

Purpose & Motivation

The state of Oregon is currently soliciting public proposals for Rocky Habitat Management Areas.

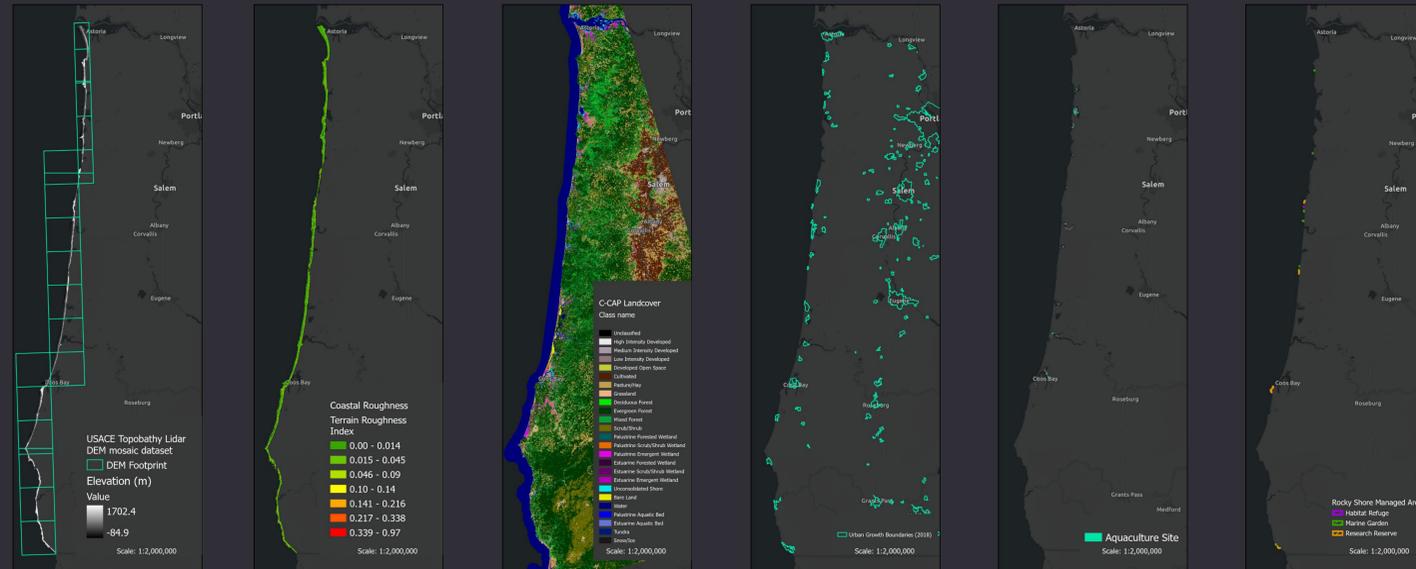
Some of the most beautiful coastline in all the United States belong to the state of Oregon. The offshore upwelling of the California Current system nourishes sea life and supports an important commercial aquaculture trade in the region. 363 miles of pristine sandy beaches are punctuated by productive fishing towns, towering cliffs, and sea stacks that offer refuge and habitat to resident seabird and marine mammal populations, diverse fishes and marine invertebrate populations, and also offers abundant recreation to human residents and holiday makers.

Unfortunately, the Oregon Coast grapples with its share of challenges posed by overfishing, environmental damage caused by marine traffic and marine recreation, and loss of vital aquatic habitat to building and development projects.

In an attempt to mitigate these threats, in 1994 Oregon adopted a Rocky Habitat Management Strategy in conjunction with the Territorial Sea Plan (TSP). The Oregon Department of Land Conservation and Development has now decided an amendment to the Rocky Shores Management Strategy is needed.

The following suitability analysis was conducted to identify suitable sites in response to the request.

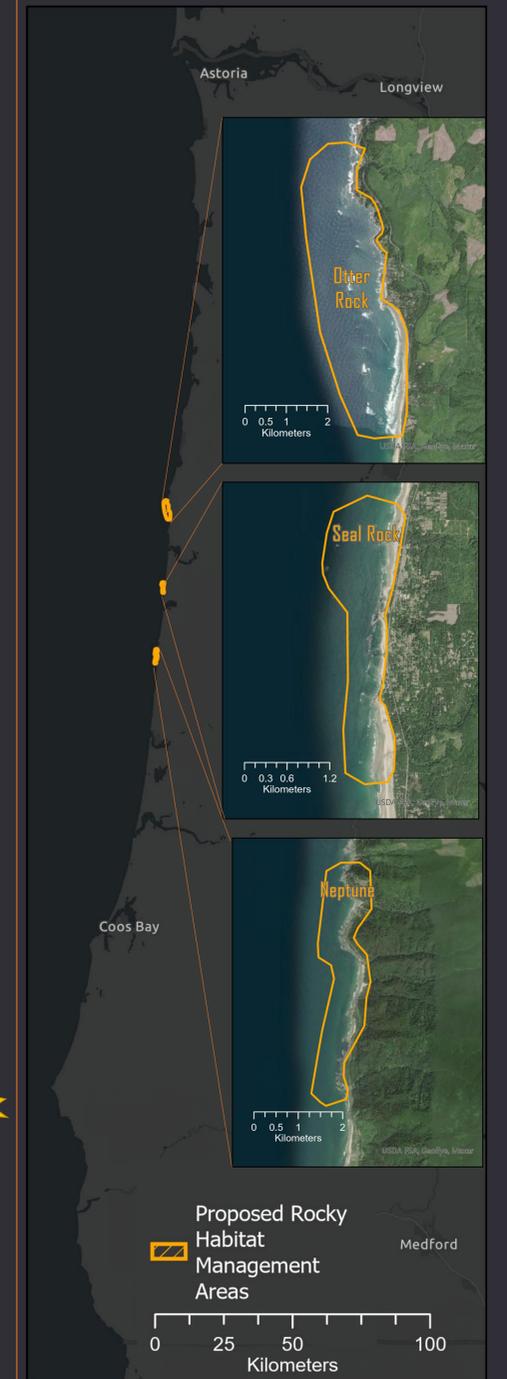
Data Layers



Data Layer	Data Type	Layer Source	Year	Role in Suitability Model
NCMP Topobathy Lidar DEM: Oregon	Raster	US Army Corps of Engineers (IALETCX)	2014	Inclusion
Terrain Roughness	Raster	N/A (derived product)	N/A	Inclusion
Coastal Change Analysis Program (C-CAP) Regional Land Cover Data	Raster	NOAA	2016	Exclusion
Oregon Urban Growth Boundaries	Polygon	Oregon Department of Land Conservation and Development	2018	Exclusion
Aquaculture	Polygon	Bureau of Ocean Energy Management, NOAA Office for Coastal Management	2018	Exclusion
Rocky Habitat Managed Areas	Polygon	Oregon Coastal Management Program	2020	Exclusion
Seabird Density	Polygon	BOEM, USGS	2012	Inclusion
Critical Habitats	Polygon	NOAA National Marine Fisheries Service	2018	Inclusion
Pinned Haulouts	Point	Oregon Department of Fish and Wildlife	2008	Inclusion
Invasive Species Observations	Point	iMapInvasives, NatureServe	2020	Inclusion



Results



Methodology

All analyses were performed in ArcGIS Pro 2.7 with the exception of the DEM mosaic dataset and terrain roughness model, which were created in ArcMap 10.8.1. The roughness index was generated using the vector terrain ruggedness (VRM) tool from the Benthic Terrain Modeler ArcMap add-in solution. The VRM uses orthogonal vectors in a moving window to compare slope and aspect of surrounding cells. It derives a roughness index valued 0 (no variation) to 1 (complete variation). The VRM was treated as the primary layer in this suitability model, as greater terrain rugosity is associated with higher biodiversity levels. Here, the assumption was made that high biodiversity plus rockier terrain represented the most suitable selection type for recommendation as a Rocky Habitat Management Area. For this study, a roughness index ≥ 0.1 was found to correspond to significantly rocky terrain, so all area with roughness < 0.1 was eliminated. Subsequently, each layer contributing to this analysis was used in an inclusive or exclusive mode. For example, areas of significant development, aquaculture use, or those already within management regions were excluded, while those correlated with seabird or marine mammal populations, critical and essential habitats, or those in close proximity to observed invasive species were prioritized as better candidates. The steps executed for this suitability analysis are detailed in the ModelBuilder diagram above.

Conclusion

Based on the suitability analysis described here, three coastal sites have been identified as proposal candidates for new Oregon Rocky Habitat Management areas. All are located along the Central Oregon Coast, characterized by steep, rocky cliffs on the headland and sea stacks in the intertidal zone. From north to south, the proposed sites are: Otter Rock, Seal Rock, and Neptune. These sites are ecologically diverse yet vulnerable. They are subject to human economic and recreational pressures, and are worthy of protection.