1	6

Source: NOAA ENOW, 2021.

Little data related to the blue economy exists that is collected and published consistently and uniformly across Alaska, California, Oregon, and Washington. Development of a data set specific to the U.S. West Coast using local data would improve Oregon's ability to understand its own blue economy in relation to its neighboring coastal states.

[12] The offshore mineral extraction sector includes support activities such as geophysical exploration and mapping services and support activities for oil and gas operations. It may also capture establishments that are physically located in one state despite most of their activities taking place in another.

[13] Ibid.

Case Study: Washington's Maritime Blue Initiative

In 2019, at the request of Governor Jay Inslee, Washington state a released a new state strategy for the blue economy. The governor-established Marine Innovation Advisory Council led the development of the strategy, and the process included extensive engagement of representatives throughout the maritime sector, including industry, non-profits, academia, Tribes, government, and more. The strategy outlines how the state will develop a sustainable and thriving marine economy through a series of initiatives: decarbonization, blue innovation, working waterfronts, workforce development, and cluster coordination (Maritime Blue, 2019). A key result of the strategy was the establishment of Maritime Blue, a public-private cluster organization that functions as "a strategic alliance for accelerating maritime innovation and sustainability through knowledge sharing, technology, business and workforce development projects" (Maritime Blue, 2023). Maritime Blue's efforts range from an innovation accelerator to incubate blue economy entrepreneurship to a joint industry project to create electric ferries and green hydrogen options for ports and maritime applications to equity-focused youth workforce training (Maritime Blue, 2022). Highlights of some of their initiatives include:

- **Youth Maritime Collaborative** focuses on providing workforce training opportunities for traditionally underrepresented communities through paid internships and hands-on workforce training and education opportunities.
- **Maritime Blue Innovation Accelerator** helps maritime startups grow their efforts through a mentor-based incubator program that helps cohorts of entrepreneurs refine their functions and secure start-up funding.
- **Zero Emission Fast Foil Ferry** is a collaborative effort between ports, power companies, ship builders, and other partners to develop a "zero-emission, clean transit concept for a high-speed hydrofoil craft using lightweight carbon fiber hull construction" (Maritime Blue, 2023).

Opportunities for Expanding Oregon's Blue Economy

Opportunities Assessment

ERG identified opportunities for growth in Oregon's blue economy and associated needs by drawing on specific opportunities and themes identified through interviews, the industry representative survey, and document review. In collaboration with the Advisory Committee, ERG developed a series of criteria and a scoring system to rank each identified opportunity. Table 6 below details the criteria and associated scoring, with criteria grouped in four overarching categories.

Table 6. Criteria definitions and ranking.

Criteria	Description	Scoring
Enabling Conditions		
Infrastructure and support services available	What is the level of existing infrastructure (e.g., facilities, processing plants, dock space, etc.) to support industry development or expansion?	1) Low 2) Medium 3) High
Investment opportunities	What amount of public and private investment opportunities are available to help implement the opportunity?	1) Low 2) Medium 3) High
Stage of technology available	How advanced is the technology available related to the opportunity? Is it still under development, or is it mature and well-tested?	1) Young 2) Moderate 3) Advanced
Legal framework	Does the opportunity have an existing legal and policy framework to support implementation, and how strong is that framework?	1) Weak 2) Moderate 3) Strong
Environmental Impacts		
Environmental impacts	What are the potential environmental impacts of the opportunity?	1) High 2) Medium 3) Low
Market Feasibility		

Criteria	Description	Scoring
Synergy with existing industries	What is the level of synergies between the opportunity and other blue economy industries?	1) Low 2) Medium 3) High
Level of competition	What is the existing competition opportunity to the industry-e.g., are there other states working on this or is this a new area Oregon could fill a niche in?	1) High 2) Medium 3) Low
Market opportunity	What types of markets exist for the opportunity (e.g., scale/ maturity of market, regional or national market competition and saturation, unique contribution of OR to the market)?	1) Low 2) Medium 3) High
Barriers to entry	What is the level of barriers to entry into the market for the opportunity?	1) High 2) Medium 3) Low
Workforce		
Workforce maturity	Is there an existing workforce to address the opportunity, and how mature is the workforce (e.g., are many highly skilled and trained workers available)?	1) Low 2) Medium 3) High
Workforce growth potential	What is the level of opportunities available to grow and expand the workforce, including education and training opportunities, job assistance, and hiring support?	1) Low 2) Medium 3) High

ERG grouped opportunities into seven categories to represent the seven pillars of the blue economy industry ecosystem: 1) workforce and training; 2) research, innovation, and demonstration; 3) market and trade development; 4) community infrastructure and/or site development; 5) operational improvements and capital access; 6) social and economic equity; 7) supplier networks. After assessing and scoring each opportunity against the criteria, ERG identified the top two opportunities (or three, in instances where there was a tie score) for each industry pillar. Many of the top-ranked opportunities represent areas where there are existing efforts and investments that Oregon and its partners could build upon. Table 7 summarizes the top-ranked opportunities, including the timeframe needed to fully implement each opportunity and begin realizing industry growth benefits. (Note that all opportunities could benefit from immediate investments; however, the timeframe needed for implementation and benefits varies.) The sections below discuss the most highly ranked opportunities in more detail for each industry ecosystem pillar, and Appendix E. Opportunities Assessment provides full details regarding each opportunity and its ranking.

Overall, these criteria and the prioritization processes used represent a framework that the state can use in assessing future blue economy opportunities. Although the opportunities below represent those that are more highly ranked at this time, ERG recommends that the state continually revisits this prioritization list to see what opportunities may become more viable over time due to changing conditions (e.g., new investment opportunities, advancing technology). At the end of this section, ERG highlights a few specific emerging opportunities that represent areas of future growth, but where investments in the short term could help pilot useful technologies and approaches that could help with the initial development of these industries.

Table 7. Summary of top-ranked opportunities.

Opportunity	Summary	Average Ranking	Time Frame
Workforce and Training			
Expand and scale of marine welding training	Expand and scale Oregon Coast Community College's existing marine welding certificate (offered through the OCCC Maritime Welding Training Center), which is in collaboration with the Port of Toledo, Oregon. Expansion of the program could provide a larger trained workforce for marine welding needs on ships and in ports	**Enabling conditions:** High **Environmental impacts:** Low **Market feasibility:** High **Workforce:** High	Short-term

Opportunity	Summary	Average Ranking	Time Frame
	and build on momentum of this highly successful program.		
Develop fisheries and aquaculture training programs	Implement training programs that provide basic skills needed for fisheries and aquaculture jobs. Expanded training programs could help to attract new entrants (particular for wild capture fisheries due to greying of the workforce) and expose participants to array of skills and expertise needed for fisheries and aquaculture jobs.	**Enabling conditions:** High **Environmental impacts:** Low **Market feasibility:** High **Workforce:** High	Short-term
Research, Innovation, and Demonstration			
Develop blue economy business accelerator or incubator	Building on the work of the existing OSU Advantage Accelerator, the Centers of Innovation Excellence, the Hatfield Marine Science Center Innovation Lab, and the Ocean Innovation Hub, develop a new coast wide, blue economy-focused public-private cluster initiative[14]. The cluster could help entrepreneurs build and test blue economy businesses, receive mentorship, connect to potential investment capital, and more.	**Enabling conditions:** High **Environmental impacts:** Low **Market feasibility:** Medium/High **Workforce:** High	Medium-term
Expand coastal aquaculture and mariculture facilities	In collaboration with Oregon ports, develop expanded shoreside aquaculture and mariculture facilities (e.g., for new products such as dulse seaweed, native kelp, and urchins). These efforts could build on some existing initiatives underway for coastal aquaculture and mariculture; provide water quality, nutrient mitigation, and carbon sequestration benefits; and allow for the processing and marketing of new seafood products (e.g., urchins for sushi, high-quality kelp and seaweed).	**Enabling conditions:** Medium/High **Environmental impacts:** Medium **Market feasibility:** High **Workforce:** Medium/High	Medium-term
Market and Trade Development			
Create and expand value-added and new seafood and aquaculture products	Build on, expand, and fund many existing efforts in Oregon that are underway to create additional or value-added products from seafood and aquaculture (e.g., the Oregon Cluster Initiative, Positively Groundfish, the Pacific Aquaculture Marketing and Innovation Center). Pursuing this opportunity could help make better use of existing seafood products caught and brought to port in the state and avoid the high level of economic leakage (~30% loss of the $840 million that tourists spend on food each year) that occurs in visitor food sales due to the amount of imported food sold to tourists.	**Enabling conditions:** High **Environmental impacts:** Low **Market feasibility:** High **Workforce:** Medium/High	Medium-term

[14] Cluster initiatives or organizations are groups of interrelated businesses and other public and private partners that work together to drive innovation and strengthen their competitive advantage.

Opportunity	Summary	Average Ranking	Time Frame
Develop an Oregon seafood marketplace initiative	Raise awareness and desirability of Oregon seafood products through a targeted marketing campaign that educates consumers on the benefits and sustainability of local seafood products.	**Enabling conditions:** High **Environmental impacts:** Low **Market feasibility:** Medium/High **Workforce:** Medium/High	Short-term
Community Infrastructure and/or Site Development			
Develop a pipeline of public ports infrastructure projects, identify funding needs, and implement identified projects	Building off recommendations of the "Ports 2010: A New Strategic Business Plan for Oregon's Statewide Port System" and the development of the Capital Facilities Plan for ports, continue to plan for, inventory and develop a pipeline of potential projects to strengthen port infrastructure. Projects could also focus on reducing risks to potential climate hazards and identifying and implementing strategies to mitigate risks and strengthen resilience.	**Enabling conditions:** Medium/High **Environmental impacts:** Medium **Market feasibility:** High **Workforce:** Medium/High	Medium-term
Identify, develop, and implement coastal restoration and resilience projects	Develop and coordinate a collaborative and community-based effort to plan for and identify key restoration needs for coastal communities, particularly for projects that could strengthen coastal resilience and help build a pipeline of "shovel-ready" restoration projects. This opportunity could build off DLCD's Estuarine Resilience Action Plans, as well as the OSU and Oregon Sea Grant Oregon Coastal Futures Project.	**Enabling conditions:** High **Environmental impacts:** Medium **Market feasibility:** High **Workforce:** High	Medium-term
Enhance infrastructure for year-round seafood processing	Invest in enhanced cold storage facilities that help retain more wild capture fisheries products locally, in addition to offering year-round seafood processing opportunities. This opportunity could also require investing in the infrastructure—such as training, housing support, and more—needed for a year-round (as opposed to seasonal) fish processing workforce.	**Enabling conditions:** Medium/High **Environmental impacts:** Low **Market feasibility:** Medium/High **Workforce:** High	Medium-term
Operational Improvements and Capital Access			
Create an in-state innovation grants program for blue economy businesses	Develop a grants program (e.g., similar to existing farm grants initiatives) for blue economy businesses, such as fishers, fish processors, blue technology startups, and more. The grant program could provide access to capital for innovations, technology upgrades, sustainability solutions, new product development, and other business improvements.	**Enabling conditions:** High **Environmental impacts:** High **Market feasibility:** High **Workforce:** Medium/High	Short-term
Investigate and restructure Oregon	Review statewide job categorization system and identify ways to restructure the system to better acknowledge the blue economy and capture	**Enabling conditions:** Medium	Medium-term

Opportunity	Summary	Average Ranking	Time Frame
workforce job codes categorization	data that more accurately reflects the various jobs that relate to the sector. Implement changes to the system and consider establishing a new "blue economy" job sector.	**Environmental impacts:** Low **Market feasibility:** High **Workforce:** Medium/High	
Social and Economic Equity			
Implement a community-driven process to identify coastal community needs and blue economy priorities	Work with coastal communities to identify their needs and desires for expanding the blue economy. Develop small-scale pilot projects that provide opportunities for ongoing engagement with community organizations and members to test and implement new ideas.	**Enabling conditions:** High **Environmental impacts:** Low **Market feasibility:** High **Workforce:** Medium/High	Medium-term
Support all Oregon-based individuals and firms, including local, women-owned, or minority-owned businesses in grant-making	Develop clear criteria and a process to help all groups—including minority-owned, women-owned, and small local businesses—have an equal opportunity to compete for state blue economy grants.	**Enabling conditions:** High **Environmental impacts:** Low **Market feasibility:** High **Workforce:** Medium/High	Short-term
Supplier Networks			
Support development of the Pacific Coast Intermodal Port in Coos Bay	Support efforts to fund and develop the Pacific Coast Intermodal Port in Coos Bay. This project would entail construction of the intermodal terminal, upgrades to the existing rail line, and expansion of the navigation channel. The new Pacific Coast Intermodal Port would be a world-class, energy-efficient facility that could vastly expand the West Coast supply chain and alleviate many current supplier network issues. Supporting this development would create additional capacity for imports and exports in Oregon and on the West Coast and could generate thousands of jobs.	**Enabling conditions:** High **Environmental impacts:** Medium **Market feasibility:** Medium/High **Workforce:** Medium/High	Long-term
Strengthen local fish processing, packaging, and distribution	By strengthening the local infrastructure for fish storage, processing, packaging, and distribution, coastal communities and the state could keep more of their valuable seafood local, as opposed to exporting high proportions of landed seafood and importing seafood for local businesses.	**Enabling conditions:** Medium/High **Environmental impacts:** Low **Market feasibility:** Medium/High **Workforce:** High	Medium-term

Workforce and Training

Among interview and survey respondents, many recommended that new training and education programs could help build a skilled workforce to address existing and emerging blue economy opportunities. ERG

identified eight workforce and training opportunities, which ranged from expansion of existing courses on topics such as seafood preparation to helping integrate blue economy topics into K-12 curriculum. The two snapshots below describe the most highly ranked opportunities in this category and summarize their ratings; see Appendix E. Opportunities Assessmentfor more details.

Opportunity Snapshot: Expand and scale existing marine welding training	
Expand and scale Oregon Coast Community College's existing marine welding certificate (offered through the OCCC Maritime Welding Training Center), which is in collaboration with the Port of Toledo, Oregon. Expansion of the program could provide a larger trained workforce for marine welding needs on ships and in ports and build on momentum of this highly successful program.	
Enabling Conditions	**High:** The existing infrastructure that exists through the OCC and Port of Toledo collaboration provides a strong framework and skills to build upon and advance. There are no issues to consider in relation to the legal framework, and program expansion would draw on the skills and approaches used in the current program. The existing program has a waitlist, so student revenue could be used to help support program expansion.
Environmental Impacts	**Low:** No environmental impacts of concern.
Market Feasibility	**High:** An expanded workforce in marine welding would help provide much needed skills that are useful for many other maritime industries, including port maintenance, ship building, offshore wind platform constructions, and more. Given the existing collaboration between OCCC and the Port of Toledo, with sufficient funding this would be a relatively simple opportunity to undertake.
Workforce	**High:** There is already a skilled workforce in this area; however, there is a need for expansion. Given the highly successful nature of the program (which has a waitlist, expansion would likely generate high interest and help grow the skilled marine welding workforce.

Opportunity Snapshot: Develop fisheries and aquaculture training programs	
Implement training programs that provide basic skills (including both shoreside and at-sea skills, such as maritime safety and training, gear repair, engine repair, refrigeration repair, hatchery operations, feeding, and more) needed for fisheries and aquaculture jobs. Expanded training programs could help to attract new entrants (particular for wild capture fisheries due to greying of the workforce) and expose participants to array of skills and expertise needed for fisheries and aquaculture jobs.	
Enabling Conditions	**High:** There are existing programs and curriculum to draw on from other states both in relation to fisheries and aquaculture. The workforce in Oregon has many of the existing skills, but more localized training is needed. There are no issues to consider in relation to the legal framework, and curriculum would draw on existing workforce skills. There are many potential public and private investment opportunities to support program development, such as the Future Ready Oregon: Workforce Education and Investment Training Package, the federal Agriculture and Food Research Initiative - Education and Workforce Development Program, and more.
Environmental Impacts	**Low:** No environmental impacts of concern.
Market Feasibility	**High:** A trained fisheries and aquaculture workforce would help provide available product for restaurants and tourists throughout the state and create more supply for development of value-added products, particularly given the expanding nature of the aquaculture industry. Given the existing knowledge, resources, and skills, development of a workforce training program would not be complex, assuming available funding.

Opportunity Snapshot: Develop fisheries and aquaculture training programs	
Workforce	**High:** There is already a skilled workforce in this area; however, there is a need for expansion, particularly given the aging workforce in wild capture fisheries. Aquaculture presents a large area for expansion of the workforce with potential development of new facilities.

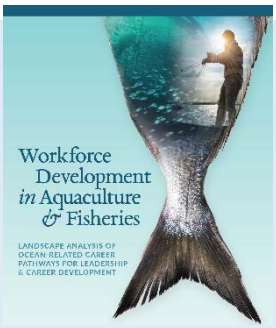
Research, Innovation, and Demonstration

Oregon's entrepreneurial spirit, strong research institutions, and desire to find sustainable solutions reflect the array of opportunities identified in this category. Suggested strategies ranged from building on the strengths of the existing fisheries industry to developing a new organization to incubate innovative ventures to piloting zero carbon marine hydrogen as an alternative fuel source. The two snapshots below describe the most highly ranked opportunities in this category and summarize their ratings; see Appendix E. Opportunities Assessmentfor more details.

Opportunity Snapshot: Develop a blue economy business accelerator or incubator	
Building on the work of the existing OSU Advantage Accelerator, the Centers of Innovation Excellence, the Hatfield Marine Science Center Innovation Lab, and the Ocean Innovation Hub, develop a new coast wide, blue economy-focused public-private cluster initiative that provides an opportunity for potential entrepreneurs to build and test blue economy businesses, receive mentorship, connect to potential investment capital, and more. The cluster initiative could be a coast-wide endeavor, with multiple facilities in locations where existing industries and institutions are currently centered (e.g., Newport).	
Enabling Conditions	**High:** There are many existing innovation centers, including some (the Ocean Innovation Hub, the iLab) that are marine focused. By working with other accelerator programs in the state and expanding the focus to have a blue economy cluster organization that is funded, statewide, and comprehensive could add great value in developing the blue economy. There are federal opportunities that could be available through agencies like the EDA to fund such an effort, and given the federal focus on blue economy initiatives, there are likely to be more opportunities available in the future. Additionally, a new organization could use a public-private funding model that would draw on private capital from participating industries and businesses and create a self-sustaining financial mode.
Environmental Impacts	**Low:** No environmental impacts of concern.
Market Feasibility	**Medium/High:** Given that there are existing, localized cluster efforts in Oregon (as well as in other states), there is some potential for overlap and competition. However, this effort could serve as a unified, statewide program that could help leverage (and not duplicate) the efforts of existing organizations. Creating a new program could allow for increased investment in and focus on blue economy opportunities within the state, although organizational development will require considerable coordination and engagement of partners, as well as investment.
Workforce	**High:** This effort would draw on the existing expertise, industries, and knowledge of those already involved with the blue economy workforce throughout the state. An accelerator or expanded cluster initiative would help grow new businesses and provide training and resources to potential entrepreneurs and workforce entrants.

Opportunity Snapshot: Expand coastal aquaculture and mariculture facilities	
In collaboration with Oregon ports, develop expanded shoreside aquaculture and mariculture facilities (e.g., for new products such as dulse seaweed, kelp, and urchins). These efforts could build on some existing initiatives underway for coastal aquaculture and mariculture; provide water quality, nutrient mitigation, and carbon sequestration benefits; and allow for the processing and marketing of new seafood products (e.g., urchins for sushi, high-quality kelp and seaweed).	
Enabling Conditions	**Medium/High:** A current effort is underway with the Oregon Kelp Alliance and the Port of Bandon to remove purple urchins from kelp forests and grow them in a mariculture urchin ranch.

Opportunity Snapshot: Expand coastal aquaculture and mariculture facilities	
	There is also existing infrastructure in other ports that could be drawn on for the development of new coastal aquaculture and mariculture facilities, and for mariculture, there are many native species of kelp that could be targets for growth (Considine et al. 2023). Funding for such efforts could come from public funders (e.g., through NOAA's Small Business Innovation Research Program, the OR USDA Rural Business Development grant program), as well as private foundations (e.g., The Builders Initiative, the Good Food Institute). The legal framework for aquaculture is well-developed (though there is not a comprehensive framework for seaweed farming regulations), although it is complex.
Environmental Impacts	**Medium:** The construction of new facilities could have potential environmental impacts—particularly in relation to potential impacts of at-sea finfish facilities to wild populations (especially if using open pen structures). Land-based facilities also will have wastewater and effluent that could impact surrounding ecosystems. However, there are also environmental benefits. For instance, for mariculture, there is large carbon sequestration potential for kelp farms—in addition to potential nutrient mitigation and water quality benefits (Considine et al. 2023)—though some potential for ecosystem impacts depending on methods (e.g., entanglement due to seaweed growth lines).
Market Feasibility	**High:** There are many aqua and mariculture facilities throughout the United States and other states that are more advanced in the industry. Given increasing demand for product, however, there is still room for aqua and mariculture growth in Oregon. More aquaculture facilities would result in more fish available for local businesses, as well as for export. High-quality kelp is also in high demand for many industries. This would align well with the existing industry and infrastructure for fish processing and would provide food for the tourism industry and local restaurants. Aquaculture and mariculture facilities could also serve as demonstration sites that the public could come to and learn more about practices and techniques.
Workforce	**Medium/High:** While there are some existing aqua/mariculture efforts in Oregon, the state is not as advanced as other states in terms of aquaculture and the workforce still needs training and expansion. Given increasing demands for fish protein and seaweed for use in a variety of food and other products (e.g., pharmaceuticals and cosmetics), the decline of wild capture fisheries, the wide array of jobs associated with aqua and mariculture operations (see case study in the box below for an example), and the potential for sourcing seafood for residents and tourists, there is large potential for expansion of the workforce.



Case Study: Opportunities for Growth and Scaling in Aqua/Mariculture

Each of the various subsectors and industries within Oregon's blue economy has a wealth of opportunities for growth and expansion. Given changes in technology, consumer demand for sustainable products, and ongoing innovations, scaling an industry could provide a wealth of economic and workforce opportunities for the state. A prime example is the aquaculture and mariculture industry. In the past three decades, aquaculture production has been increasing steadily to meet a growing demand for fish protein and a decline in wild-capture fisheries production (FAO, 2018). In 2017, Oregon's aquaculture industry generated close to 300 jobs and $12.7 million in wages (Oregon Employment Department, 2019). According to respondents interviewed and surveyed in the development of this report, there are many opportunities in the state related to growing the aquaculture and mariculture industries—from repurposing old mill sites (which have existing water rights and wastewater permits) for finfish aquaculture to smaller-scale coastal kelp farms. Overall, the aquaculture and mariculture sectors are expanding rapidly due to a variety of technological innovations—from land-based recirculating aquaculture system (RAS) facilities, new monitoring technologies to help decrease environmental impacts of aquaculture plants, and offshore aquaculture innovations and technology. Aquaculture and mariculture are complex industries, requiring a large array of suppliers, producers, and support services, such as hatcheries, farms, marine and terrestrial transport services, and processing plants. A 2019 report developed by ERG for The Builders Initiative found that the sector also requires a highly multidisciplinary workforce (ERG, 2019). The skills and jobs listed below are examples of the array of workforce needs that will be necessary to scale aquaculture and mariculture growth:

- **Physical and natural science jobs**, in areas such as biology, water chemistry, animal nutrition and physiology, ecology, and genetics that can help with advances in breeding techniques, feed advances and innovations, and other research and development areas that could help determine solutions to reduce environmental impacts of aquaculture.
- **Skilled hatchery and farm laborers** to work as farm hands, boat drivers, mechanics, equipment repair persons, and hatchery technicians, as well as **fish processing jobs** to account for increased product development.
- **Business entrepreneurship jobs,** such as skilled farm managers, to be able to start and manage farms and hatchery facilities and understand how to lead multidisciplinary teams and staff, in addition to helping with branding and marketing of value-added products produced from farms.
- **Technology, engineering, and data science jobs** to help design equipment and systems and understand data produced from new innovations (e.g., feed and water quality monitoring tools).

Market and Trade Development

ERG identified four major opportunities to develop blue economy-related markets and trade. While three of four identified opportunities related to existing markets like fisheries, aquaculture, and coastal tourism, one of the identified opportunities related to promoting development of the new offshore wind energy, particularly given the potential for the upcoming offshore wind energy leases through BOEM. The two snapshots below describe the most highly ranked opportunities in this category and summarize their ratings; see Appendix E. Opportunities Assessmentfor more details.

Opportunity Snapshot: Create and expand value-added and or new seafood and aquaculture products

Build on, expand, and fund many existing efforts in Oregon that are underway to create additional or value-added products from seafood and aquaculture. Efforts from the Oregon Coast Visitors' Association through the Oregon Cluster Initiative and Positively Groundfish, Pacific Seafood's longstanding BioOregon Protein center, and the new Pacific Aquaculture Marketing and Innovation Center present an opportunity for expansion and growth. This opportunity would help make better use of existing seafood caught and brought to port in Oregon, particular filet byproducts that are often discarded. Pursuing this opportunity could help avoid the high level of economic leakage (approximately a 30% loss of the $840 million that tourists spend on food each year) that occurs in visitor food sales due to the amount of imported food being sold to tourists.

Opportunity Snapshot: Create and expand value-added and or new seafood and aquaculture products	
Enabling Conditions	**High:** There are existing institutions making use of the extensive seafood products in Oregon (e.g., Positively Groundfish, Pacific Seafoods BioProtein Oregon center) to develop value-added and other products from seafood, including traditional fish byproducts (e.g., skins). There are many existing skills, products, and techniques to draw upon domestically and internationally. For instance, in Iceland, the Iceland Ocean Cluster successfully tripled revenues from their seafood landings by developing alternate and value-added uses of filets and fish byproducts. There could be funding opportunities through USDA grants, as well as private investors and seed capital.
Environmental Impacts	**Low:** Creating value-added products, as well as finding new uses for existing seafood waste products, would help make better—and potentially more economically viable—use of existing seafood products and would avoid the need for waste and disposal of filet byproducts.
Market Feasibility	**High:** There are many other companies domestically and internationally developing value-added and new seafood products. Oregon has potential to contribute to this market due to the volume of seafood landed and processed, and this effort could help provide high-quality seafood products to restaurants, stores, and other buyers. There still, however, will be competition from many existing companies. Finding new uses for seafood byproducts that are currently unused could also open up opportunities to provide seafood products to new markets.
Workforce	**Medium/High:** There are institutions and groups that have been working on development of value-added products for many years, though there is still a need for expanding a highly trained workforce. Given the demand for high-quality fish and seaweed products, there is likely to be an opportunity for growing a skilled workforce to address this opportunity.

Opportunity Snapshot: Develop an Oregon seafood marketplace initiative	
Raise awareness and desirability of Oregon seafood products through a targeted marketing campaign that educates consumers on the benefits and sustainability of local seafood products.	
Enabling Conditions	**High:** There are existing efforts through Positively Groundfish and others to raise the visibility of the state's fish products and educate consumers on potential fish to buy and use. While there may be some public and private funding sources to support efforts, communications campaigns could be a mainly industry-supported effort, particularly given the potential ROI from increased demand for seafood products.
Environmental Impacts	**Low:** No environmental impacts of concern.
Market Feasibility	**Medium/High:** Oregon seafood products compete with products from other states; however, there is a large opportunity to market sustainable Oregon seafood. Increased demand for seafood products would benefit fishers and aquaculture producers and could also align well with coastal tourism efforts and incentives for tourists to visit the coast. The state already has a strong seafood industry; this opportunity would help publicize and educate consumers on the value of local, Oregon-caught seafood.
Workforce	**Medium/High:** The state already has a trained fisheries workforce; these efforts would require collaborating with communications firms and others to better market and educate consumers about existing products. While the communications aspect of a seafood campaign would not directly provide many jobs, by growing interest in and demand for fish products, it could help expand the fisheries and aquaculture workforce.

Community Infrastructure and/or Site Development

Growing Oregon's blue economy will require considerable investments in infrastructure to support development and expansion of new industries and businesses. Additionally, due to increasing threats from climate change and aging infrastructure, it will be critical to invest in strengthening the resilience of existing and new infrastructure, as well as identifying risks that could impact facilities and future mitigation actions. Opportunities identified in this category ranged from identifying projects and strategies to strengthen the resilience of port

infrastructure and coasts to working to decarbonize vessels to expanding the infrastructure for marine recreation. For all opportunities related to infrastructure and site development, the state and its partners should identify potential future risks and hazards that could impact infrastructure and facility development, as well as mitigation and adaptation strategies to address these risks. There are many existing tools in the state (e.g., the Oregon Shore Explorer Map, the Oregon Hazards Explorer) that could help identify potential risks and hazards.

The three snapshots below describe the most highly ranked opportunities in this category and summarize their ratings; see Appendix E. Opportunities Assessmentfor more details.

Opportunity Snapshot: Develop a pipeline of public ports infrastructure projects, identify funding needs, and implement identified projects	
Building off recommendations of the "Ports 2010: A New Strategic Business Plan for Oregon's Statewide Port System" and the development of the Capital Facilities Plan for ports, continue to plan for, inventory, and develop a pipeline of potential projects to strengthen port infrastructure and provide blue economy opportunities, including identifying project funding needs, partners, and implementation timeframes. Projects could also focus on reducing risks to potential climate hazards and identifying and implementing strategies to mitigate risks and strengthen resilience.	
Enabling Conditions	**Medium/High:** This effort is already underway through the Capital Facilities Plan for ports. Leveraging these existing efforts and the skills and expertise of the ports could help continue this useful effort and ensure funding for ports' needs. To support these efforts, there could be the potential for federal investments through the Infrastructure Investment and Jobs Act and EDA, in addition to the potential opportunities for public-private partnerships with industries that support ports. The legal framework to support infrastructure projects at ports is generally well developed; however, projects that use newer and innovative solutions (e.g., natural and nature-based features projects) could be more difficult to permit.
Environmental Impacts	**Medium:** No environmental impacts of concern. Projects selected could have the potential to increase the sustainability of port infrastructure.
Market Feasibility	**High:** This is an Oregon-specific opportunity that would build on the existing port infrastructure and workforce and not necessitate competition with other states. Strengthening port infrastructure would benefit the many maritime industries that use port space, particularly given that existing port infrastructure is often outdated and requires repairs, particularly to support any expanded or new efforts.
Workforce	**Medium/High:** There is a strong existing port workforce to draw from, as well as existing mechanisms to gather and coordinate representatives from ports. By identifying new needs for port projects and working to obtain funding for these efforts, there could be opportunities for new jobs (e.g., for new port infrastructure development).

Opportunity Snapshot: Identify, develop, and implement coastal restoration and resilience projects	
Develop and coordinate a collaborative and community-based effort to plan for and identify key restoration needs for coastal communities, particularly for projects that could strengthen coastal resilience and help build a pipeline of "shovel-ready" restoration projects. This opportunity could build off DLCD's Estuarine Resilience Action Plans that they are beginning to work on in certain coastal jurisdictions, as well as the OSU and Oregon Sea Grant Oregon Coastal Futures Project.	
Enabling Conditions	**High:** This would build on existing efforts of many public, private, and coastal community partners, including DLCD's existing work on developing Estuarine Resilience Action Plans and OSU and OR Sea Grant's Oregon Coastal Futures project. There are also numerous public and private opportunities that could support program expansion, such as the FEMA Building Resilient Infrastructure and Communities program and the National Fish and Wildlife Foundation's National Coastal Resilience Fund. The legal framework to support traditional restoration projects is well developed; however, projects that use newer and innovative solutions (e.g., natural and nature-based features projects) can be more difficult to permit.

Opportunity Snapshot: Identify, develop, and implement coastal restoration and resilience projects	
Environmental Impacts	**Medium:** No environmental impacts of concern. Projects selected could have the potential to strengthen resilience and reduce negative environmental impacts.
Market Feasibility	**High:** These opportunities are specific to the Oregon coast and would not require competition with other states; moreover, there is a strong need to implement projects to strengthen coastal resilience given potential climate change impacts. More resilient coasts would provide protection for a variety of coastal businesses.
Workforce	**High:** While there are many organizations throughout the state with skills in restoration and resilience project implementation, there may be a need for additional expertise and training in relation to new approaches (e.g., for natural and nature-based features projects). As described above, coastal restoration projects are an important part of the blue economy and are critical in strengthening coastal resilience to climate change. Implementation of these projects could help strengthen the "restoration economy" and provide many different types of job opportunities.

Opportunity Snapshot: Enhance infrastructure for year-round seafood processing	
Invest in enhanced cold storage facilities that could allow for retaining more wild capture fisheries products locally and provide year-round seafood processing opportunities for traditional and value-added seafood products. This opportunity could also require investing in the infrastructure—such as training, housing support, and more—needed for a year-round (as opposed to seasonal) fish processing workforce.	
Enabling Conditions	**Medium/High:** While there is existing cold storage infrastructure on the coast, there is a need for expanding this infrastructure to help retain more landed seafood on the coast. This opportunity does not require any new technology and would draw on existing techniques and approaches, as well as the existing fishing, fish storage, and processing frameworks. There could be some federal investment opportunities through EDA, USDA, and the Infrastructure Investment and Jobs Act.
Environmental Impacts	**Low:** No environmental impacts of concern. Increased retainment of landed seafood on the coast could provide more local, sustainable seafood for residents and visitors, would decrease the need to import seafood from other locations, and thus reduce the associated carbon footprint of imported seafood.
Market Feasibility	**Medium/High:** This opportunity would allow for use of more Oregon-landed seafood in restaurants and businesses on the coast and throughout the state. Though there is competition with imported seafood, the benefits of local seafood would make Oregon products highly competitive. Given the increasing demand for sustainably and locally sourced seafood, having a greater ability to provide that seafood and retain more of the fish from Oregon's fishers would be a benefit to the industry.
Workforce	**High:** This opportunity would build on the existing fishing and fish processing workforce and create opportunities for more local storage of fish landed in Oregon. Increased cold storage for fish would provide more products that could be used by processors and could cause expansion of the processing industry, particularly in terms of allowing for year-long (as opposed to seasonal) fish processing. Increased locally stored fish could also provide opportunities for jobs in terms of creation of value-added products.

Operational Improvements and Capital

To provide access to blue economy opportunities for businesses and entrepreneurs, there will be a need to help connect them to capital and reduce some of the barriers that can impede business development, such as complex permitting processes. The two opportunities identified in relation to this category aim to link businesses to increased capital and better illustrate the value of the blue economy within Oregon. Due to a tie in scoring, there are three opportunities summarized below; see Appendix E. Opportunities Assessmentfor more details.

Opportunity Snapshot: Create in-state innovation grants program for blue economy businesses (e.g., fishers and food processors, blue technology, and more)	
Develop a grants program (e.g., similar to existing farm grants initiatives) for blue economy businesses, such as fishers, fish processors, blue technology startups, and more. The grant program could provide access to capital for innovations, technology upgrades, sustainability solutions, new product development, and more.	
Enabling Conditions	**High:** There are many models to draw from in developing grant programs in Oregon, and the state has funded many innovation centers and grants, although this would require the development of a new program. The state could consider looking at other blue economy federal funding initiatives and pairing these with state and private funds to create a pooled fund that they could then administer and distribute to recipients.
Environmental Sustainability	**Low:** No environmental impacts of concern.
Market Feasibility	**High:** A competitive grants program could help provide opportunities and spur growth across many subsectors of Oregon's blue economy. There is not a program like this currently in the state, and it could help advance blue economy initiatives across many subsectors. Developing and administering a grants program would not be complex; however, the state would need to identify and secure funding to support the program.
Workforce	**Medium/High:** This would draw upon existing skills among agencies within the state. Development and implementation of this opportunity would not result directly in job creation; however, a competitive grants program could help pilot and scale new blue economy businesses, which would eventually result in job creation.

Opportunity Snapshot: Investigate and restructure Oregon workforce job codes categorization	
Review statewide job categorization system and determine ways to restructure to better acknowledge the blue economy and capture data that more accurately reflects the various jobs that relate to the sector. Implement changes to the system and consider establishing a new "blue economy" job sector.	
Enabling Conditions	**Medium:** This effort would involve review of existing state and federal job codes and would require a team to implement the work. While there are likely to be limited funds to support this direct effort, better demonstrating the value of the blue economy to the state could help attract investors and better position Oregon to be competitive in federal grant opportunities related to the blue economy.
Environmental Impacts	**Low:** No environmental impacts of concern.
Market Feasibility	**High:** There have not been previous efforts like this in the state, and this effort could be critical in helping demonstrate the true value of many blue economy industries. Demonstrating the value of these industries could help make a case for increased funding of these industries. Creating new job categorizations could also help highlight important industries that are not currently included in blue economy statistics. Conducting more detailed research into the job codes and developing potentials solutions would require relatively small and one-time investment and labor time.
Workforce	**Medium/High:** This would draw on existing expertise and capacity within the state. Although this effort would not directly result in job creation, it could help highlight the value of the blue economy. Better understanding and representing the sector could help attract investors, which could result in increased capital for blue economy endeavors and ultimately, more jobs. It could also help increase interest in the blue economy among potential workforce entrants.

Social and Economic Equity

Currently, Oregon's blue economy workforce is largely white and predominantly male, though there has been an increase in women working in blue economy industries in the last few decades. Strengthening diversity, equity, and inclusion within the state's blue economy will be critical to modernizing the sector and helping attract new entrants. Opportunities identified related to strategies such as implementing community-driven blue

economy needs identification processes, designing a comprehensive workforce development program, and helping connect minority and women-owned businesses to competitive grant funding. The two snapshots below describe the most highly ranked opportunities in this category and summarize their ratings; see Appendix E. Opportunities Assessmentfor more details.

Opportunity Snapshot: Implement a community-driven process to identify coastal community needs and priorities for the blue economy	
Work with coastal communities to identify their needs and desires for expanding the blue economy. Develop small-scale pilot projects that provide opportunities for ongoing engagement with community organizations and members to test and implement new ideas.	
Enabling Conditions	**High:** This would draw upon existing expertise and knowledge of coastal businesses, institutions, and communities. While it would require funding to coordinate an inclusive process and implement pilot projects, there could be the potential for private investment from foundations (e.g., National Fish and Wildlife Foundation) or government agencies (NOAA, FEMA) with a coastal and ocean focus, particularly if the planning process focused on community-led processes to strengthen resilience.
Environmental Impacts	**Low:** No environmental impacts of concern.
Market Feasibility	**High:** This opportunity would incorporate perspectives of existing coastal businesses and residents and help identify their priorities and needs for growth and expansion; there have not been previous comprehensive efforts like this in the state, though such an effort could build off the existing framework from Oregon Sea Grant's Oregon Coastal Futures project. The results of such an effort could help strengthen coastal community economies and resilience.
Workforce	**Medium/High:** This opportunity would not require any specialty skills and would instead focus on engaging communities to identify opportunities, needs, and potential pilot projects. Implementation of identified pilot projects (and scaling of projects that occurred afterward) could have the potential to result in job growth, though the level of increase is unknown.

Opportunity Snapshot: Support all Oregon-based individuals and firms, including local, women, or minority-owned businesses in grant-making	
Develop clear criteria and a process to help all groups—including minority, women-owned, and small local businesses—have an equal opportunity to compete for state blue economy grants.	
Enabling Conditions	**High:** This opportunity would not require significant infrastructure for development and could be housed within an existing state agency, such as Business Oregon. The state could consider looking at other blue economy federal funding initiatives (as mentioned throughout this report) and pairing these with state and private funds to create a pooled fund that they could then administer and distribute to recipients.
Environmental Impacts	**Low:** No environmental impacts of concern.
Market Feasibility	**High:** Helping ensure that grants related to the blue economy are available to all Oregon firms—including small, minority-owned, and women-owned businesses—could help spur growth of these businesses. While the state has some allocation requirements in grants already, this would place an emphasis on ensuring all firms have an equal opportunity to compete for funds. This could be an important step in helping strengthen diversity, equity, and inclusion within Oregon's blue economy.
Workforce	**Medium/High:** This opportunity would provide funding for existing and new blue economy-related businesses. Ensuring an equal opportunity for all firms to compete for grants could help grow some coastal businesses, thus providing associated job growth.

Supplier Networks

To grow the blue economy, it will be necessary for the state to consider how to best expand its network of manufacturers, suppliers, and distributors that can provide the goods and equipment needed to support industries. Siting and recruitment of suppliers and related services could help existing and emerging industries grow, while providing increasing workforce and market growth opportunities in-state. As the blue economy sector grows, new supplier network opportunities will emerge; however, the two opportunities below highlight how strengthening supplier networks could strengthen the supply chain throughout the West Coast, in addition to supporting and strengthening the local value of existing industries like fishing.

Opportunity Snapshot: Support development of the Pacific Coast Intermodal Port in Coos Bay	
Support efforts to fund and develop the Pacific Coast Intermodal Port in Coos Bay. This project would entail construction of the intermodal terminal, upgrades to the existing rail line, and expansion of the navigation channel. The new Pacific Coast Intermodal Port would be a world-class, energy-efficient facility that could vastly expand the West Coast supply chain and alleviate many current supplier network issues. Supporting this development would create additional capacity for imports and exports in Oregon and on the West Coast and could generate thousands of jobs.	
Enabling Conditions	**High:** The International Port of Coos Bay has an existing rail line, a naturally deep channel maintained by the U.S. Army Corps of Engineers, and many acres of undeveloped, industrially-zoned land. While there is considerable construction and upgrades needed, there is existing infrastructure to build upon. NorthPoint Development has committed $447 million to this project. Project partners are pursuing additional funding through the Infrastructure Investment and Jobs Act and have strong congressional support in both parties for this project. The partners are also pursuing additional funding through the U.S. Department of Transportation. This opportunity would make use of existing port and rail technology and incorporate electric technology innovations at the port (e.g., electric hook ups for ships while unloading, electric cranes).
Environmental Impacts	**Medium:** Port development (including channel deepening, rail upgrades, and terminal construction) will have an unknown level of environmental impacts. However, in the long-term the project is also expected to yield many environmental benefits from using electric shore hook ups for boats, using other electric port infrastructure (e.g., electric cranes), and having direct boat to rail transport options.
Market Feasibility	**Medium/High:** There are existing large international ports on the West Coast (e.g., Port of LA/Long Beach, Port of Seattle, Port of Oakland); however, increased trade volumes have created overflow at these ports, resulting in major supply chain delays. There is thus an opportunity to expand the West Coast port infrastructure and associated supply chain capacity. By greatly enhancing supply chain capacity, reducing port congestion, and helping address supply chain challenges, this opportunity has the potential for synergy with many existing industries within and beyond the blue economy. Due to its geographic location, Coos Bay represents one of the few areas on the West Coast where large-scale international port development is feasible. While the port, NorthPoint Development, and many partners are committed to this project, there is still a need to raise a very large sum of funds to meet the projected $1.77 billion in cost.
Workforce	**Medium/High:** While there is a skilled port workforce, there would be a need to attract new workers to Coos Bay, which has experienced economic contraction since shifts in the timber industry many decades ago. There is, however, a great opportunity for economic growth that would stem from this effort; the project is estimated to produce 3,500 direct construction jobs and 6,000 permanent long-term (direct and indirect) jobs.

Opportunity Snapshot: Strengthen local fish processing, packaging, and distribution
By strengthening the local infrastructure for fish storage, processing, packaging, and distribution, coastal communities and the state could keep more of their valuable seafood local, as opposed to exporting high proportions of landed seafood and importing seafood for local businesses.

Opportunity Snapshot: Strengthen local fish processing, packaging, and distribution	
Enabling Conditions	**Medium/High:** There is some existing infrastructure related to fish processing, packaging, and distribution on the OR coast; however, there is a need to further expand this infrastructure and focus it on more local facilities, retention, and distribution of OR seafood products. There could be some federal investment opportunities through EDA, USDA and the Infrastructure Investment and Jobs Act. This opportunity does not require any new technology and would draw on existing techniques and approaches; additionally, there may be federal funding available to support this opportunity through departments such as EDA, USDA, and the Infrastructure Investment and Jobs Act.
Environmental Impacts	**Low:** There are environmental impacts of concern. Increased retainment and in-state distribution of already landed seafood locally could provide more local, sustainable seafood, would decrease the need to import seafood from other locations, and reduce the associated carbon footprint of imported seafood.
Market Feasibility	**Medium/High:** Increased processing, packaging, and distribution facilities that are focused on local-scale activities would provide many opportunities for growing the workforce, with growth concentrated within coastal communities. Increased local seafood storage, processing, and distribution would provide more local products to restaurants and businesses on the coast and throughout the state. Given the increasing demand for sustainably and locally sourced seafood, having increased ability to provide that seafood and retain more of the fish from Oregon's fishers in-state would be a benefit to the industry. Building new storage and processing facilities, as well as strengthening the local distribution infrastructure would require space for facilities and investment to build and acquire new infrastructure (including distribution).
Workforce	**High:** This opportunity would build on the existing fishing and fish processing and distribution workforce and create opportunities for more local storage, processing, and distribution of locally caught fish. Increased processing, packaging, and distribution facilities that are focused on local-scale activities would provide many opportunities for growing the workforce, with growth concentrated within coastal communities.

Emerging Opportunities

Most of the opportunities highlighted above represent areas where Oregon could consider investment in the short-term and which would likely yield benefits in a short or medium-term timeframe. There are also many emerging opportunities that did not score as highly against the criteria due to the current state of the market, workforce, and enabling conditions. These opportunities represent growth areas that are likely to take at least five to 10 years to yield scalable economic benefits; however, current investments in these areas could help pilot technology and approaches—in addition to strengthening enabling conditions—that could support future industry growth and expansion. These opportunities are highlighted below. Oregon could continue assessing emerging opportunities using the prioritization framework to determine potential new areas of investment and growth.

- **Invest in preparing for the development of the offshore wind energy industry.** The offshore wind industry is currently in its nascent stages. Due to its wind quality and coastal geography and topology, southern Oregon is uniquely situated to be one of the most economically viable offshore wind locations on the West Coast and could provide power that could be sold to customers across many Western states once infrastructure is established. There are many complexities of offshore wind development in Oregon that will need to be investigated, such as the potential environmental impacts of platform installation and impacts to existing industries that are active in the same locations (e.g., fishing). There will also need to be a significant increase in supply chain capacity to support offshore wind development. Investing in research to better understand and coordinate industry stakeholders on the environment risks, tradeoffs, long-term benefits, and supply chain needs—as well as better understanding potential synergies and conflicts with existing industries—could help the state prepare for the potential large economic opportunity stemming from offshore wind. The state and its partners

will also need to work toward developing the manufacturing and supply chain capabilities that can help provide the enabling conditions for starting and expanding a viable offshore wind industry.

- **Support piloting and growth of renewable marine hydrogen options.** There is a large potential to use hydrogen as an alternative fuel source in maritime vessels. Additionally, with the potential for offshore wind platforms, there are existing examples internationally of integrating hydrogen production, storage, and offloading into the same platforms used for offshore wind. New offshore marine hydrogen platform siting could also take place well outside of fishing grounds, thus maximizing synergies with the fishing industry. There are some short-term renewable hydrogen projects that the state and its partners could invest in, though the scale of investment will depend upon the desired application of hydrogen as a fuel source (e.g., ship engines, car charging off grid, or supplemental emergency power). Hydrogen could also present additional benefits in providing an alternative fuel source for the coast in the event of electric grid failure and power outages.
- **Explore and support options for vessel and port electrification.** Given the growing desire for electric transport and clean fuel alternatives, there is a large potential for expanding a workforce skilled in the support services needed for electric vessels and associated port infrastructure (e.g., cranes, non-road vehicles, trucks). Regarding vessel electrification, some companies, such as Photon Marine, have already begun to develop innovative solutions like electric motors. Additionally, in Washington State Maritime Blue is collaborating with industry partners to develop an electric passenger ferry. Investing in electric vessel technology and port electrification could help pave the way towards decarbonized options for maritime vessels and port services in the future.

Weaknesses and Challenges of Oregon's Blue Economy

While Oregon has many strengths and unique characteristics that can help advance its blue economy, there are also many weaknesses and challenges—both for existing and new and emerging industries—that it must overcome if the state wants to galvanize and sustain growth. The weaknesses and challenges range from physical infrastructure, overall resources, limited skills, and lack of coordination. Below are examples and details of these weaknesses and challenges as mentioned by interview and survey respondents:

Aging/Lack of Infrastructure: There are existing subsectors, such as ports, docks, production plants, fisheries, roads, sewer/water, dikes/levees, and marine transportation, that have not been maintained or lack the ongoing investment needed to sustain them. The rough ocean climate and other threats impact aging infrastructure, and there is a need to repair and build resiliency of these physical assets to threats. In addition to the existing infrastructure, there is also a need for investment in new infrastructure that could be scaled to address market needs and development (e.g., seafood production, global supply-chains for goods shipped by sea vessels, offshore wind). However, the increase in costs and permitting complexities have become major challenges for infrastructure investment, causing delays in maintaining and creating facilities that benefit the blue economy.

Limited Resources: Many rural and underrepresented communities make up the Oregon coast, but there are fewer policymakers championing efforts focused on providing economic benefits to these coastal communities. This leads to fewer financial and technical assistance resources to seek and allocate for these communities. There is a need for planning mechanisms to support small businesses, such as ports and other facilities, to apply for available funding. Given changing economies (away from resource extraction), lack of tax base, and lack of professional capacity, the state is challenged with supporting growth of its coastal industries and economies.

Limited Skills, Workforce, and Training: Oregon's blue economy workforce has many weaknesses—including an aging workforce, lack of training in the skills needed

to support blue economy growth, and limited volume of skilled workers to support all the varying existing and new blue economy activities. Job classes also currently have outdated definitions for the maritime sector. Beyond bringing new jobs and skills to the workforce, the blue economy sector also suffers from issues with employment retention, housing availability, and overall capacity. Many businesses on the coast are small and run by few people, so capacity to scale up can also be a challenge and access to local talent is limited. Additionally, many business bring in out of state/region help to support their needs, so there is also a need for diverse training programs locally and supporting development of new and existing local businesses to fill key niches.

Lack of Coordination and Competing Goals: There is a need for a clear definition of the blue economy for Oregon to help align coordination and goals among stakeholders and partners in the state. The lack of understanding and communications on what the blue economy is creates confusion and competition in both existing and new/emerging industries. There needs to be more strategic in its thinking around the blue economy and identify types of industries that are best for each community—based on equity, environmental, and social justice, as well as the culture and character of the communities. With the absence of an established "blue economy" group in Oregon, it can be difficult for other states on the West Coast to coordinate on potential regional blue economy opportunities. The state and coastal communities could benefit from increased communication, education, and marketing, regarding the blue economy's benefits, which could help generate coordinated blue economy investments within the state.

Reactive Mindset: Respondents interviewed and surveyed perceived that Oregon is slow and too dependent on research to take action when it comes to the blue economy. The lack of proactive government level leadership creates difficulties when it comes to planned resources and funding to support activities. For example, complex permitting processes are in need of streamlining and updating to reflect the current science and data and reduce unnecessary regulatory barriers. There is also a desire to continue doing business as usual, rather than looking at new models and invocation to help strengthen the blue economy in Oregon.

Strategies to Overcome Weaknesses and Challenges

Based on interview and survey responses, some key strategies and examples to overcome these weaknesses and challenges and help strengthen and expand the blue economy in Oregon include:

Leverage resources

- Encourage coastal restaurants to use local seafood. Build resilient seafood processing and storage infrastructure and understand the return on investment to the local community.
- Leverage existing programs and trainings, such as the Oregon Coast Community College's marine welding program.
- Understand different agency and organizations' goals and coordinate around a common vision and collaborative partnerships that add value strategically.
- Explore and tap into federal and state funding opportunities (e.g., Bipartisan Infrastructure Law, Inflation Reduction Act, Oregon Ocean Science Trust) and identify and draw upon lessons learned and best practices from other states, countries, and industries.

Build and develop the workforce

- Create training programs that are both responsive to current needs, but also look to the future and the potential skills that will be needed as the blue economy strengthens and expands.
- Diversify the coastal community workforce and invest in hard infrastructure, processing, storage, and packaging to be able to create value-added products from fish, aquaculture, and seaweed.
- Invest and expand in curriculum development, training equipment, and faculty to support growing and enhancing the capacity of the workforce.
- Work towards expanding incentives for more affordable and diverse housing types on the coast and increased pay for maritime jobs.
- Grow a workforce that can deal with natural hazards, particularly certified engineering geologists that support resilient development and can support restoration economies as well.

Pilot innovative and cutting-edge solutions

- Create an accelerator pipeline that helps launch new small businesses annually on the coast.
- Design and conduct think tanks and innovation hubs to foster and support emerging ideas.
- Create connections and promote collaboration among Oregon coastal communities to identify shared interests and provide greater opportunities.
- Streamline and coordinate permitting processes across agency departments to help expedite emerging initiatives in the blue economy sector.
- Support safe navigation in and out of ports and invest in emerging technology related to the shipping and transportation sector, given the importance of shipping to all other marine industries.
- Invest and partner with key players, such as those in industry, universities, utilities, labor unions, tribes, and fishing to capitalize on wind and wave power technologies.
- Create a program similar to farm grants, but for commercial and charter fishers and processors to access capital.

Maintain existing industries

- Create a better understanding of existing blue economy industries among state agencies, partners, and communities.
- Assess what infrastructure exists in each coastal community to support blue economy subsectors, and identify opportunities to build resilient infrastructure.
- Develop a plan for vetting new and emerging industries to find what makes a good fit, value add, and is aligned with community and state interests.

Increasing Viability of Oregon's Blue Economy

Based on interview and survey responses, some example strategies Oregon could take to strengthen its blue economy and subsectors within it include:

- **Raise awareness and share information** with decision-makers and community members to gather buy in and support.
- **Leverage other existing efforts and resources** and look for win-win opportunities that provide benefits for the local communities.
- **Invest in workforce development and training** and leverage university and community college programs, especially those focused on rural communities. Assess existing workforce job codes to help increase state and federal funding.
- **Update and invest in infrastructure** and support and promote growth of the existing industries and how to build resilience.

Developing Oregon's vision for its blue economy will require collaboration across communities within the state and across industrial sectors.

Lessons Learned and Best Practices from Other States

Key areas of lessons learned and best practices from other states' (Alaska, Washington, California) blue economy efforts relate to themes such as strategic planning, partnerships, and proactively identifying new opportunities. Specifically, through research related to these states' blue economy efforts, a series of strategies emerged that Oregon could apply as it looks to develop, expand, and strengthen its blue economy:

- **Develop a clear strategy and vision:** Build on existing state plans (e.g., Oregon Territorial Sea Plan, Ocean Plan) and develop a defined blue economy strategic plan for Oregon. Assess any statutory text these existing plans resulted in that can provide the framework for identifying and prioritizing strategies to achieve overall objectives. Think about how the blue economy sector and its opportunities are organized for Oregon and develop a vision for the state that can be supported and championed by all stakeholders and partners. *For examples of other West Coast states' blue economy related investment strategies, see* Table 8*.*
- **Coordinate and build partnerships:** Explore public-private partnerships that have shared goals and identified opportunities. To help raise awareness of Oregon's blue economy efforts, consider partnering with a film production company that can help develop marketing and communications material. Explore and develop marine clusters in Oregon as a community-based network to foster and build ideas, speed up innovation, and implement joint projects, as well as leverage resources. Work with employers to set up a career development program or training in underrepresented communities. Identify a leader(s) that can build credibility and trust in the communities and frame partnership engagement for each unique partner.
- **Focus on key opportunities**: Do not try to tackle everything at once, but rather be strategic and thoughtful when it comes to assessing opportunities for Oregon's blue economy. Work to achieve some small wins to leverage for the future. Explore roles as an incubator and accelerator (e.g., SeaAhead, Maritime Blue, Creative Destruction Lab) to help support and grow the economic drivers for the blue economy. Look at opportunities both in the traditional sectors (e.g., ports, fishing, tourism), as well as emerging research and technology sectors (e.g., energy development, wetland restoration, aquaculture).

Table 8. Examples Of other west coast states' blue economy related investment strategies.

State	Example Blue Economy Related Investment Strategies
Washington[1]	• **Deep Decarbonization**: Accelerate the transition of Washington's maritime industry to a low-carbon future. • **Blue Innovation**: Drive the commercialization of emerging blue technologies. • **Working Waterfronts**: Lead the nation in efficient, clean, and safe maritime practices across all sectors of the industry. • **Workforce Development**: Next generation of an inclusive and diverse maritime workforce with technological expertise and access to clean, healthy, living wage jobs. • **Cluster Coordination**: A formal cluster organization will drive implementation of Washington Maritime Blue to ensure a strong maritime industry founded on competitive companies and an attractive business environment.
Alaska[2]	• **Workforce:** Develop a diversified and resilient economy and workforce in the state. • **Research and Education**: Serve as a resource to the state by advancing research and education opportunities in fisheries, mariculture, energy, marine observing and technology, and training. • **Education**: Promote ocean economic literacy for the general public and subsistence-based coastal communities in Alaska. • **Innovation**: Focus on technological innovations that benefit Alaska's maritime industries, coastal communities, and ocean ecosystems
California	• **The Port of San Diego's Blue Economy Incubator** focuses on the "creation, early development, and initial scaling of sustainable aquaculture and Port-related blue technology ventures" (Port of San Diego, 2022).

State	Example Blue Economy Related Investment Strategies
	• **AltaSea** is investing in the blue economy with a focus on transforming systems to be more sustainable, including ocean sources of food, fuel, pharmaceuticals, and energy, along with innovation in blue technologies like underwater drones and mapping devices.

[1]Based on Maritime Blue's Strategy for the Blue Economy report.
[2]Based on goals of the Alaska Blue Economy Center and Alaska Ocean Cluster.

Diversity, Equity, and Inclusion in Oregon's Blue Economy

There is a lack of overall data and standards in demographic information available for the industries within the blue economy sector as a whole. Thus, most of the themes highlighted below in relation to diversity, equity, and inclusion (DEI) are drawn from qualitative data and perceptions from the interviews and surveys. Specifically, interview and survey respondents were asked how they would describe the existing gender characteristics of Oregon's blue economy and subsectors. Key themes included:

- The overall blue economy sector, especially particularly the fishing subsector, is heavily skewed toward a **white, male, and aging** population. Oregon's maritime subsector has a graying workforce, with 27 percent of jobs held by workers aged 55 and older (Oregon Innovation Hub, n.d.).
- The seafood processing industry is less white and has more people of color, many of whom are employed as seasonal workers. There are more women in seafood processing than in wild capture fishing.
- There are more women in the nonprofit, education, and outreach subsectors, compared to some of the more trade-based parts of the blue economy, though the population is still mostly white.
- Over the past decade and according to interview responses, there has been an increase in women in higher-level roles and positions in various subsectors of the blue economy (e.g., managing ports, chief financial officer, executive directors).
- Traditionally, the tourism and hospitality sector tends to be more diverse with regards to gender, race, and ethnicity than other areas of the blue economy.

Recommended Strategies for DEI in Oregon's Blue Economy

Importance of Considering Tribal Perspectives

As blue economy efforts move forward in Oregon, it will be necessary to engage tribes in a meaningful manner and consider tribal perspectives in all efforts. Due to the rapid timing of this market analysis, ERG was not able to engage tribes as much as intended.

Insights ERG was able to gather from the limited tribal engagement in this market analysis focused on:

- Key opportunities for growth for the tribe as it relates to the blue economy.
- Types of investments needed for this growth.
- Workforce development needs for the tribe.

Moving forward, the state should consider establishing a more formalized consultation and engagement process (e.g., government-to-government consultation, tribal-to-local government consultation, inclusive engagement) with federally recognized and non-federally recognized tribes and tribal entities to coordinate with tribal communities on blue economy opportunities. Issues related to the blue economy can impact both cultural and natural resources that tribes depend on and value. It will be critical for the state and its partners to understand these perspectives when assessing future potential opportunities and efforts and work with tribes to jointly create solutions and implement actions.

Based on responses from interviews and surveys, some recommended strategies for outreach to and increased engagement and representation of underserved communities and populations in Oregon's blue economy, as well as promoting equal opportunities for all groups, include:

- **Start collecting consistent data related to DEI**. Collect data related to DEI in a consistent manner across different projects and initiatives, especially baseline data on demographics, wages, and salaries, in order to track progress of DEI efforts. See the State of Oregon's DEI Action Plan (2021) for more information on disaggregating data as a lever for change.
- **Work with communities and community-based organizations to identify strategies and build partnerships.** Ensure strategies are developed by and for local communities. Work closely with community-based organizations and other nonprofits (see box on next page) skilled in community engagement and equity. Ensure coordination and collaboration with tribes and local/overburdened communities. Partner with community colleges that are helping diversify the workforce.
- **Target outreach.** In collaboration with community-based organizations and local communities, develop outreach strategies to target marketing related to blue economy opportunities (e.g., blue technology, electrification, marine transportation) to diverse audiences, especially those in high schools and community colleges. Create messaging around promoting the blue economy sector and the cultural value of subsectors as a viable career and job option for young adult populations. Work with tribes to develop better strategies to engage tribal communities.
- **Develop trainings and programs.** Develop workforce training or apprentice programs for local/overburdened communities focused on the blue economy, including through community colleges. Prioritize science, technology, engineering, and math (STEM) programs in rural and tribal communities and partner with organizations and programs like Oregon Pathways to Industrial Research Careers, Oregon Coast STEM Hub, Oregon Mesa, and Oregon Sea Grant. Ensure programs are led by diverse members of the community.
- **Develop incentives.** Offer incentives such as childcare, transportation, and affordable housing to help build a diverse workforce. Develop technical assistance programs to remove barriers and help people enter the workforce (e.g., by filling out forms, permits, or applications). For example, the Alaska Fishermen's Network has a list of resources related to COVID-19 impacts, financing, and job search processes.
- **Expand hiring practices.** Ensure transparent and inclusive hiring practices. Develop pathways for advancing within industries. See the State of Oregon's DEI Action Plan (2021) for more information on diversifying the workforce and creating an inclusive workplace.

Example Organizations to Help Strengthen DEI in Oregon's Blue Economy Sector

Based on interviews and survey responses, the following are suggested organizations that potentially can help strengthen DEI within Oregon's blue economy sector, either through expertise, experience, sharing best practices, resources, providing networking connections, and more.

- Adelante Mujeres
- Centro de Ayuda
- Columbia River Chapter of the Society of Women Engineers
- Consejo Hispano
- Hunters of Color
- Intersectional Environmentalism
- Maritime Blue
- Newport Fishermen's Wives
- Northwest Maritime Center
- NW Works
- Oregon Albacore Commission
- Oregon Dungeness Crab Commission
- Oregon Native American Chamber
- Oregon Salmon Commission
- Oregon Tradeswomen
- Oregon Trawl Commission
- OSU Extension Service
- Rogue Climate
- Schmidt Marine Technology Partners
- Schmidt Ocean Institute
- Sea Potential
- West Coast Seafood Processors Association

Funding Needs and Opportunities

Identifying key funding needs and opportunities is an important first step to expand Oregon's blue economy. The following subsections summarize feedback on funding opportunities that was collected from interviews and surveys with blue economy stakeholders and partners.

Scale and Types of Investment Needed

In interviews and surveys, Oregon's blue economy partners and stakeholders identified key areas where more investment could aid the growth of the sector. The sections that follow provide details related to specific needs for some of the major blue economy subsectors. Additionally, respondents also highlighted a few overarching themes related to investment needs:

- **Coordinate efforts at the state level:** Respondents discussed the need for coordinated efforts from state government to help centralize sectoral efforts and create a clear organizational structure that businesses could rely on for funding and support. Some respondents suggested that a multi-agency blue economy task force could provide this structure and help create a pathway to legitimize current blue economy related activities and focus more resources on them. Such a task force could also partner and coordinate with existing and expanded blue economy cluster organizations, like the Ocean Innovation Hub and others as discussed throughout this report.
- **Invest in community infrastructure:** Many respondents noted the need for investing in the enabling infrastructure that can support growth of the blue economy and its workforce. For instance, respondents cited the need for affordable housing for coastal communities. Many blue economy industries, such as the seafood processing industry, often struggle to obtain consistent labor and have to rely on seasonal workers. Affordable housing would allow communities to absorb a larger workforce and make it economically viable for the blue economy industries to have sustained growth. Affordable childcare would also enable a greater proportion of the community to join the blue economy workforce.
- **Strengthen investments in education and training:** In conjunction with affordable housing, many respondents emphasized that education is key to building a skilled blue economy workforce. The current maritime sector in particular is graying and beginning to retire, and there is a need for increasing the proportion of younger, skilled professionals that can fill these positions. Many interview and survey respondents mentioned the importance of building a curriculum that can be incorporated into grade schools and high schools and focuses on innovation in the blue economy to help generate excitement among the younger generation about the opportunities available in these career paths. Partnerships with community colleges and apprenticeship programs are also important to help train entry-level seafood and processor shoreside jobs.

Marine construction

Based on interview and survey responses, one of the first steps to supporting the blue economy involves investing in infrastructure. There is currently not enough available land along the coast needed for large scale industries, like aquaculture, to develop. Many companies also do not have enough industrial buildings for expansion or recruitment of workers from outside the state. Additionally, existing infrastructure is aging and requires updates to strengthen sustainability and resilience. For instance, many coastal regions rely on septic systems or well water. For Oregon to grow many ocean-related industries, such as aquaculture, sufficient municipal sewer and water services are needed to handle operations and effluent. Funds are also needed to maintain ports (both for shoreside infrastructure, as well as dredging needed for channels and boat passage) and shore facilities that thousands of tourists visit every year. Additionally, increases in broadband availability would help to digitally connect the coast and support rural businesses.

Living resources

Upgrades and investment are needed for shoreside services for the fishing industry, such as cold storage and landing space. For instance, investments in ice plants with clean, secure, onsite energy—as well as support for live tanks for storage—would help the industry retain landed product locally and provide more available seafood for coastal residents and tourists on the coast and throughout the state. Some interview and survey respondents mentioned the possibility of the state managing shared use infrastructure such as micro-processing, storage, and delivery facilities. These investments could help reduce costs and allow many small businesses to share the same land area and only use the space they need.

Like other blue economy subsectors, training for living resources industries is essential for their continued vitality. As described in the opportunities section, there is a need for investing in partnerships with community colleges to teach skills such as seafood butchering, aquaculture science, and fishing. For community colleges to be able to offer professional certification, there needs to be a Standard Industrial Classification (SIC) code to get state money to build this workforce training program and be recognized.

Investments in policy change could also help spur growth of the living resources subsector. For instance, streamlining the process for fishers to sell their products directly, as opposed to having to go through fish buyers, could make it easier for fishers to sell fish directly to local restaurants. Additionally, creating temporary permits to harvest urchins would not only generate a high value food market, but could help to mitigate the destruction of kelp forests. Kelp restoration could also improve the quality of habitat that many fished species rely on. Policy changes that make it easier for young fishers to obtain permits and quotas could also facilitate the growth of a younger generation engaged in the fishing industry.

Tourism and recreation

Tourism to the Oregon coast brings in $1.2 billion to the Oregon Coast every year (Travel Oregon, 2021). Investing in a visitor strategy for the coast could help organize and streamline goals for increasing tourism. Given that many tourists come to enjoy the Oregon coast's natural resources and outdoor recreation, there could be opportunities to strengthen the tourism base for voluntourism and citizen science activities (e.g., kelp forest replenishment, native plant restoration). Additionally, tourists spend a considerable amount of money on food and restaurants. About half of all visitors to Oregon purchased at least one food product while in the state (Suzanne Cook Consulting, LLC, 2011). Investing in the creation of more seafood products caught by Oregon fisheries would help keep visitor dollars in the state. Additionally, investments in shared use, micro processing, micro canning, and vacuum sealing could further kickstart Oregon's specialty food market. Finally, targeting investments to help ports without dining services (due to zoning constraints) offer food services through local food trucks at the port could generate more business opportunity (Oregon Coast Visitors Association, 2021).

Marine transportation

Based on the perspectives of interview and survey respondents, funding and investments in ports and port infrastructure are essential for the marine transportation sector. Building docks and port infrastructure is very costly, and consistent funding is necessary to ensure that permitted projects can be completed. Building relationships with state legislators and encouraging them to engage with port issues could help obtain funding to support updates to port infrastructure, channel dredging, and implementation of nature-based infrastructure to strengthen port resilience.

Emerging blue technology (e.g., offshore wind energy, vessel electrification)

In 2021, the Oregon House of Representatives made a goal of planning for the development of up to three gigawatts of floating offshore wind energy projects within federal waters off of the Oregon coast by 2030 (House Bill 3375, 2021). The House also created a task force on floating offshore wind energy to develop the State's strategic plan. This bill clearly established the state's policy position on offshore wind energy and suggests that substantial opportunities in this industry can be expected. To realize these goals, there will need to be significant investment in the infrastructure necessary to support these projects. For example, there will be a need for ports that are near and can service offshore locations, cable development, specialized equipment for offshore platforms, and more. Beyond offshore wind energy, other sustainable technologies will also require considerable investments. For instance, incentivizing businesses to electrify their vessel fleets and installing charging infrastructure along the waterways would further facilitate the transition to a cleaner blue economy.

Coastal restoration and resilience

Blue carbon, the carbon stored in marine and coastal ecosystems, is an important carbon sequestration tool. Investing in the conservation of and research in these ecosystems would help the state's climate action goals while also conserving important habitat and ecosystem services such as coastal flooding protection. Estuaries provide valuable habitat for the fishing industry; 68 and 80 percent of the U.S. commercial fish catch and recreational catch, respectively, spend some or all of their lives in estuaries (NOAA Fisheries, 2022).

Additionally, investing in restoration of coastal ecosystems to strengthen resilience could provide considerable economic benefits in relation to coastal protection and damages avoided, in addition to generating jobs and income.

Opportunities for Funding and Investment

Building on initial funding research by the Oregon Coast Visitors Association, ERG created a blue economy funding database (Appendix F. Funding Database) and added initial resources and grants suggested from interview and survey respondents. The majority of grants identified were from public funding sources, with 26 federal and four state opportunities. Two private and three nonprofit funding sources were also identified. Grant opportunities ranged from career development for fishers, to marine energy, to port infrastructure investment. A sample of some of the most viable public and private opportunities for Oregon to pursue are described in Table 9.

Table 9. Blue economy funding opportunities.

Funding Organization Name	Funding Type	Funding Opportunity Title	Brief Description
Builders Initiative	Private	*No specific opportunity*	Supports the following ocean areas: **Sustainable Fisheries Management -** Support innovation in the operation and management of sustainable fisheries in partnership with fishers and their coastal communities. **Ocean Resilience -** Help communities adapt to a changing climate through resilience projects and coastal and ecosystem restoration. **Catalyzing Restorative Aquaculture -** Expand restorative aquaculture projects that repair ecosystems and produce healthy seafood.
Business Oregon	Public - State	Oregon Port Revolving Fund	Provides loan funding to assist ports in the planning and construction of facilities and infrastructure.
National Fish and Wildlife Foundation (NFWF)	Public - Federal	National Coastal Resilience Fund	Grants investments in planning, design, and restoration of natural and nature-based solutions to help protect coastal communities from the impacts of storms, floods, and other natural hazards and enable them to recover more quickly and enhance habitats for fish and wildlife.
NOAA - Department of Commerce	Public - Federal	Saltonstall-Kennedy Grant Competition	Funds projects that address the needs of fishing communities, optimize economic benefits by building and maintaining sustainable fisheries, and increase other opportunities to keep working waterfronts viable.
Pacific States Marine Fisheries Commission	Public - Federal	Marine Aquaculture Pilot Projects	Funds marine aquaculture pilot projects focusing on sustainable aquatic farming techniques and regional business practices to grow U.S. domestic seafood.
U.S. Department of Energy's (DOE) Water Power Technologies Office (WPTO)	Public - Federal	Marine Energy Systems Innovation at Sea	Provides funding to accelerate the development and testing of renewable marine energy technologies with a focus on wave and ocean current resources. Offshore wind is not included in this program.
U.S. Department of Transportation	Public	Bipartisan Infrastructure Law	Will provide funding to rebuild America's roads, bridges and rails, expand access to clean drinking water, ensure every American has access to high-speed internet, tackle the climate crisis, advance environmental justice, and invest in communities that have too often been left behind.

Funding Organization Name	Funding Type	Funding Opportunity Title	Brief Description
U.S. Economic Development Administration (EDA)	Public - Federal	Build to Scale Program	Builds regional economies through scalable startups through the Venture Challenge and Capital Challenge.
U.S. Federal Emergency Management Agency (FEMA)	Public - Federal	Building Resilient Infrastructure and Communities	Supports states, local communities, tribes and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards.
U.S. Government	Public – Federal	Inflation Reduction Act	Invests in clean energy solutions for every sector of the economy and across the country, strengthens supply chains for everything from critical minerals to efficient electric appliances, and creates jobs and new economic opportunities for workers. Includes funding to modernize the electric grid, strengthen the battery supply chain, expand public transit and passenger rail, invest in new clean energy and emissions reduction technologies, and improve resilience in physical and natural systems.

Strategies for Pursuing Funding

To obtain increased public and private funding for the blue economy and its industries, Oregon will need to consider its development strategies carefully. Interview and survey respondents suggested some key strategies that could help the state pursue funding for blue economy efforts:

- **Develop a clear vision for Oregon's blue economy** that articulates how Oregon envisions the blue economy, the various industries it is concentrating on, and Oregon's unique strengths in relation to the blue economy. A clear vision will help Oregon make a compelling case of the value of its efforts for both public and private investment opportunities.
- **Assess fiscal capacity and ensure proposals are led by dedicated grant writers** (who could be within state agencies or hired as external consultants) with previous experience in blue economy and federal grant writing. A grant writer could be part of the inter-agency task force mentioned earlier in this section and help provide support to multiple state agencies as they work to pursue blue economy efforts. Ensure there is an institutional structure in place to be able to handle and administer funding as a fiscal sponsor or entity.
- **Cultivate public-private partnerships through collaboration with blue economy-related organizations**, such as tourism groups, Business Oregon, cluster organizations and incubators, and others to facilitate access to larger and more diverse grant opportunities. As recommended above, a multi-agency task force on the blue economy with a clear mandate to help pursue blue economy funding opportunities could serve as the lead (in coordination with public-private cluster organizations) to target large-scale federal funding.
- **Encourage state and federal legislatures** to include the blue economy in all infrastructure and economic development programs. Continuing to advocate for the importance of blue economy investments will help increase funding to support sector growth.

Recommendations and Actions

Oregon's ocean, coast, and estuaries are ecologically rich, and the continued health and vitality of these ecosystems is critical to a viable blue economy. The Oregon coast also boasts a wealth of world-class research and educational institutions and existing blue economy businesses, and coastal communities pride

themselves on their culture of resource stewardship. Nationally and internationally, federal and state governments have begun to place an increased focus on promoting and supporting opportunities that foster sustainable use of ocean resources and provide economic opportunities that promote ecosystem protection. Oregon is poised to capitalize upon these opportunities and expand and strengthen its blue economy. In doing so, it will be critical for Oregon to consider how to balance its rich ecological diversity and value with economic development and identify blue economy solutions and also promote ecological, community, and economic resilience. The state and its partners will also need to look for opportunities for projects with potential co-benefits for the blue economy, local communities, and the environment—such as restoration projects that could mitigate coastal hazards and climate impacts, improve living resources, and create additional recreation opportunities. The existing and emerging opportunities highlighted in this report represent specific areas where the state and its partners could consider investments in the short, mid, and long term. In addition to these opportunities, overarching actions Oregon could take to strengthen its blue economy include:

- **Conduct additional analyses to better understand blue economy opportunities.** Currently, the true economic value of Oregon's blue economy is unknown due to inconsistent reporting on ocean-related industries and the various industries they depend on. There are many analyses the state and its partners could conduct to better understand and illustrate the value of the blue economy. Examples include conducting economic valuations of industries not reported on in ENOW (e.g., emerging blue technology, coastal restoration), conducting an economic opportunities assessment to understand the potential future value of the state's blue economy, and compiling demographic and enrollment data for marine-focused training and education programs in Oregon. See Appendix G. Recommended Additional Analyses and Data Compilation to Better Understand Oregon's Blue Economyfor more details regarding additional types of analyses and data compilation that could help advance understanding of Oregon's blue economy.
- **Consider and support conditions needed to sustain subsectors within the blue economy.** Both existing and emerging industries that constitute Oregon's blue economy require more than financial investment to be viable. As the state considers which opportunities it will pursue and invest in, it should also consider factors that are necessary to sustain these industries, such as capacity and infrastructure (see the box to the right).
- **Consider opportunities for advancing DEI in the blue economy.** While the diversity of some industries within the blue economy has improved in recent years, diversity and equity still need to be strengthened within the sector. Oregon and its partners should consider how to implement and build upon the strategies highlighted above in the section on DEI in Oregon's Blue Economy to create a more inclusive, diverse, and equitable blue economy sector.
- **Continue to raise awareness of the blue economy and its value.** The blue economy landscape within Oregon, nationally, and internationally is evolving. Successfully growing Oregon's blue economy will require government, industry, local communities, and others to understand the full range of possibilities of the blue economy. Raising awareness of the value of the blue economy among decision-makers and within the governor's office, for instance, could help Oregon focus its investments and better position itself to target federal funding opportunities. Helping local consumers and tourists recognize the benefits of

Conditions to Sustain Oregon's Blue Economy Industries

There are internal and external conditions, identified through the survey and interviews, needed for sectors within Oregon's blue economy to sustain itself, including:

- **Fiscal capacity** (e.g., financial resources available).
- **Human capacity** (e.g., skilled workers, technical capacity).
- **Infrastructure** (e.g., access and upgrades to necessary infrastructure).
- **Regulations** (e.g., improved policies that are conducive to business, streamlined permitting, existing regulations that will need to be considered in project development).
- **Real estate** (e.g., access to land, facility locations, site readiness).
- **Coordination and partnerships** (e.g., community involvement in restoration efforts and strategic planning, collaboration with other states).

Oregon's blue economy businesses—while also working to understand and identify community needs— could help increase demand for some blue economy products (e.g., sustainable Oregon seafood) and increase revenue.

- **Identify opportunities for partnerships internally and externally.** Within Oregon, given the existing landscape of businesses, academic institutions, government agencies, and tribal governments working toward a variety of blue economy efforts, there are many opportunities to encourage partnerships and leverage efforts of individual entities. The state could consider identifying mechanisms within Oregon to promote internal collaboration, knowledge sharing, and collaborative enterprise development (e.g., through investing in an inter-agency taskforce, as highlighted above). Additionally, beyond Oregon there are many opportunities to partner with other West Coast neighbors. Alaska, Washington, and California have all formed blue economy efforts within their states—whether at the more local level (e.g., the Port of San Diego's Blue Economy Incubator) or statewide (such as Washington's Maritime Blue and the Alaska Ocean Cluster). Partnering with other states on specific blue economy industries or the entire sector could help build upon Oregon's unique strengths, attract additional investment, and promote distribution of blue economy products within and beyond Oregon.

> *"If there were more of a focus [on the blue economy], it would allow [Oregon] to have more of a pipeline of money…. [Oregon needs to] create a pathway to legitimize some of the things that are already happening and focus more resources on them." – Interview respondent*

- **Identify strategies to protect cultural and natural resources.** Oregon's cultural and natural resources are essential to the viability of its blue economy. The condition these resources will impact blue economy businesses, and business development has the potential for negative environmental impacts that could harm natural and cultural resources. As Oregon moves forward with blue economy development, it should assess how to balance economic growth with environmental protection and consider strategies to support community, economic, and ecological resilience. The state and its partners will also need to consider how growth of the blue economy relates to state priorities on ecological protection, such as marine reserves, fisheries management actions, endangered and threatened species protection, and more.
- **Leverage existing resources and industries.** There are many opportunities over the coming decade for blue economy-related industries that are likely to grow and become more viable, such as offshore wind production, marine hydrogen, and electric vessels. These new blue economy technologies may be ripe for investment in the future (and may have considerable public and private investment in). However, it will also be critical for Oregon to continue leveraging and strengthening existing resources and industries that have formed the mainstay of the state's blue economy for many decades, such as fishing, tourism, maritime construction, and more. As highlighted within the opportunities presented earlier in this report, there are many ways to strengthen and expand the profitability of these industries. Oregon and its partners should continue to work with existing industries to identify mechanisms to strengthen and support their growth and expansion.

> *"[Oregon needs to] assess coastal resilience. Resilience takes on a number of forms, but [we need] strategies that focus on long term resilience of a community--what industries can we support, what's been here, what will be here in 100 years, how can we make this community thrive through the future with all of the changes that will be coming?" – Interview respondent*

Industry Pillar Recommendations

In addition to these overarching actions, Oregon could also consider the recommendations outlined below for each of the seven industry pillars.

Workforce and Training

Oregon has a strong network of research institutions and community colleges that are already working extensively on research, education, and training programs related to marine and ocean resources and the blue economy. Most opportunities highlighted in this report showcase these existing programs and recommend expanding on their successes. Beyond Oregon, there are also trainings and curriculum from programs in other states on key topics—such as mariculture, aquaculture, fisheries technology, and more. The state should consider how to best make use of existing programs within and beyond Oregon, as well as the key needs throughout various blue economy industries in relation to workforce and training. Evaluating existing workforce and training strengths, needs, and gaps will help Oregon direct future investments as strategically and effectively as possible and avoid duplicating existing programs.

Research, innovation, and Demonstration

There are many areas of growth within the blue economy, particularly in developing and piloting new products and technologies that could offer sustainable replacements for existing products (e.g., renewable marine hydrogen as an alternative fuel). The state should continue investigating potential new products and technologies as well as the expansion of facilities for existing but growing industries, such as aquaculture. Additionally, to support incubation of new blue technology businesses and entrepreneurs, the state could consider formalizing, leveraging, and expanding existing blue economy cluster and incubator organizations like the Oregon Innovation Hub. A cluster organization could provide a clear pathway for helping incubate research, development, and scaling of new blue economy businesses.

Market and Trade Development

There are many opportunities to strengthen the existing industries that currently constitute the majority of Oregon's blue economy (e.g., fishing, tourism), through targeted marketing, branding, and new product development (e.g., new value-added seafood products). Focusing on marketing and expanding existing industries could help target state, domestic, and international markets for Oregon products. Additionally, the state should continue to track and identify opportunities to invest in (when ready) emerging industries that Oregon is uniquely situated to contribute to, such as offshore wind energy.

Community Infrastructure and/or Site Development

As highlighted throughout this report, strong and resilient infrastructure is a critical enabling condition to support blue economy businesses and industries. Infrastructure investments are critical in helping spur job creation and growth, and there are opportunities for the state to consider infrastructure investments that are sustainable, inclusive, and resilient. Given the age of some infrastructure related to Oregon's blue economy (e.g., ports)—as well as notable gaps in infrastructure, such as the lack of shoreside cold storage facilities—the state and its partners should carefully assess the needs of existing and new infrastructure. Understanding and prioritizing opportunities for infrastructure investment across various blue economy industries can help the state guide its blue economy infrastructure spending in the short, mid, and long term.

Operational Improvements and Capital Access

For businesses and industries within the state's blue economy, Oregon has a critical role to play in helping attract capital to support business scaling and expansion, thus increasing the profitability of the blue economy sector. The state should consider how it can attract increased public and private investment in the state's blue economy, as well as how it can help distribute funds to potential businesses and entrepreneurs. Additionally, Oregon should consider the steps it can take (as outlined throughout this report) to strengthen collection of baseline and ongoing data for the blue economy sector and better demonstrate the true economic value of the sector within and beyond the state. Oregon could also consider investigating potential barriers to investment (e.g., policies and regulations, lack of infrastructure) and determining policy and programmatic solutions to help remove these barriers.

Social and Economic Equity

Although an increasing number of women have been entering the blue economy workforce across various industries, Oregon's blue economy workforce currently is still largely male. Additionally, the blue economy workforce is overwhelmingly white. As the state seeks to increase diversity, equity, and inclusion within the blue economy sector, it will need to carefully consider potential strategies to address challenges such as low wages, disparate employee benefits, and inequitable treatment within the workforce. The state and its partners could consider the following actions: 1) collecting consistent data related to DEI, especially baseline data, in order to track progress of DEI efforts; 2) establishing and supporting workforce development programs (both state and federal) that provide job exposure and training to a diversity of participants; and 3) providing equal opportunities for funding small-scale, local, and minority and women-owned businesses. Additionally, Oregon could work to engage coastal communities in identifying and prioritizing what they need in order to strengthen local opportunities within the blue economy.

Supplier networks

Both existing and emerging industries within Oregon's blue economy are growing. Manufacturers that produce specific supplies needed for industries (e.g., cables and floating platforms for offshore wind energy development, fish processing equipment, ship parts) will be critical for helping scale industry growth. Oregon will need to consider mechanisms for recruiting suppliers and related services, particularly if it wants to maximize the number of blue economy-related benefits that can be brought to and stay within Oregon. The state will need to identify critical supply chain needs and opportunities, with a focus on the parts of the coast with current or increasing clusters of industry assets. In thinking about supplier networks, Oregon should consider strategies for ensuring supply and distribution of critical blue economy products (e.g., local seafood) within Oregon to help capture more of the value and benefits of the blue economy locally.

Proposed Metrics to Assess Progress

To track the progress of its blue economy, Oregon will need to have a clear set of metrics that it can use to assess performance in relation to its goals. Table 10 presents recommendations on preliminary blue economy progress metrics to consider and Table 11 presents proposed DEI metrics to consider. The tables below propose metrics where most can be compiled by mining publicly available data streams (which are linked in the tables) that are currently being collected and published by organizations in Oregon and across the United States. Oregon can use these metrics to establish a current baseline understanding of its blue economy and to track changes in Oregon's blue economy over time. Unless the sampling location of a proposed DEI metric is indicated as exclusively coastal or beach level, data are available for non-coastal Oregon counties as well for purposes of comparison. The proposed metrics are constrained by current data gaps (which have been described throughout this report). DEI data related to Oregon's blue economy is especially limited. Expanding collection and publication of Oregon-specific data related to the blue economy would improve the state's ability to track both the growth of the blue economy and changes in DEI in the blue economy. Recommendations for analyses to assess the status of DEI in Oregon's blue economy are included in Appendix G. Recommended Additional Analyses and Data Compilation to Better Understand Oregon's Blue Economy at the end of this report "Recommended Additional Analyses and Data Compilation to Better Understand Oregon's Blue Economy".

Table 10. Proposed metrics to assess blue economy progress in Oregon.

Metric	What does this metric indicate?	Organization Collecting Data	Sampling Locations and Granularity for Oregon	Data Sources, Repositories, or Contact Info
Number of workers in Oregon's Ocean Economy*	Blue economy job growth	National Oceanic and Atmospheric Administration	Nation-wide (county level for OR)	ENOW Explorer

Metric	What does this metric indicate?	Organization Collecting Data	Sampling Locations and Granularity for Oregon	Data Sources, Repositories, or Contact Info
Wages paid to workers in Oregon's Ocean Economy*	Blue economy income	National Oceanic and Atmospheric Administration	Nation-wide (county level for OR)	ENOW Explorer
Establishments in Oregon's Ocean Economy*	Blue economy market structures	National Oceanic and Atmospheric Administration	Nation-wide (county level for OR)	ENOW Explorer
GDP Generated by Oregon's Ocean Economy*	Monetary value of blue economy goods and services	National Oceanic and Atmospheric Administration	Nation-wide (county level for OR)	ENOW Explorer
Oregon Sea Grant Project Funding Annually	Blue economy spending	National Oceanic and Atmospheric Administration/ National Sea Grant	Nation-wide (state level for OR)	PIER Database
Average Coastal Property Value per Parcel ($)	May indicate a strengthening coastal economy with greater demand for housing and/or rising incomes	American Community Survey (ACS) – Census Bureau	Nation-wide (county level for OR)	American Community Survey
		Commercial Real Estate Companies	Zillow (household level for OR; also available at zip code, county, city/town, and state levels)	United States Home Values
			Redfin (household level for OR; also available at zip code, county, city/town, and state levels)	United States Housing Market
Commercial Fish Landings (Pounds and Value in $)	Monetary value of OR fishing operations; Potential to indicate overfishing	National Oceanic and Atmospheric Administration	Nation-wide (State level for OR)	Landings Database

*Using the NOAA ENOW classification of the ocean economy across six ocean-dependent economic sectors[15]

[15] NOAA Office for Coastal Management Economics: National Ocean Watch (ENOW) Sectors, Industries, and the North American Industry Classification System (NAICS)

Table 11. Proposed metrics to access diversity, equity, and inclusion in Oregon's coastal communities.

Metric	What Does This Metric Indicate?	Organization Collecting Data	Sampling Locations and Granularity for Oregon	Data Sources, Repositories, or Contact Info
Ratio of seasonal salaries vs. cost of living	Likely to indicate affordability of communities for residents of coastal communities, and help address the question of whether seasonal workers can afford to live in the communities where work.	Middlebury Institute of International Studies at Monterey, Center for the Blue Economy, National Ocean Economics Program (NOEP)	Coasts Nation-wide (county level for OR)	Data for seasonal workforce wages can be found on the National Ocean Economics Program website
		U.S. Bureau of Labor Statistics	Nation-wide (county level for OR)	Overview of BLS Wage Data by Area and Occupation Bureau for Labor Statistics website
		U.S. Census Bureau	Nation-wide (state level for OR)	Data for housing affordability can be found on the U.S. Census Bureau Housing Affordability website.
		U.S. Department of Housing and Urban Development	Nation-wide (zip code tabulation area for OR; data also available at place, county, and state levels)	The U.S. Department of Housing and Urban Development Geospatial Data Storefront hosts several datasets regarding fair housing and community indicators.
		National Association of Realtors	Nation-wide (place level for OR	Housing Affordability Index
Number of people employed by advocacy groups	Employment in advocacy work can serve as a proxy for the volume of advocacy activities in coastal communities	Bureau of Labor Statistics (BLS)	Nation-wide (county level for OR)	Quarterly Census of Employment & Wages
Correlation of beach water quality with percentages of non-white residents in coastal counties	Distribution of coastal-specific environmental risks based on race	Oregon Health Authority	State-wide (beach level for OR)	Oregon Beach Monitoring Program
		U.S. Census Bureau	Nation-wide (county level for OR)	American Community Survey Data
Number of Oregon's coastal access locations that include accessibility improvements	Access to Oregon coasts based on ableness	Oregon Coastal Management Program	Oregon Coast (state level for OR)	Oregon Coastal Access Inventory

Metric	What Does This Metric Indicate?	Organization Collecting Data	Sampling Locations and Granularity for Oregon	Data Sources, Repositories, or Contact Info
Correlation of household income with percentages of non-white residents in coastal counties	Distribution of coastal economy benefits based on race	U.S. Census Bureau	Nation-wide (county level for OR)	American Community Survey Data
Correlation of poverty rates with percentages of non-white residents in coastal counties	Distribution of coastal economy benefits based on race	U.S. Census Bureau	Nation-wide (county level for OR)	American Community Survey Data
Trends in racial and ethnic population make up in Oregon's coastal counties	Trends in racial and ethnic diversity in coastal counties	U.S. Census Bureau	Nation-wide (county level for OR)	American Community Survey Data
Trends in population sex ratio (males per 100 females) in Oregon's coastal counties	Trends in the number of male and female individuals living in coastal counties	U.S. Census Bureau	Nation-wide (county level for OR)	American Community Survey Data
Number of men and women living in poverty in Oregon's coastal counties	Distribution of coastal economy benefits based on gender	U.S. Census Bureau	Nation-wide (county level for OR)	American Community Survey Data
Demographics (race, gender) awarded grant funding related to the blue economy	Distribution of professional and economic opportunities in the blue economy based on race and gender	Currently not collected	TBD; ideally, in relation to all funded blue economy grant recipients	The state would need to consider appointing a state agency to collect this data (or to compile data across agencies) for all blue economy grant recipients
Demographics (race, gender) of workforce and training program participants	Distribution of educational opportunities in the blue economy based on race and gender	Unknown, may potentially be collected by existing training programs	All blue economy-related training and education programs	The state would need to coordinate with blue economy education and training programs (e.g., those run through community colleges) to ensure collection of relevant demographic data

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Appendix A. Engagement Methods

To inform report development, ERG engaged representatives with knowledge in the blue economy through four main avenues, each of which is described in more detail in the following sections: an Advisory Committee, a project Steering Committee, key informant interviews, and a blue economy industry representative survey (for a list of all individuals engaged, please see Appendix B. Stakeholders Engaged).

Advisory Committee and Steering Committee

ERG and Business Oregon coordinated two groups to guide the project: an Advisory Committee and a Steering Committee. The Advisory Committee included individuals representing a range of interests related to Oregon's blue economy (see Appendix B. Stakeholders Engaged). Throughout the project, the Advisory Committee:

- Provided insights and feedback to actively guide the project process.
- Helped fill data gaps and support external stakeholder engagement.
- Provided advice on the project approach and research tools.
- Reviewed draft plans and other project materials.

The Advisory Committee met five times over the course of the project:

- **Meeting 1 (Kickoff):** Reviewed the project approach, process, and timeline (held on 11/15/22).
- **Meeting 2:** Discussed initial industry profile, engagement methods, and preliminary opportunities (held on 12/27/22).
- **Meeting 3:** Provided feedback on industry expansion issues, supply chain needs, labor requirements, job growth opportunities, and investment capital needs (held on 1/24/23).
- **Meeting 4:** Commented on identified actions and tactics to grow Oregon's blue economy and cultivate investment; diversity, equity, and inclusion measures and outreach methods; and metrics for growth (held on 2/7/23).
- **Meeting 5:** Provided high-level feedback on the draft consolidated report (held on 2/21/23).

In addition to the Advisory Committee, Business Oregon and ERG engaged a smaller project Steering Committee. The Steering Committee met on a biweekly basis throughout the course of the project and provided feedback on all interim deliverables (e.g., research tools, draft report sections), in addition to helping connect ERG to relevant blue economy representatives and providing guidance on the direction of the project. The Steering Committee included of nine individuals, including representatives from Business Oregon, academic institutions, economic development organizations, and industry representatives (see Appendix B. Stakeholders Engaged for a full list of Steering Committee representatives).

Key Informant Interviews and Online Survey

In collaboration with the Steering Committee, ERG identified 21 individuals for key informant interviews, and interviewed 17 individuals. Interview respondents represented a range of sectors within Oregon's blue economy, including business, economic development, research and education, fisheries and aquaculture, ports, and ocean energy (see Appendix B. Stakeholders Engaged). ERG also interviewed three representatives from other West Coast states (Alaska, California, Washington) with knowledge of best practices and lessons learned from those states' blue economy efforts. Interviews addressed the following objectives:

- **Objective 1:** Gain feedback on how Oregon should define its blue economy sector.
- **Objective 2:** Understand the competitive economic strengths and weaknesses of the blue economy sector and its subsectors in Oregon.

- **Objective 3:** Discuss potential strategies, policies, actions, and funding opportunities that could be taken to overcome weakness and barriers, strengthen the state's blue economy, and increase its competitiveness.
- **Objective 4:** Identify lessons learned and best practices for blue economy growth from other states.
- **Objective 5:** Gather perspectives on pathways for strengthening diversity of the blue economy and subsectors within it.

For the full set of interview questions asked, please see Appendix C. Interview and Survey Questions

To complement interviews and allow for a broader sampling of blue economy representatives, ERG also distributed an online survey through the platform SurveyMonkey. The survey contained the same questions as the interview, and ERG asked survey takers to provide written answers for the questions. ERG distributed 70 surveys and received 30 responses (response rate = 43%).

ERG analyzed all data and used inductive and deductive coding to identify key themes and trends across respondents. Findings informed the Task 3 Opportunity Assessment and Task 4 Strategic and Tactical Guidance.

Tribal Engagement

The Steering Committee and ERG worked together to identify tribal representatives to engage as part of the study. Steering Committee members provided ERG with tribal contacts they are already connected to (e.g., the Siletz Tribe), and ERG followed up with these individuals accordingly, but only were able to talk to a couple tribal representatives. Tribes are a critical voice in this conversation, especially on the topic of impacts to cultural resources. It is important to acknowledge the Tribal communities, their place in the landscape, and the interconnectedness of and similarities between cultural and natural resources. Moving forward, there needs to be a cultural and tribal lens on blue economy efforts considered.

Appendix B. Stakeholders Engaged

Please see the full list of individuals engaged through the Steering Committee, Advisory Committee, interviews, and surveys below. This list also includes those who were invited to review and provide feedback on the draft deliverables.

ROLE	ORGANIZATION	LAST	FIRST	TITLE
A/Lead	Business Oregon	Greene	Donna	Strategic Initiatives Project Manager Project Administrator
A/Lead	Eastern Research Group ERG: Blue Earth Team	Lam	Jennifer	Director Consulting Project Manager
A/Lead	Eastern Research Group ERG: Blue Earth Team	Pietri	Diana	Senior Social Scientist Consulting Deputy Project Manager
B/Steering Committee	Business Oregon	Flathers	Courtney	Ports Manager
B/Steering Committee	Business Oregon	Murphy	Melissa	Regional Development Officer
B/Steering Committee	Economic Development Alliance of Lincoln County	Schuytema	Paul	Executive Director
B/Steering Committee	Oregon Coast Energy Alliance Network	Souza	Shannon	Policy Chair
B/Steering Committee	Oregon Coast Visitors Association	Hinz	Marcus (Mark)	Director
B/Steering Committee	Oregon State University - Hatfield Marine Center	Farley	Mark	Strategic Initiatives Manager
B/Steering Committee	Oregon Trawl Commission	Nowak	Yelena	Executive Director
B/Steering Committee	Port of Newport	Miranda	Paula	General Manager
C/Advisory & Interest Group	Local Ocean	Anderson	Laura	Founder/Owner
C/Advisory & Interest Group	Center of Excellence for Marine Manufacturing & Technology	Avery	Ann	
C/Advisory & Interest Group	Port of Coos Bay	Barber	Margaret	Director of External Affairs and Business Development
C/Advisory & Interest Group	Renewable Northwest	Brandt	Diane	Oregon Policy Manager
C/Advisory & Interest Group	Port of Coos Bay	Burns	John	
C/Advisory & Interest Group	Women's International Shipping and Trade Association	Burroughs	Sarah	WISTA USA PNW co-chapter President

ROLE	ORGANIZATION	LAST	FIRST	TITLE
C/Advisory & Interest Group	Pacific Ocean Energy Trust (POET) and Oregon Seaweed	Busch	Jason	Executive Director
C/Advisory & Interest Group	Oregon Albacore and Salmon Commissions	Carlson	Ericka	Administrator
C/Advisory & Interest Group	Deep Blue Pacific Wind	Cogswell	Peter	Director of Government and External Affairs
C/Advisory & Interest Group	Port of Port Orford	Cox	Pat	
C/Advisory & Interest Group	Oregon Department of Agriculture	Garman	Erick	Trade Development Manager
C/Advisory & Interest Group	Port of Bandon	Griffin	Jeff	Port Manager
C/Advisory & Interest Group	Renewable Northwest	Hughes	Nicole	Executive Director
C/Advisory & Interest Group	Port of Siuslaw	Huntington	David	
C/Advisory & Interest Group	Port of Astoria	Isom	Will	Executive Director
C/Advisory & Interest Group	Port of Umpqua	Kent	Scott	
C/Advisory & Interest Group	Energy Ventures	Klure	Justin	
C/Advisory & Interest Group	NorthPoint Development	McKeown	Caddy	
C/Advisory & Interest Group	Oregon Fishermen's Cable Committee	McMullen	Scott	Chairman
C/Advisory & Interest Group	Deep Blue Pacific Wind, Simply Blue Group	Morrice	Katie	Environmental/Permitting Manager
C/Advisory & Interest Group	Midwater Trawlers Cooperative	Munro Mann	Heather	Executive Director
C/Advisory & Interest Group	Oregon Dungeness Crab Commission	Novotny	Tim	Executive Director
C/Advisory & Interest Group	Gadusol Labs	Pettinger	Katie	
C/Advisory & Interest Group	Oregon Department of Land Conservation and Development	Phipps	Lisa	Oregon Coastal Management Program Manager
C/Advisory & Interest Group	Small Business Development Center-OCCC	Price	Dave	Director, Oregon Coast SBDC

ROLE	ORGANIZATION	LAST	FIRST	TITLE
C/Advisory & Interest Group	Oregon Department of Land Conservation and Development	Reed	Meg	Coastal Policy Specialist
C/Advisory & Interest Group	Business Oregon	Runberg	Damon	Economist
C/Advisory & Interest Group	Port of Brookings Harbor	Sachanowski	April	Port Office
C/Advisory & Interest Group	Port of Toledo	Scacco	Debbie	Port Manager
C/Advisory & Interest Group	Transportation Institute	Scherer	Sarah	
C/Advisory & Interest Group	Oregon Department of Energy	Sierman	Jason	Senior Policy Analyst
C/Advisory & Interest Group	West Coast Seafood Processors	Steele	Lori	Executive Director
C/Advisory & Interest Group	Nicoll Black & Feig	Strunk	Elizabeth	
C/Advisory & Interest Group	OregonState University - Hatfield Marine Center	Sylvia	Gilbert (Gil)	Marine Resource Economist
C/Advisory & Interest Group	Port of Gold Beach	Wright	Andy	Port Manager
	Tradewinds Charters	Achen	Noelie	
	Hallmark Fisheries	Adams	Crystal	
	Photon Marine	Alvarez	Marcelino	
	Washington Maritime Blue	Berger	Joshua	CEO
		Bladholm	Susan	
	Curry County Commission	Boice	Courtney	Commissioner
	Lane County Commission	Bozievich	Jay	Commissioner-District 1 West Lane County. Sits on Oregon Coastal Zone Management Association Committee
	Port of Tillamook	Bradley	Michele	
	Chelsea Rose Seafood	Brandburg	Cari	
	Oregon State University - Port Orford Field Station	Calvanese	Tom	Station Manager
	Oregon Manufacturing Innovation Center	Campbell	Craig	Executive Director

ROLE	ORGANIZATION	LAST	FIRST	TITLE
	Washington Maritime Blue	Carter	Josh	Director
	Oregon State University - Cooperative Institute for Marine Ecosystem and Resources Studies (CIMERS)	Chan	Francis	Director
	Center for the Blue Economy at Middlebury Institute	Colgan	Charlie	Research Director
	OR Salmon Commission, Newman's Fish Company	Collins	Dwight	Owner
	Oregon State University - Oregon Sea Grant	Crews	Tracy	Marine Education Program Manager
	Northwest Oregon Works	DeSart	Heather	Executive Director
	Alaska Ocean Cluster	Evridge	Garrett	Managing Director
	USCG Marine Safety Office	Farrell	Curt	
		Garber	Sorin	
	Challenger Biosciences LLC	Gerhart	Don	
	South Coast Dev Council	Gibbs	Shaun	
	Oregon Albacore Commission	Goche	Rick	Chair
	South Coast Dev Council	Haga	Theresa	
	Oregon State University - PacWave	Hellin	Dan	Deputy Director
	Positively Ground Fish	Hennig	Jana	Executive Director
	Lincoln County Board of Commissioners	Jacobson	Kaety	Commissioner
	Tillamook Bay Community College	Jarrell	Paul	
	Coquille Indian Tribe	Johnston	Mark	Executive Director
	Oregon Public Ports Association	Landauer	Mark	Executive Director
	Oregon Department of Land Conservation and Development	Lanier	Andy	Marine Affairs Coordinator

ROLE	ORGANIZATION	LAST	FIRST	TITLE
	Pacific States Marine Fisheries Commission	Lomeli	Mark	
	Port Orford Sustainable Seafood	Longton	Aaron	
	Sequoia Consulting	Maddock-Hughes	Rachael	Grantwriter
	Oregon State University - Advantage Accelerator	Mundorff	Karl	Executive Director of Innovation and Entrepreneurship, Director OSU Advantage Accelerator
	OR Salmon Commission, Newell Seafood	Newell	Mark	Owner
	Oregon State University - Oregon Sea Grant	Nielsen	Karina	Director
	Oregon Aquaculture Association	Parrish	Kellen	
	Fishermen Direct Seafoods	Perdikis	Bruce	
		Pettinger	Brad	Fisherman
	Confederated Tribes of the Siletz Indians	Pigsley	Delores	Chair
	Oregon Boating Foundation	Richardson	Ollie	
	Port of Garibaldi	Saindon	Michael	
	Confederated Tribes of Coos, Lower Umpqua, and Siuslaw	Slyter	Doc	Chief
	Port of Portland	Smith	Doug	
	Tri Marine Group	Svensson	Christa	
	Coos County Commission	Sweet	John	Commissioner (part of the the South Coast Development Corporation)
	NearSpace	Tucker	Kevin	President
	Clatsop County Commission	Wev	Pamela	Commissioner District 3
	Clatsop Community College Maritime Science	Wilkin	Kristen K	
	Cow Creek Band of Umpqua Tribe of Indians			
	Curry Marine			

ROLE	ORGANIZATION	LAST	FIRST	TITLE
	Fishermen Direct Seafoods			
	Oregon Oyster Farms, Inc.			
	Port Orford Sustainable Seafood			
	Umpqua Triangle Oysters			
	Whiskey Creek Shellfish Hatchery			
	Yaquina Boat Equipment			

Appendix C. Interview and Survey Questions

ERG asked the questions below during key informant interviews with blue economy experts from Oregon and neighboring states. Additionally, individuals who ERG was not able to interview due to time and scope constraints received an online survey with the same set of questions.

1. Prior to our interview today, we sent over this link to existing blue economy definitions. In thinking about Oregon specifically, do you have a suggested definition (or parts of a definition) for the blue economy?
2. What are unique characteristics of Oregon that the state should consider in growing its blue economy in relation to the following:
    - Geographic characteristics?
    - Existing industries?
    - Workforce skills and composition?
    - Academic institutions?
    - Businesses?
3. What do you see as Oregon's strengths in relation to the blue economy and various subsectors within it?
    - How do these strengths set Oregon apart from other states?
4. What do you see as Oregon's weaknesses in relation to the blue economy—both for existing and new/emerging industries?
    - What strategies can Oregon take to overcome these weaknesses in working to expand its blue economy?
5. What types of strategies could Oregon take to increase the competitiveness of its blue economy and subsectors within it?
6. For [**subsector that respondent is most familiar with**] What do you see as key opportunities for growth in your sector?
    - What suppliers are most important to sustaining your industry/sector?
    - What are the main needs (e.g., workforce development and training, increased investment, business incubation, partnership development, etc.) in relation to these opportunities?
7. What types of jobs within the [**respondent's sector**] will be involved in addressing the current (next five years) growth and opportunities you mentioned?
    - What types of skills or certifications do you think are necessary for entrants to the workforce to have, considering changes and growth in the coming years?
    - What types of new training and skills are needed to help scale growth and incubate new businesses?
    - What actions do you think Oregon can take to support potential entrants to the workforce in gaining needed skills?

8. For [**respondent's sector**], what are the internal and external conditions that you think your sector needs to sustain itself (e.g., access to infrastructure, real estate)?
9. What level or types of investment do you think is needed for public and private partners to help grow Oregon's blue economy sector in the near-, mid-, and long-term in relation to the following: *Types of example investments include conservation/restoration of salmon habitat, decarbonization of international shipping, sustainable ocean-based food production, and offshore wind energy production.*
    - Infrastructure?
    - Workforce?
    - Policy change?
    - Technical assistance?
    - Other capacity?
10. Beyond investment opportunities, are there any other types of policy solutions you think could be helpful to grow the blue economy and investments in the sector moving forward? If so, please describe.
11. Are you aware of any specific public or private funding opportunities (e.g., federal funding opportunities, private grants, other private investment opportunities) that are available to support the growth of Oregon's blue economy? If so, could you describe these opportunities and how you think Oregon could best position itself to target these opportunities?
12. [**For respondents with knowledge of other states**] What strategies has your state found successful to grow your blue economy?
13. [**For respondents with knowledge of other states**] What lessons have you learned from your state's blue economy efforts? How could Oregon apply these lessons as it looks to expand and strengthen its blue economy?
14. How would you describe the existing gender and demographic characteristics of [**sector name**]?
    - What types of strategies could Oregon consider to strengthen diversity, equity, and inclusion within its blue economy sector?
    - Do you have suggestions regarding specific contacts or groups we should speak to in relation to strengthening DEI with Oregon's blue economy sector?

Appendix D. Suggested Opportunities to Build on Existing Efforts

Based on document review, interview, and survey research to date, ERG identified several existing opportunities and initiatives in Oregon. These initiatives, described below in Table D1, represent areas to research further during the next phases of this project and illustrate the diversity of blue economy-related efforts currently underway in Oregon. ERG categorized the initiatives in relation to the key pillars of the industry ecosystem identified by Business Oregon. In the Opportunities Assessment, ERG investigated these efforts in more detail and used them as the basis for understanding potential areas Oregon could capitalize upon to build and strengthen its blue economy.

Table D1. Existing initiatives related to Oregon's blue economy.

Name of Existing Initiative (hyperlink)	**Description**	**Lead Organization**
Workforce and Training *The existing workforce and training programs detailed below represent the breadth and diversity of existing educational efforts with relevance to blue economy that already exist within Oregon. These efforts may offer opportunities for collaboration or program implementation in relation to developing workforce education and training programs in relation to specific skills (e.g., aquaculture technology, seafood butchering, renewable energy, product innovation).*		
Aquarium Science Program	OCCC offers a two-year Associate of Applied Science degree and a one-year certificate that is open only to individuals who already possess a bachelor's degree in a life science area. Both the Certificate and the AAS provide theory and practical experience designed to prepare students for a career in aquatic animal husbandry. In addition, OCVA has written a $250K grant for OCCC to help start a commercial live tank certification component.	Oregon Coast Community College
Certificate of Completion Culinary Arts Program	The Certificate of Completion Culinary Arts program prepares students for the culinary world by offering chef training (basic and advanced) as well as restaurant management skills without the 17 academic credits. There could be opportunities to add seafood relevant courses to their curriculum, such as a course in seafood butchering.	Southwest Oregon Community College
Future Ready Oregon: Workforce Training and Education Investment Package	Future Ready Oregon is a comprehensive $200 million investment package that supports the education and training Oregonians need for family-wage careers. This package includes strategic and targeted investments focused on advancing opportunities for historically underserved communities.	Higher Education Coordinating Commission
Hazard Analysis and Critical Control Point (HACCP) Training	The HACCP series of training courses provides practical and technical information to help workers and businesses develop, implement and maintain a HACCP-based food safety system. Understanding the HACCP method helps trainees identify and control food safety hazards and to support a robust food safety culture. The HACCP training could be used in conjunction with development of new value-added seafood products to ensure the safety of products developed. OCVA recently organized and supported the HACCP certification of small business owners (11 completed, 5 in progress with a goal of 30 more over the next 2-years).	National Science Foundation, Oregon Coast Visitors Association, and others

Name of Existing Initiative (hyperlink)	Description	Lead Organization
Marine and Environmental Research and Training Station (MERTS)	A “one-stop shopping center” for education in Maritime Science, coastal resources, environmental studies, scientific research training and Industrial and Manufacturing Technologies.	Clatsop County Community College
Oregon's Maritime Sector Workforce Report	This report provides labor market information about Oregon’s maritime sector.	Oregon Employment Department
Undergraduate and Graduate Programs	There are several undergraduate and graduate programs at the universities and research institutions in the state focused on marine resource management, fisheries, energy, biology, research, and more.	Oregon State University, Hatfield Marine Science Center, Oregon Institute of Marine Biology
Welding Program	OCCC currently offers a series of welding certificates which, upon completion, qualify students to take the welding certification test offered by Port of Toledo. The Port of Toledo and OCCC Maritime Welding Training Center is a 2,000-sq-ft facility next to the Port of Toledo Shipyard on the Yaquina River, where students from OCCC, Toledo High School and the surrounding area advance in the art and craft of welding.	OCCC and the Port of Toledo
Research, Innovation, and Demonstration *Oregon has many existing incubators, innovation centers, accelerators, and other organizations that are helping advance new projects and businesses. Some are specific to the blue economy, and others focus on business innovation more broadly; however, they could be leveraged to incorporate blue economy related projects. The existing research, innovation, and demonstration initiatives provide a solid basis for Oregon to build on in considering how to incubate and expand new blue economy ventures.*		
Advantage Accelerator	The OSU Advantage Accelerator was created in 2013 to help develop high-growth, innovative products and services by taking companies through all phases of the startup process. The Accelerator assists faculty, staff, students and the broader community to commercialize research and concepts. OSU staff, mentors, and student interns work directly with innovators and entrepreneurs to explore markets, develop products, and obtain customers.	Oregon State University
Centers of Innovation Excellence (CIE)	As a component of Oregon’s 10-Year Innovation Plan, Business Oregon will be developing Centers of Innovation Excellence (CIE) focused on technology commercialization and applied R&D that will support growth and development within target sectors. The Centers will be public-private partnerships that concentrate their efforts on developing the funding, facilities, talent, and support services in industry sectors where Oregon has a competitive advantage. There could be opportunities to consider developing a CIE centered around blue economy opportunities.	Business Oregon
Coastal Oregon Marine Experiment Station (COMES)/OSU Seafood Lab	The OSU Seafood laboratory is the only seafood experiment station on the West Coast of the contiguous United States.	Oregon State University
Food Innovation Center	As one of Oregon State University’s Agricultural Experiment Stations, the FIC provides technical, creative and educational service to the food industry,	Oregon State University

Name of Existing Initiative (hyperlink)	Description	Lead Organization
	entrepreneurs, and Northwest communities, with a focus on quality, safety and sustainability. Have begun to collaborate with the Oregon Coast Visitors Association and the Seafood Lab on potential training and technical assistance programs, including having staff participate in HACCP trainings.	
Innovation Lab (iLab)	The lab has space and equipment to take projects from the idea phase, to fabricating and testing a prototype, and into production.	Hatfield Marine Science Center
Marine Studies Initiative	Pioneering new research and teaching models to help sustain healthy ocean and coasts to ensure wellness, environmental health, and economic prosperity for future generations.	Oregon State University
NOAA Marine Operations Center – Pacific	The NOAA Marine Operations Center-Pacific (MOC-P) serves as a homeport for two NOAA ships and provides administrative, engineering, maintenance, and logistical support to NOAA's Pacific fleet.	NOAA
Ocean Innovation Hub	O2IH is a collaborative project determined to enrich and increase Oregon's Blue Economy. The Oregon Ocean Innovation Hub, a distributed initiative in which individuals can perform research and development, receive innovation and entrepreneurial support, and engage in Blue Sector workforce development.	Lincoln County Economic Development Alliance and their Blue Sector partners
PacWave	An Energy Department-funded, grid-connected, full-scale test facility for wave energy conversion technologies—the first of its kind in the United States.	Oregon State University
Market and Trade Development *ERG identified a few existing efforts in Oregon that have focused or are currently concentrating on creating additional or value-added goods from seafood and aquaculture products. These efforts demonstrate the skills that already exist within the state related to innovative use of seafood products and represent potential areas for expansion in relation to the blue economy. ERG will continue to investigate existing initiatives related to market development in other blue economy subsectors.*		
BioOregon Protein	BioOregon Protein (a Pacific Seafoods Company) develops, manufactures and markets sustainable, fish-based ingredients for improving quality and value in pet food, aquaculture diets and animal feeds. They also produce specialty proteins for fermentation, and fish and shellfish-based organic fertilizers. They derive all products from fresh cuttings of seafood harvested and processed for human consumption.	Pacific Seafoods
2018 Food from the Sea Conference	Oregon State University (OSU), together with industry, agency, and community partners, conducted a three day workshop May 14-16, 2018 in Newport, Oregon. More than 110 participants considered the future of seafood and ideas for developing a new OSU center focused on innovations in seafood systems research, education, and partnerships.	Oregon State University
Oregon Cluster Initiative	The Oregon Cluster Incubator Program will boost and encourage the development of value-added seafood	Oregon Coast Visitors Association

Name of Existing Initiative (hyperlink)	Description	Lead Organization
	and aquaculture products in the region including a seafood incubator facility in Newport. In addition, this project will establish Regional Distribution Networks and Market Channels to focus on determining and implementing more cost-effective and efficient solutions for the Oregon seafood supply chain transportation system.	
Pacific Aquaculture Marketing and Innovation Center	The Steward Foundation, along with three key industry partners—Oregon Aquaculture Association (OAA), Northwest Aquaculture Alliance (NWAA), California Aquaculture Association (CAA)—recently received a $197,000 grant as a 2021 awardee of the USDA Local Food Promotion Program (LFPP). Steward and its partner organizations will use the funding to plan for a Pacific Aquaculture Marketing & Innovation Center (PAMIC).	The Steward Foundation
Positively Groundfish	Positively Groundfish is a non-profit trade association that unites a broad set of stakeholders of the West Coast groundfish fishery: fishers, fish processors, environmental advocates, certifiers, academic researchers and state agencies. Positively Groundfish is working on creating an incubator for innovation and for entrepreneurs to enter into state with intent of developing a new innovative food item with one or another species of wild caught seafood.	Positively Groundfish
Oregon Kelp	Oregon Kelp Alliance and Port of Bandon are collaborating to develop a mariculture urchin ranch to get Oregon Coast Uni on menus. This work will also help save kelp forests which will sustain and increase carbon capture.	Oregon Kelp Alliance, Port of Bandon
Community Infrastructure and/or Site Development		
Statewide Capital Facilities Plan	The "2010 Strategic Business Plan for Oregon's Statewide Port System" included a recommendation to create a statewide Capital Facilities Plan (CFP) for Oregon ports. Business Oregon is currently in the process of drafting this plan. The CFP will identify the top capital project needs for the system of 23 public ports across the state, including project descriptions, estimated costs, potential funding sources and project timelines.	Business Oregon
Operational Improvements and Capital Access *The OCVA Mitigation, Adaptation, and Resiliency Plan provides an example that Oregon could adapt in terms of considering the resiliency of its blue economy sector and opportunities to leverage growth moving forward. ERG will continue to investigate existing efforts and opportunities for operational improvements and capital access related to the blue economy.*		
Oregon Coast Visitors Association Mitigation, Adaptation and Resiliency Plan-2022	Provides a roadmap to guide Oregon's coastal tourism industry and support cross-sector collaborations to align efforts and resources in the implementation of goals, and offers suggestions of prioritized mitigation, adaptation, and resiliency actions.	Oregon Coast Visitors Association

Name of Existing Initiative (hyperlink)	Description	Lead Organization
Social and Economic Equity *The Oregon Coast Food Prospector tool is something Oregon could consider expanding and leveraging to think about the sustainability of local blue economy-related businesses, beyond food systems. ERG will continue to investigate additional potential social and economic equity efforts related to the blue economy.*		
Oregon Coast Food Prospector	This tool focuses on sustainable, local food systems on the Oregon Coast. It looks at the production, processing, distribution and points of consumption of fisheries and farms (uses NOAA Coastal Communities Social Vulnerability Indicators).	Oregon Coast Visitors Association

Appendix E. Opportunities Assessment

This appendix file titled “AppendixE.OEI_BlueEcon_Opportunities_Assessment_021323” contains the full draft opportunities assessment completed by ERG. The spreadsheet lists all opportunities identified through research as part of this project and details their rankings against the assessment criteria. Advisory Committee members should review the link above and provide comments directly in the file. ERG discussed the opportunities assessment in detail with the Advisory Committee during the 1/24/23 meeting.

Appendix F. Funding Database

This appendix file titled “AppendixF.OEIBlueEcon_FundingDatabase_021323” is a funding database from ERG’s rapid assessment of available blue economy grant and funding opportunities based on resources shared by stakeholders and partners, such as the Oregon Coast Visitors Association.

Appendix G. Recommended Additional Analyses and Data Compilation to Better Understand Oregon's Blue Economy

The following preliminary notes will be updated and incorporated into the full consolidated report.

Additional Analyses

- **Economic valuations of non-ENOW industries in relation to the blue economy**
  - Filter NAICS for ocean/non-ocean dependent industries and estimate what percentage of activities in partially ocean-dependent industries are ocean-dependent
  - Could be accomplished by a survey of firms (what NAICS do you report to, what percentage of your firm's activities are ocean-dependent)
  - Can multiply reported partials by existing data streams reporting economic metrics at the industry level to estimate blue economy economic metrics
  - Potential to create Oregon-specific data stream characterizing the blue economy in greater detail than ENOW data
- **Economic Opportunities Assessment**
  - Forecast blue economy sector growth metrics under "business as usual" and "intervention" scenarios
  - Business as usual forecast using observed trends in the blue economy
  - Intervention scenario(s) forecast expected economic change under the certain conditions specified by the analyst (e.g., increased investment in Oregon's blue economy, increased demand for blue economy goods and services, etc.)
  - These analyses can be very complicated. They are often used to project the impacts of climate change.
- **Status of Diversity, Equity, and Inclusion in the Blue Economy**
  - Survey measuring demographics at ocean-dependent firms, number of employees that are not cisgender men and/or non-white individuals in leadership positions, number of employees with a disability, number of individuals with a disability in leadership positions, number of employees identifying with a sexual orientation other than heterosexual, number of employees identifying with a sexual orientation other than heterosexual in a leadership position, number of non-cisgender employees, number of non-cisgender employees in a leadership position. For employees/leaders identifying with a minority group, when did they enter the industry and/or attain leadership position. Wages paid to or salaries of employees by gender, race, ethnicity, and sexual orientation.
  - Could use to understand current status of DEI in OR's blue economy and potentially track DEI changes over time if data collection is repeated regularly in the future
- **Perceptions about Opportunities within the Blue Economy**
  - Survey assessing attitudes about opportunities within the blue economy. Do workers perceive opportunities within Oregon's blue economy as accessible? Do they see opportunities to build and advance a career? Do workers perceive the blue economy to be welcoming of or discriminatory towards workers who are disabled, self-identify as racial or ethnic minorities, self-identify with a sexual identity other than heterosexual, or self-identify as non-cisgender?
  - Can ask respondents to self-report their demographic information to track response patterns across demographic groups.

    - Useful for evaluating attitudes toward DEI in Oregon's blue economy. Do workers feel that they are welcome and valued in Oregon's blue economy? Do they feel that they can build and advance in a career within the blue economy?

- **Interlinkages between sectors**
    - Survey or project (data mining or interviews?) to learn about supply and demand chains in the OR blue economy. How are industries within the blue economy interconnected?
    - We cover this to a limited extent but it could be explored in much more detail

Data Compilation Efforts

- **Parse out ocean-dependent government spending. Generally, government budgets are publicly available and relevant data can be extracted.**
    - For a more detailed analysis, identify both ocean-dependent spending as well partially ocean-dependent spending (and try to estimate what percent of spending is ocean-dependent for partials).
    - Can use this information to estimate the value of government spending in the blue economy.
- **Compile enrollment and demographic data for marine-focused college programs in Oregon**
    - OSU collects and publishes enrollment and demographic data for each academic term
        - Enrollment data is reported down to the program level
        - Demographic data is reported down to the college level
    - This is a relatively common practice for universities
    - Compiling data on enrollment in marine-related degree programs at Oregon colleges would help track OR blue economy growth
    - Compiling data on demographics within marine-related degree programs at Oregon colleges would help track OR blue economy DEI changes
    - Likely to require cooperation with academic institutions
    - Could potentially data mine enrollment data without cooperation
- **Ocean-dependent electricity**
    - Would be helpful to develop a central hub of information related to existing or planned ocean-dependent power plants and projects
    - May be useful to also track coastal electricity infrastructure in general
- **Compile data on ocean-dependent and partially ocean-dependent activities at upriver ports in Oregon**
    - Tracks ocean-dependence beyond the coastal counties
    - May require port cooperation (depending on if/how OR ports publish data)
- **Emerging Technologies**
    - Create a central location to publish information about new and emerging blue technologies to track their development over time
    - Would likely require industry participation
- **Coastal restoration**

- Create database for **coastal** watershed restoration projects. Currently, only easy to extract watershed restoration projects for the entire state.
    - Could add further valuable information about project funding amounts and employment
- Track spending on, funding for, or another consistent economic metric demonstrating the value of watershed council restoration projects to the blue economy

- **Coastal Community Resilience**
    - This sector would benefit from an increase in applied studies on the economic impact of coastal resilience work. Some data captured by NOAA ENOW (not all, and unclear how much is captured)
        - Would be useful to update habitually to track trends
- **Manufacturing**
    - Would benefit from a project evaluating the role of manufacturing in the blue economy (maybe related to the interlinkages analysis recommended above) and inventorying major contributions of manufacturing to the blue economy
        - Would be useful to update habitually to track trends
- **Blue economy data tracking consistent metrics across CA, WA, AK, and OR.**
    - Blue economy data reporting is inconsistent across states, making it difficult to compare their blue economies
    - Would be useful to track a set of consistent variables across time to track trends across the West Coast and for comparative analyses.