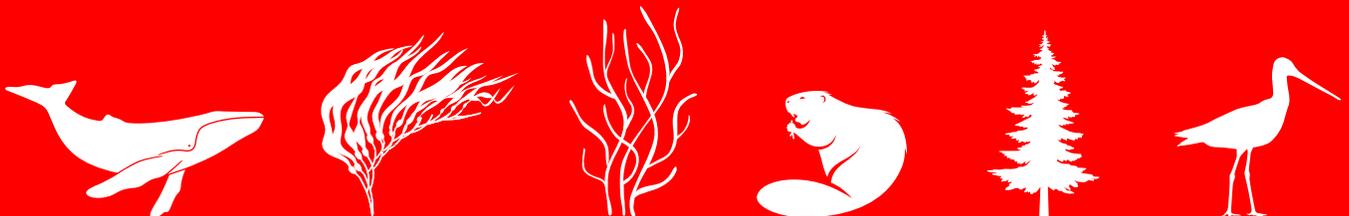


Blue Carbon & Regenerative Livelihoods

How Natural Systems That Store Carbon Sustain Coastal Communities

Through investments in blue carbon — or carbon found in coastal and marine ecosystems — we can strengthen economies over the long term. These relationships are regenerative, in that they create positive feedback loops that mutually sustain economies and ecosystems for future generations.

From whale watching to habitat restoration, blue carbon conservation is good for local people and jobs.





Astoria

Seaside

Tillamook

Portland

Salem

Newport

Eugene

Florence

Coos Bay

Roseburg

Port Orford

- Proposed Humpback Whale Critical Habitat
- Existing and Historic Kelp
- Eelgrass
- Forested Wetland
- Tidal Wetlands
- Sitka Spruce Forest

Whales & Tourism



How It Works

Actions that support and protect whales, such as reduced vessel speeds along migration corridors to avoid collisions; collection of worn out fishing gear, ropes, lines and other marine debris to reduce entanglements; and investments in improved water quality and pollution reduction can then help ensure a vibrant whale watching industry along the Oregon coast.

Local Economic Benefits

Whale watching generates diverse income streams for coastal industries, including boat tours, vacation lodging, restaurants, and other local businesses. Whale watching can increase support for whale conservation, enabling additional investments in actions that sustain healthy whale populations.¹



Whales & Blue Carbon

- Whales are carbon storage superstars — a single gray whale can sequester ~33 tons of carbon, equivalent to 1375 mature trees²
- Whales are carbon sinks, storing carbon in their bodies throughout their lifetimes. After death, if their carcasses sink to the ocean floor, carbon can be stored there for millennia³
- Through swimming, diving, feeding and excreting feces, whales increase nutrients on the ocean surface, boosting phytoplankton and marine plants, which in turn removes more carbon from the atmosphere⁴



“We’re a small business on the coast so we are able to provide jobs and pay our taxes. People come from across the world and from local communities throughout the region to whale watch, and we hope that while they’re here they’re helping the local economy by supporting other local businesses.”

—Kit Stephenson, Whale’s Tail Charters, Depoe Bay

¹ <https://www.imf.org/external/pubs/ft/fandd/2019/12/natures-solution-to-climate-change-chami.htm>
<https://visittheoregoncoast.com/travel-guides/outdoor-activities/whale-watching/>

² <https://www.imf.org/external/pubs/ft/fandd/2019/12/natures-solution-to-climate-change-chami.htm>

³ *Why Whales Are Important For Carbon Sequestration — Foresight*

⁴ *Why Whales Are Important For Carbon Sequestration — Foresight*

Sea Otter Reintroduction & Kelp Forest Restoration

How It Works

Kelp forests are diverse underwater habitats that grow near rocky shorelines. Globally, kelp and other large aquatic plants process around 200 million tons of carbon dioxide every year — about as much as the annual emissions of the state of New York.⁵ An important animal to many coastal tribes, sea otter play a key role in sustaining kelp forests by keeping sea urchins that feed on kelp in check, making otter reintroduction in Oregon also good news for kelp forests.

Local Economic Benefits

Sea otters are part of the web of interconnections that Indigenous people have long relied upon for their prosperity. Exterminated in Oregon by Euro-American trappers in the early 1900's, otter reintroduction represents an important cultural milestone. While there are concerns about competition from sea otter for valuable Dungeness crab, hopes for reintroduction are modest and will bring other tourism and fisheries benefits.⁶



Kelp & Blue Carbon

- Kelp can grow up to two feet per day and exports a large portion of its biomass and associated Carbon into the deep sea⁷
- Northwards, from Canada to Alaska's Aleutian Islands, the presence of otters increases carbon storage in kelp forests by 4.4 to 8.7 megatons—equivalent to the amount of carbon found in the annual carbon dioxide emissions from 3 to 6 million passenger cars⁸



“Modern ecology has been catching up to those ancestral understandings, those interconnections, that people who have lived in this place have always known are there.”

—Peter Hatch, Elakha Alliance board member and member of the Confederated Tribe of the Siletz Indians

⁵ <https://www.nature.com/articles/ngeo2790>

⁶ <https://www.npr.org/2021/11/13/1052688016/coastal-tribes-oregon-sea-otters-dungeness>

⁷ [How Kelp Naturally Combats Global Climate Change — Science in the News](#)

⁸ [Thanks to Sea Otters, Kelp Forests Absorb Vast Amounts of CO2](#)



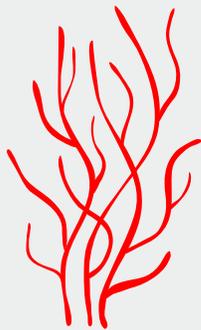
Coastal Fisheries & Eelgrass

How It Works

Eelgrass is found in all of Oregon's 22 major estuaries, where it finds the shallow subtidal habitat, soft sediment, and light it needs to thrive. Eelgrass stores greenhouse gasses, mitigates ocean acidification, and helps safeguard coastal communities from storms and floods. Reduced pollution, dredging and estuary development can help protect this carbon and fishery powerhouse.⁹

Local Economic Benefits

Eelgrass beds serve as nursery habitat for young fish and invertebrates, and provide spawning surfaces for Pacific herring, a key forage fish for salmonids. Thriving crab, salmon and herring populations lead to more productive commercial and private fishing industries, benefiting coastal families and communities. The protection eelgrass offers from storm surges can deliver valuable economic benefits in the form of avoided losses from natural disasters. A California study estimates the economic cost to citizens of lost eelgrass habitat at \$1-2 billion.¹⁰



Eelgrass & Blue Carbon

- Despite its limited extent, eelgrass can accumulate carbon at rates up to 3 orders of magnitude higher than that of terrestrial soils, per unit area¹¹
- High carbon accumulation rates are also promoted by slow decomposition of organic material in the low-oxygen environment of seagrass sediments, high proportion of refractory organic compounds, and high C:N:P ratios. Together, these characteristics make seagrass material less mobile and biodegradable and thus more easily stored¹²



“As a Peace Corps volunteer in the Philippines, I’ll never forget snorkeling and seeing hundreds of thousands of juvenile fish living in the seagrass beds and mangroves. It’s no surprise to me that, here at home on the Pacific Coast, our eelgrass beds are also an important nursery and feeding ground for many of the fish species that support local fisheries and seafood businesses. As a seafood business owner, I know that healthy coastal ecosystems, like estuaries, support thriving fisheries. Local Ocean Seafoods and our customers rely on this for a steady supply of sustainable seafood.”

—Laura Anderson, Local Ocean (founder), Newport, Oregon

⁹ https://oregonshores.org/sites/default/files/sites/default/files/media-library/eelgrass_citizens_guide_6-1-21.pdf

¹⁰ <https://www.sciencedaily.com/releases/2017/02/170214162808.htm>

¹¹ <https://ogupubs.onlinelibrary.wiley.com/doi/full/10.1029/2018GB005941>

¹² <https://ogupubs.onlinelibrary.wiley.com/doi/full/10.1029/2018GB005941>



Tidal Wetlands & The Restoration Economy

How It Works

Coastal tidal wetlands produce and accumulate significant amounts of organic carbon, and accumulation rates are actually predicted to increase with climate change.¹³ Restoration of tidal and other coastal wetlands has had significant impacts on ecosystem health and productivity, and supports numerous local businesses and contractors in the process. Restoration projects can take years to plan and implement, employing project managers, engineers, contract crews, and construction teams.

Local Economic Benefits

Restoration of tidal and other coastal wetlands has had significant impacts on ecosystem health and productivity, and support numerous local businesses and contractors in the process. Restoration projects can take years to plan and implement, employing engineers, contract crews, and construction teams. For every \$1 million spent on watershed restoration results in ~16.7 new or sustained jobs and \$2.2-\$2.5 million in total economic activity.¹⁴



Tidal Wetlands & Blue Carbon

- Restoring tidal wetlands leads to increased carbon sequestration if conditions are right, and also supports healthier fish populations and water quality, with associated economic benefits for local communities



“Restoring coastal wetlands is important work that fills the soul. One of the best parts about restoring wetlands is that everything you need to create them is found onsite. No need to import items, no need to introduce additional pollutants. It’s more about rearranging and putting the natural landscape back together and reconnecting natural processes to create a viable, diverse and sustainable habitat. These projects are also a big economic boost to local communities. It’s been estimated that 80% of the money spent on restoration projects stays within the county where the project is located, supporting a variety of small businesses including ours.”

—Dan Porter, BCI contracting co-owner

¹³ <https://academic.oup.com/nsr/article/8/9/nwaa296/6035244>

¹⁴ Nielsen-Pincus and Moseley 2010

Forested Tidal Wetlands & the Native Plant Economy

How It Works

Restoration of tidal and other coastal marshes have significant impacts on ecosystem health and productivity, but there are also significant benefits to the local native plant economy and restoration education for future generations.

Local Economic Benefits

The restoration of tidal marshes supports local native plant nurseries and restoration contractors. In addition to a wide range of economic, cultural and ecological benefits that native plants provide, these nurseries and restoration organizations act as environmental education hubs for students, fostering environmental restoration value sets and skill sets in the next generation.



Forested Tidal Wetlands & Blue Carbon

- Tidal marshes act as carbon sinks. Per-acre, tidal wetlands store 3-5 times more carbon than tropical forests¹⁵
- Pacific Northwest tidal marsh ecosystems have high carbon sequestration potential due to high organic content in soils, high sediment delivery, brackish conditions and large tide ranges¹⁶
- Per acre, forested tidal swamps store more carbon than almost any other ecosystem on earth — in their soil, their dense vegetation, and the elevated root platforms of the Sitka spruce¹⁷



“Previously we bought stock from inland nurseries but now we do our own local seed collection and keep that work within our community. By keeping the whole life cycle of our operation local, it allows us to keep stock affordable and to keep restoration work happening. We also have summer youth crew programs to train the next generation of environmental stewards.”

—Haley Lutz, Coos Watershed Association

¹⁵ Murray et al. 2011

¹⁶ <https://www.pnwbluecarbon.org/background>

¹⁷ <https://appliedeco.org/oregons-mysterious-tidal-forests/>



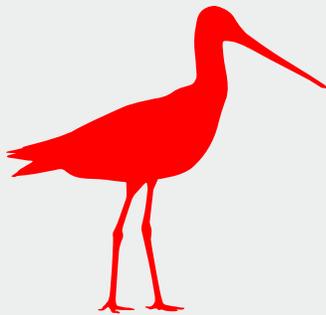
Migratory Birds & Tidal Flats

How It Works

Tidal mudflats might look barren and mucky but they are productive and packed with invertebrates for hungry birds. They also can sequester a significant amount of carbon.¹⁸ Ensuring we maintain these critical habitats for migratory birds, other wildlife and fish that depend on them will also help store more carbon and help Oregon meet its climate mitigation goals.

Local Economic Benefits

Protecting vital estuarine habitats like mud flats benefits wildlife and migratory birds and also commercially important shellfish like oysters. Supporting birding hotspots also supports the local economy. A study from 2020 suggests Oregonians spend nearly \$600 million annually on wildlife viewing activities including trip-related expenditures.¹⁹



Birds & Blue Carbon

- Migratory birds, many of conservation concern, depend on blue carbon habitats like mudflats, as vital stopover areas.
- These birding hotspots also help support the local economy from revenue generated by wildlife viewing activities.



“Some of the best birding hotspots in Oregon are along our coast in bays and estuaries. Seeing thousands of Western Sandpipers swirling in the air above you on their way to breeding grounds in remote Alaska brings home the connection between Oregon and far flung places. Connection inspires people to take action to protect the places they depend on — and also to spend money to come witness the incredible wildlife spectacle of bird migration.”

—Joe Liebezeit, Portland Audubon

¹⁸ <https://www.frontiersin.org/articles/10.3389/fmars.2022.900896/full>

¹⁹ https://industry.traveloregon.com/wp-content/uploads/2020/11/Oregon-Outdoor-Recreation-Summit_Earth-Economics.pdf