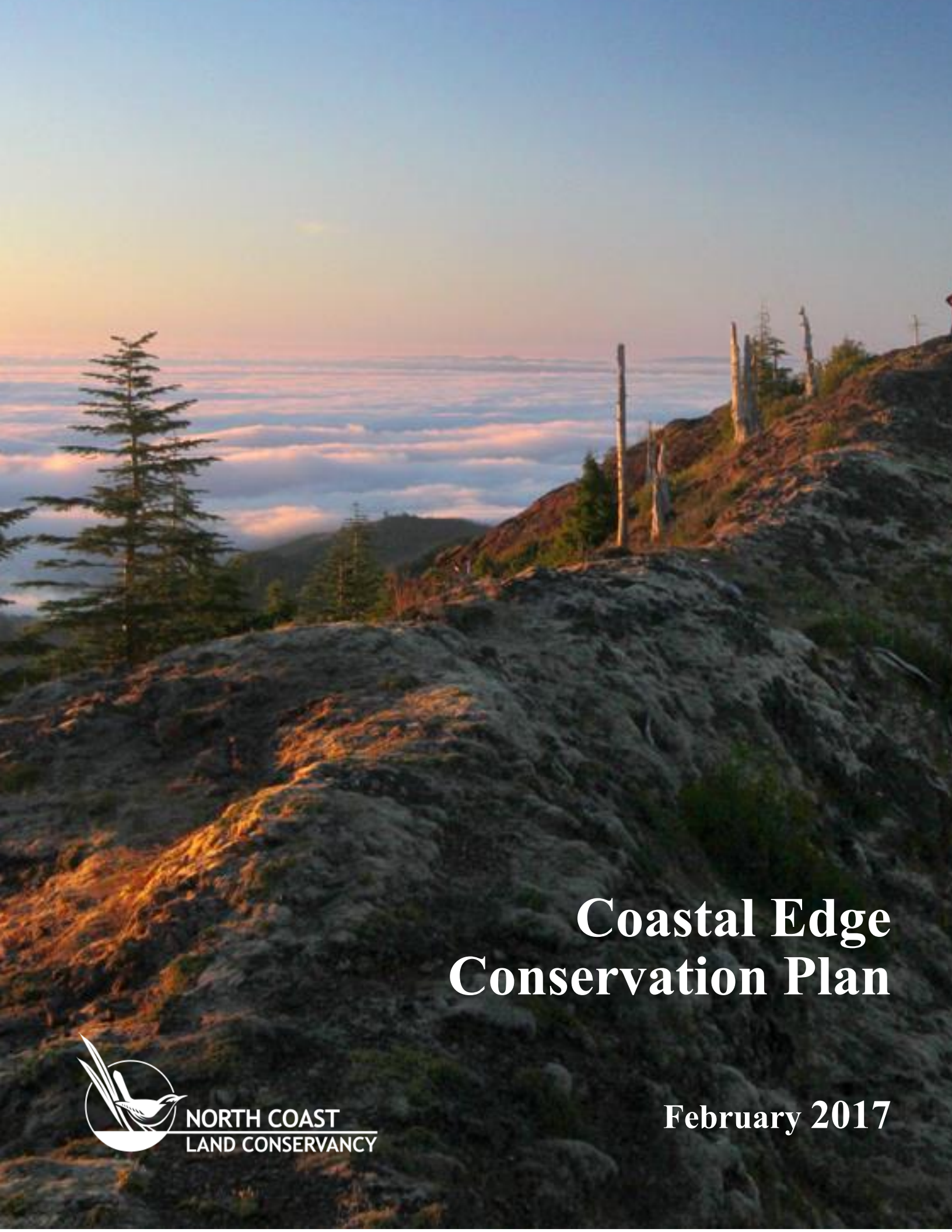

Coastal Edge Conservation Plan

NORTH COAST LAND CONSERVANCY

February 2017

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Ecola Creek estuary, Cannon Beach[2]

THE COASTAL EDGE

Cape Falcon and Smugglers' Cove, Oswald West State Park[2]

With mountain summits rising to above 3,000 feet abruptly from the ocean shoreline, the region we call the Coastal Edge, between Tillamook Head and Nehalem Bay, is an unusually compressed, biogeographically concentrated ecosystem, unlike anywhere else on the Oregon Coast. Here, the mountains rise sharply from the sea and streams plunge directly into the ocean, without large estuaries where freshwater and saltwater mingle. The direct land-sea interface of these coastal-fronting watersheds results in habitat that is also unique, home to a rare mix of plants and animals.

The Coastal Edge Initiative seeks to preserve complete, contiguous coastal watersheds, allowing the temperate rainforest indigenous to this coastline to again thrive. It will create a corridor of ecological connectivity of unprecedented scale in Oregon, stretching from the ridgetops to the ocean, in one of the world's most biodiverse regions.

North Coast Land Conservancy will work with landowners to protect sensitive habitats and build upon already conserved areas such as Oswald West State Park and the Ecola Creek Forest Reserve to create strongholds of protected land representing an array of habitat types. With this vision in mind, this conservation plan was prepared to identify areas within this landscape that constitute the highest priority for conservation.

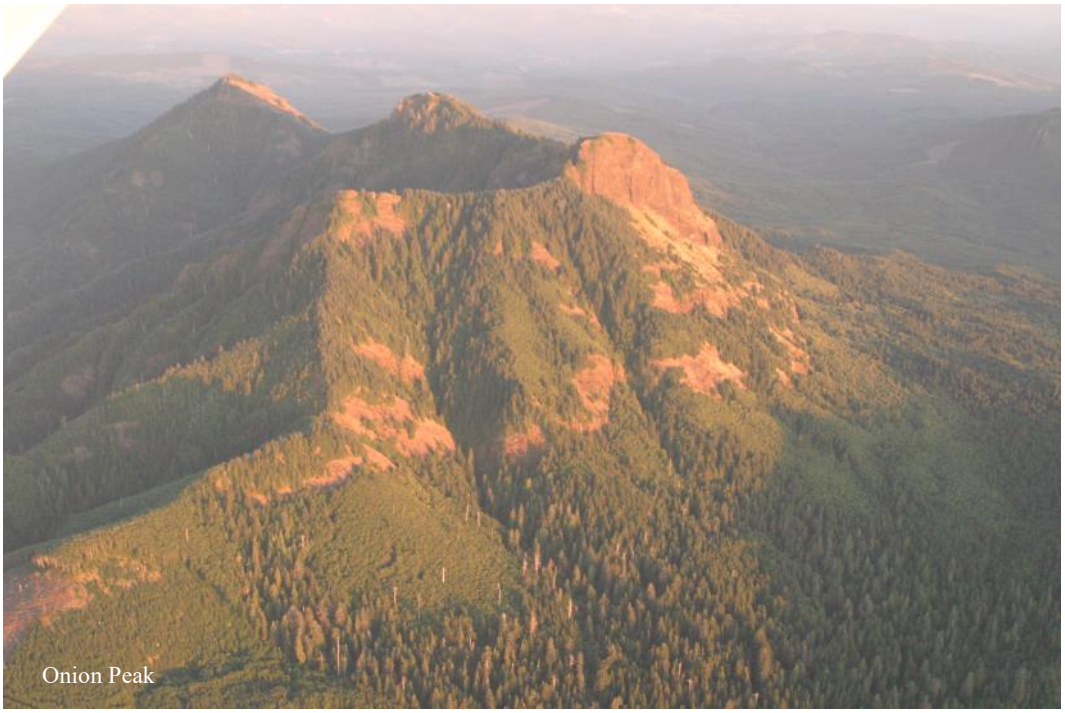
Figure 1. The Coastal Edge Initiative stretches along the rugged coastline between Tillamook Head and Nehalem Bay.

In some ways the work of North Coast Land Conservancy in this area is just beginning, but it has long been a vision of the organization and Oregon State Parks to protect this part of the Coast Range.

> "In the acquisition of [Oswald West] State Park, there has always dwelt an ulterior motive—to secure the adjoining mountain range extending northeasterly, starting with Neahkahnie Mountain, which is already part of the park. This coastal range has many peaks, among the most notable being Angora, Onion, and Sugarloaf… We have one of the greatest opportunities for creating one of the outstanding natural parks in the nation through this superior mountain range, plus the already acquired seven miles of ocean frontage. In few places in the nation do you find a mountain range precipitating itself into the ocean."
>
> - Samuel H. Boardman, Oregon State Parks Superintendent 1929-1950

Between 1931 and 1976, the nearly 2,500 acres now comprising Oswald West State Park were acquired. During that same time, the 1,025-acre Ecola State Park was also acquired at the northern end of the Coastal Edge. In 1935 Oregon Islands National Wildlife Refuge was established, protecting rocks, reefs, and islands between Tillamook Head and the California border. In 1990, building upon Ecola State Park, the Feldenheimer family and The Nature Conservancy acquired and transferred approximately 1,500 acres known as the Elmer Feldenheimer State Natural Area.

Outside of the state parks, conservation activities continued within the region. In the early 1980s The Nature Conservancy secured a conservation easement over the summit and western flank of Onion Peak. This easement was expanded upon in 2001 to total 387 acres and was subsequently transferred to North Coast Land Conservancy in 2014. Between the 1960s and 2013 the City of Cannon Beach acquired more than 1,000 acres of the Ecola Creek watershed, creating the Ecola Creek Forest Reserve for the protection of water quality and enhancement of coastal temperate rainforest. In 2016 the Cape Falcon Marine Reserve and Marine Protected Area were established offshore of Oswald West State Park. North Coast Land Conservancy seeks to identify ways to build upon these existing conserved lands to protect the most ecologically important and sensitive areas within the Coastal Edge.



Onion Peak

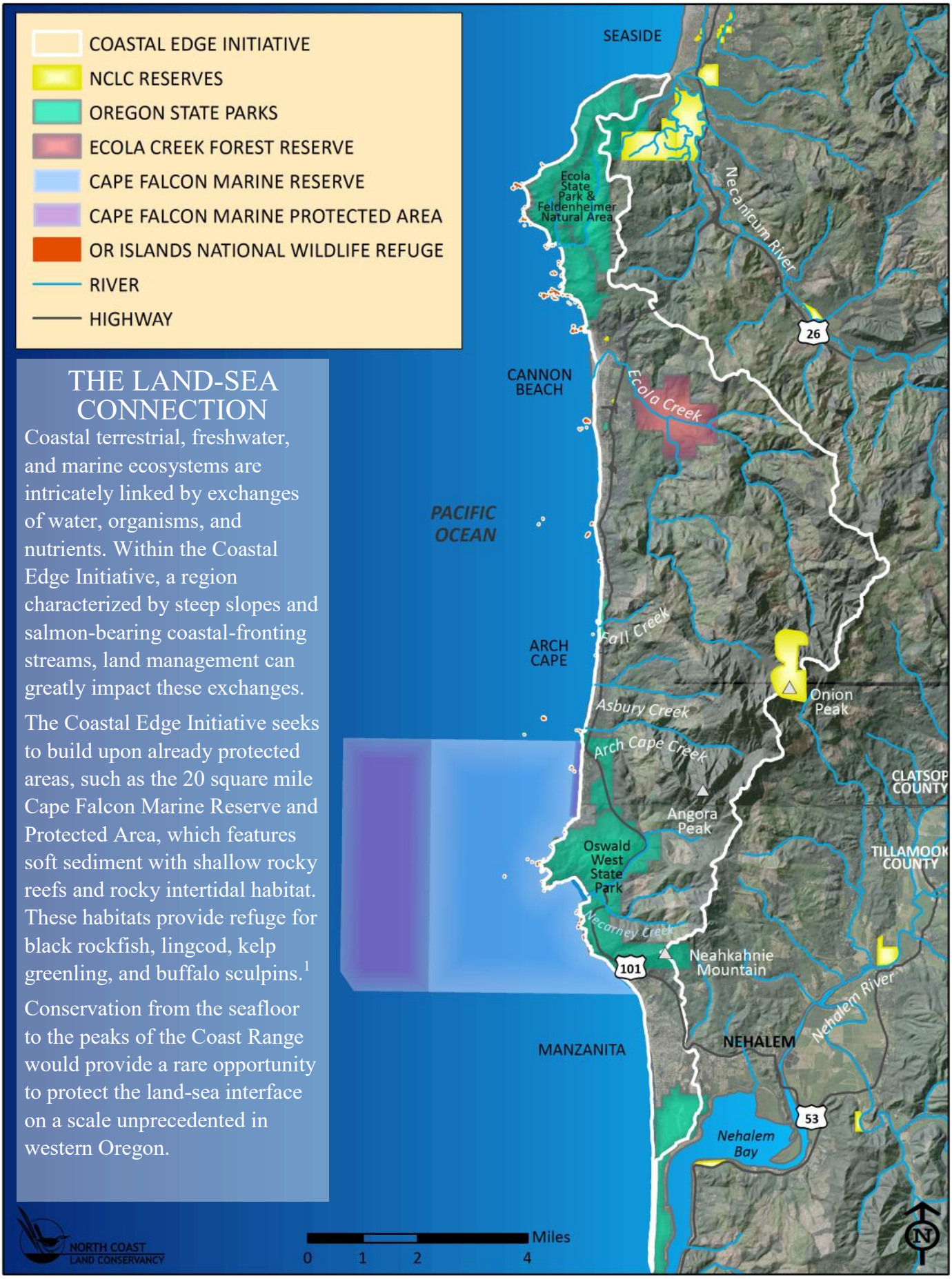


Figure 2. North Coast Land Conservancy habitat reserves and other protected areas within the Coastal Edge as of early 2017.

Geology: Shaping the Coastal Edge

The landscape we see today in the Coastal Edge is the product of geologic forces at work over millions of years. From the slope of the mountains to the sediment in the streams, geology influences habitats and, thus, plants and animals present in the initiative area.

The highest elevations in the Coastal Edge are rocky peaks made of Columbia River Basalt (CRB) in the now-uplifted submarine canyon of the Columbia River. The southwesterly trending corridor of volcanic hills slashing across the region has been interpreted as inverted topography, where the submarine canyon of the Columbia River was filled by lavas before being uplifted from the sea and eroded, forming topographic highs where adjacent soft sedimentary rock has washed away.[2] The alignment of this now uplifted former Columbia River channel forms the basis for the outline of the Coastal Edge Initiative: it is the peaks that define the eastern flank of the coastal-fronting watersheds that comprise the Coastal Edge.

Steeper slopes tend to develop higher in the watershed where it is common to find large ridges of cinnamon brown earth comprised of decomposed breccia (basalt conglomerates cemented together like concrete) and large blocks of rounded basaltic breccia. These deposits on the flanks of peaks creep or occasionally cascade downslope during heavy rains or strong regional earthquakes.[2]

The tendency of the basaltic highlands to have thin soils, results in numerous rocky outcrops or balds, as well as seeps, with abundant sunlight for unique plant and animal habitat niches.[2]

Onion and Angora Peak complexes[2]

Conserving what's here now while preparing for change

As we consider conservation with perpetuity in mind, it is important to understand the current landscape as well as future conditions. This can mean prioritizing intact habitats, seeing restoration potential in a degraded wetland or recently cut forest, and also considering future climatic conditions. With uncertainty regarding future climatic conditions, conservation planners are noting the importance of long landscape conservation and protection of areas with topographic and topoclimatic diversity. The geography and topography of the Coastal Edge, rising to 3,000 foot peaks within 2-3 miles of the Pacific Ocean, presents an opportunity to protect suites of habitats and microclimates as elevation climbs. In this area, landscapes will be more resilient to the impacts of a changing climate by providing a variety of niches for an array of species and allowing for migration of these niches and species as microclimatic conditions change within the initiative.

Human Dimensions

The human population within the Coastal Edge resides in the narrow band of relatively flat land between the beach and approximately one mile inland. Outside of Ecola and Oswald West State Parks and other public land, residences dot the coastline and cluster in the communities of Cannon Beach and Arch Cape. Approximately 1,700 people reside in Cannon Beach,[3] another 250 live in Arch Cape, with a small population in between. The year round population of Cannon Beach has grown by 470 people in the last 20 years, an increase of nearly 40%.[3] The area's beaches, outdoor recreational opportunities, and scenery attract 750,000 tourists a year[4] from the Pacific Northwest and the world, providing key economic stability to the area. Natural resource challenges facing the communities of the Coastal Edge include:

(1) lack of buildable lands within the current urban growth boundary, which will force the city to expand into historic timber/forest lands;

(2) increased demand on natural resources produced by the summer population (e.g., water, trails, fishing), which without careful planning could affect the area's natural beauty and diminish tourism; and

(3) planning for future Cascadia earthquakes and tsunamis, as well as sea level rise and migration of wetlands, which will alter current land use patterns.

Ecola Point, Ecola State Park[2]

Cannon Beach with Coast Range in background[1]

CONSERVATION GOALS & PRIORITIZATION STRATEGY

Broadly, the conservation goals of NCLC are to conserve green infrastructure by protecting lands that contribute to a fully-functioning coastal landscape where healthy communities of people, plants and wildlife all thrive. We are dedicated to conserving the diversity of habitats that exist within our service area, and maintaining connectivity between them through a green infrastructure approach. This plan outlines NCLC's conservation goals and prioritization strategy for the Coastal Edge Initiative. In order to prioritize and visualize our conservation strategies within the Coastal Edge we established a system for ranking priority habitats, ecological connectivity, and land use patterns.

Priority Habitat Types

NCLC's service area encompasses a wide array of habitats within the Coast Range ecoregion, stretching from coastal prairie to temperate rainforest and from estuaries to headwater streams. With this diverse landscape in mind, NCLC has developed a systems level approach to our initiatives, targeting key habitat types within the context of broad ecological values (e.g., wildlife corridors and connectivity) within different regions of our service area.

The Coast Range ecoregion is characterized by diverse habitats ranging from sandy dunes to headwater streams in temperate rainforests and mild, moist weather moderated by the ocean.

The habitat types that NCLC has prioritized for conservation within the Coastal Edge are aligned with those identified in the Oregon Department of Fish and Wildlife's 2016 Oregon Conservation Strategy,[5] the Oregon Department of Land Conservation and Development's Oregon Statewide Planning Goals[6] and various local Comprehensive Plans. The Oregon Conservation Strategy designated more strategy habitats in the Coast Range ecoregion than any other ecoregion, highlighting the importance of conservation efforts within NCLC's service area. Below is a list of strategy habitat types identified by the Oregon Conservation Strategy that are of particular interest to NCLC within our Coastal Edge Initiative, from highest to lowest priority. This prioritization of habitats represents not their ecological significance but their priority for focused new land conservation within this initiative.

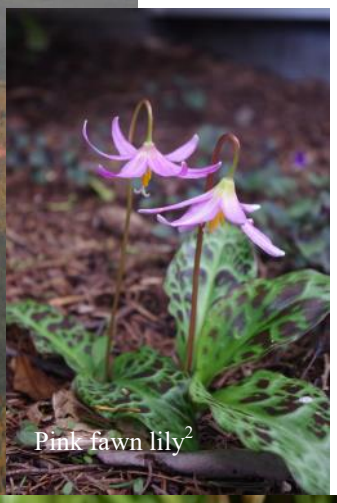
- Rock outcrops (Rocky balds)
- Late successional mixed conifer forests
- Flowing water and riparian areas
- Wetlands

Descriptions of Priority Habitats

Rocky outcrops

In the Coastal Edge, rock outcrops are the remnants of ancient lava flows pouring down Miocene Columbia River channels. The basalt fingers reached onto the continental shelf where over millennia differential erosion and the slow uplift of the continent has resulted in prominent coastal headlands and the Onion and Angora Peak complexes. On these rocky peaks and headlands and the adjacent slopes is the confluence of three floristic provinces: (1) boreal, which is characteristic of higher latitude and/or elevation areas, such as the Olympic Mountain Range; (2) xeric/ continental, which is characteristic of the drier east, beginning sixty miles eastward in the Columbia Gorge; and (3) Californian, which otherwise extends only as far north as the Klamath Range and southern Coast Range. Species from each province exist on and around the rocky outcrops of the Coastal Edge, many at the far southern, western, or northern reach of their distributions. Several endemic plant species also exist here.[7] These unique floristic communities highlight the need to prioritize the conservation of rocky outcrops.

Onion Peak complex[2]



Pink fawn lily[2]

Saddle Mountain bittercress[2]

Chambers paintbrush[2]

Late Successional Forests

Ecola State Park[2]

Forests comprise 68% of the Coastal Edge and another 18% of the initiative area is classified as grasslands/shrublands (by USGS). Much of the area categorized as grasslands/shrublands within this initiative area are recently cut and replanted forestlands, so, in total, 86% is effectively managed for forest cover. The majority of this forestland is managed for rotational harvest and is best described as third generation western hemlock (*Tsuga heterophylla*)-dominated timber farm. While these forests don't currently demonstrate late successional characteristics, they still provide important habitat and natural benefits within the initiative area.

Uncut portions are dominated by Sitka spruce (*Picea* sitchensis) and western hemlock with lesser occurrences of western redcedar (*Thuja plicata*). The understory is most often comprised of salmonberry (*Rubus spectabilis*), evergreen (*Vaccinium ovatum*) and red huckleberry (*Vaccinium parvifolium*), sword fern (*Polystichum munitum*), deer fern (*Blechnum spicant*), and salal (*Gaultheria shallon*), with hardwoods such as Pacific crabapple (*Malus fusca*) and cascara (*Rhamnus purshiana*) appearing in light gaps and windthrow areas.

Most of the forested areas in the watershed have been logged, making any remaining late successional forests a rare habitat and a priority for protection. Because nearly all forestland in the Coastal Edge is privately owned, information about the locations of these late successional forests is not widely available. NCLC depends on local knowledge and partnerships with landowners to identify opportunities to protect late successional forests.

Ecola Creek[1]

Flowing water & Riparian Areas

Flowing water habitat includes perennial freshwater streams and rivers, as well as springs, seeps, and intermittent streams. Riparian areas are transition zones between aquatic and terrestrial habitats, providing critical refuge to many species, mitigating runoff and erosion, and providing many other ecosystem services. Within the Coastal Edge, these areas provide critical habitat for salmonids, including the threatened Oregon coast coho, and yield clean water for the communities of Cannon Beach and Arch Cape. Flowing water and riparian areas are highly prioritized habitats within this initiative as they act as natural corridors for both aquatic and terrestrial species.

Seep on Onion Peak complex[2]

Wetlands

Despite covering less than 2% of Oregon,[7] the ecological and economical value provided by wetlands is disproportionally great. In addition to providing critical plant and animal habitat, wetlands protect water quality. Acting as "nature's kidneys," wetlands filter out sediment, excess nutrients, and pollutants. Through their ability to store water, wetlands protect the natural and manmade environment by attenuating floodwaters and storm surges. In Oregon, wetland acreage has declined by more than 1/3 in the last 200 years.[8] The Sitka spruce swamp and forested wetland communities found here are considered globally rare.[9] Wetlands are a rare habitat type within the Coastal Edge due to the steep, rocky slopes that characterize the area; however, wetlands provide similar services as riparian areas.

Forested wetland at Cirele Creek Habitat Reserve[1]

Prioritization Strategy

A fully-functioning coastal landscape where people, plants, and animals all thrive is a big goal. To prioritize NCLC's conservation efforts and those of our many partners, criteria have been identified that support ecological integrity and contribute to high conservation values. Data were collected from local, state, and federal agencies and synthesized for a comprehensive view of the landscape. While the potential variables are limitless when modeling a landscape, the scope of this project restricted our data inputs to those compiled by secondary sources that are applicable to the initiative area.

A scoring matrix was developed to reflect high, medium, and low conservation priorities. Within each category, scoring ranges from 5 to -1, with 5 and 4 signifying the highest priority, 3 and 2 representing medium priority and 1 to -1 the lowest overall priority.

Using geographic information systems (GIS) software, scores from each dataset are combined, resulting in an overall score for every part of the landscape. The final product of this process is a co-occurrence map. Areas with the highest cumulative scores represent areas with the greatest conservation values based on the modeled criteria.

CRITERIA

Wetland type

+

Land use type

+

Adjacency to public/ conserved lands

+

Slope

+

Rocky outcrops

+

Drinking water source areas

+

Salmonid habitat

+

Viewshed

FINAL CO-OCCURRENCE

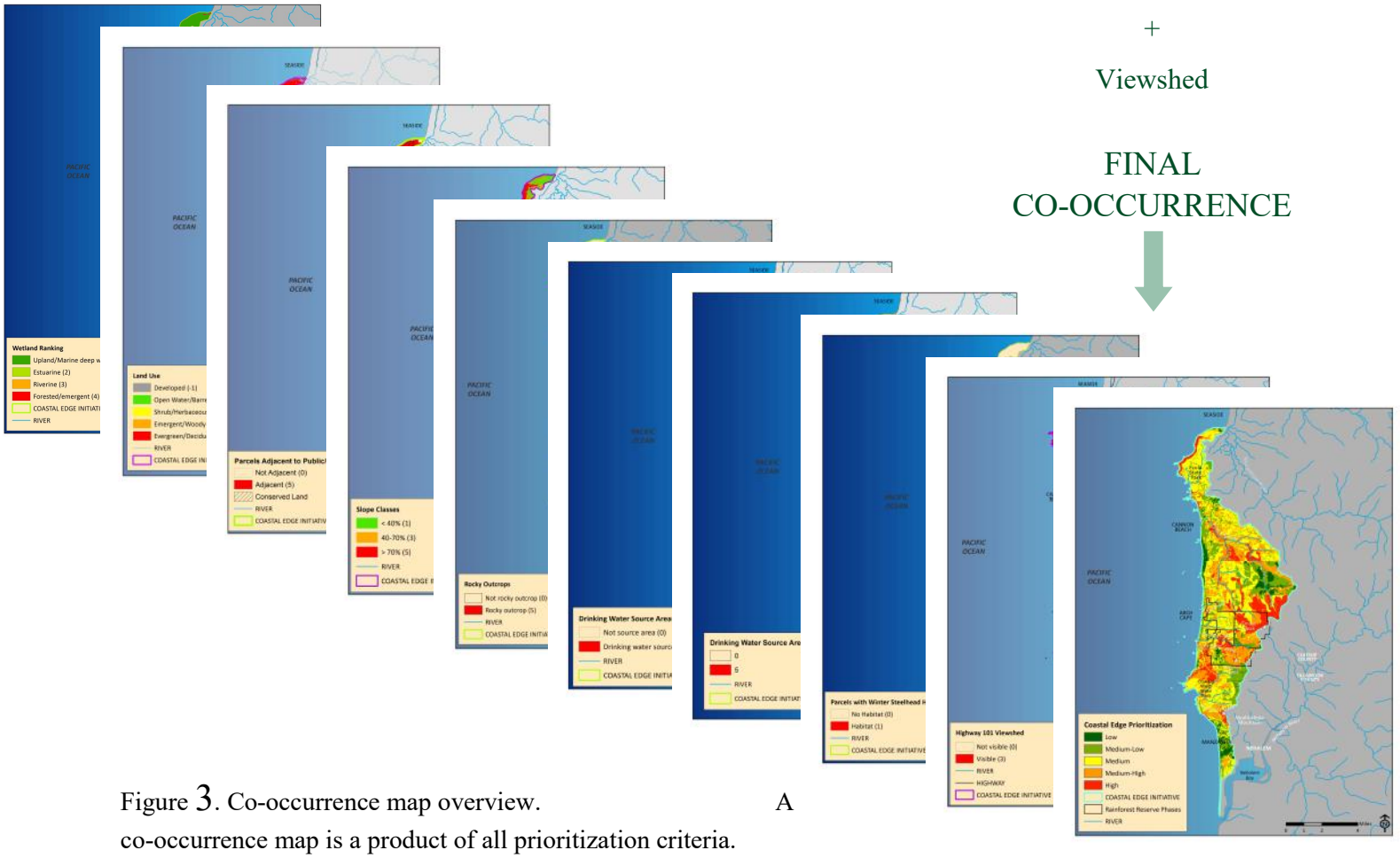


Figure 3. Co-occurrence map overview. A co-occurrence map is a product of all prioritization criteria.

Scoring Matrix

Criteria	Data Source	Category	Score
WETLAND TYPE	U.S. Fish & Wildlife Service National Wetlands Inventory	Upland/freshwater pond/marine deep water	0
		Estuarine	2
		Riverine	3
		Emergent/forested	4
LAND USE	U.S. Geological Survey (USGS)	Developed	-1
		Open water/barren	0
		Shrub/herbaceous/grassland	2
		Emergent/forested wetland	4
		Evergreen/deciduous/mixed forest	5
ADJACENCY TO CONSERVED LANDS	Clatsop and Tillamook County GIS Departments	Not adjacent	0
		Conserved or adjacent to conserved	5
SLOPE	USGS digital elevation model	<40%	1
		40-70%	3
		>70%	5
SOIL/ROCKY OUT-CROP	U.S. Department of Agriculture/NRCS county soil surveys	Not rocky outcrop	0
		Rocky outcrop	5
DRINKING WATER SOURCE AREA (SURFACE)	Oregon Department of Environmental Quality (ODEQ)	Not source area	0
		Source area	5
DRINKING WATER SOURCE AREA (GROUNDWATER)	ODEQ	Not source area	0
		Source area	5
COHO HABITAT	Oregon Department of Fish & Wildlife (ODFW)	Parcels without coho streams	0
		Parcels with coho streams	2
FALL CHINOOK HABITAT	ODFW	Parcels without chinook streams	0
		Parcels with chinook streams	2
WINTER STEELHEAD HABITAT	ODFW	Parcels without steelhead streams	0
		Parcels with steelhead streams	2
VIEWSHED	USGS digital elevation model	Not within view of Highway 101	0
		Within view of Highway 101	3

Scoring Rationale

Wetland Type

National Wetland Inventory (NWI) data created by the U.S. Fish and Wildlife Service was used to provide a coarse overview of jurisdictional wetlands within the initiative. Based upon our research, while a local wetland inventory was conducted of the Arch Cape area in 2008, the NWI provides the most comprehensive, easily mapped representation of wetlands for the initiative.

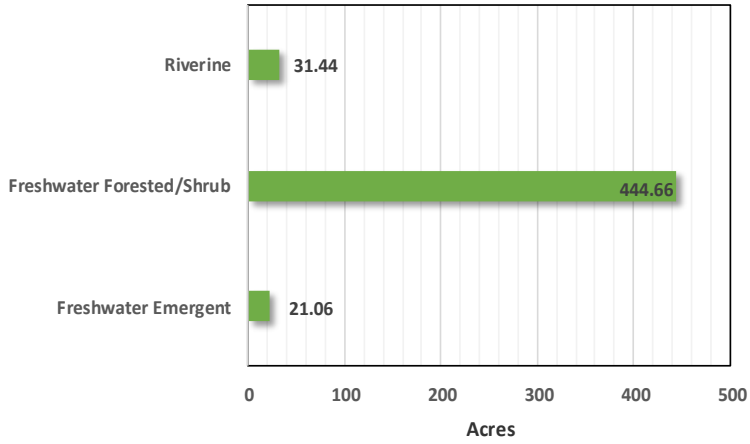


Figure 4. Wetland acres within the Coastal Edge by wetland type.

The topography of this initiative area is such that wetlands are generally restricted to low gradient areas found in the narrow band along the coast. Moving eastward, slopes increase up towards the ridges and peaks of the Coast Range.

Wetlands of all types are important for protecting water quality and providing wildlife habitat. Forested and emergent wetlands are ranked as the highest wetland types within our model. Sitka spruce forested swamps are diminishing across their range because of land management practices.

Riverine wetlands are also high priorities as streams function as the main arteries of the watersheds. These wetlands act as buffers along streams, serving as living filters protecting waterways from runoff and mitigating the effects of high flow events.

The estuarine wetlands of Ecola Creek provide important refugia for many species of wildlife, including the three salmonid species found in this initiative area, and are assigned a moderate rank.

Within this initiative area, areas categorized as freshwater ponds are mostly associated with manmade ponds and are not connected to the riverine systems prioritized in this initiative. Marine deep water habitats are also not the focus of this particular initiative. Both areas are assigned ranks of zero.

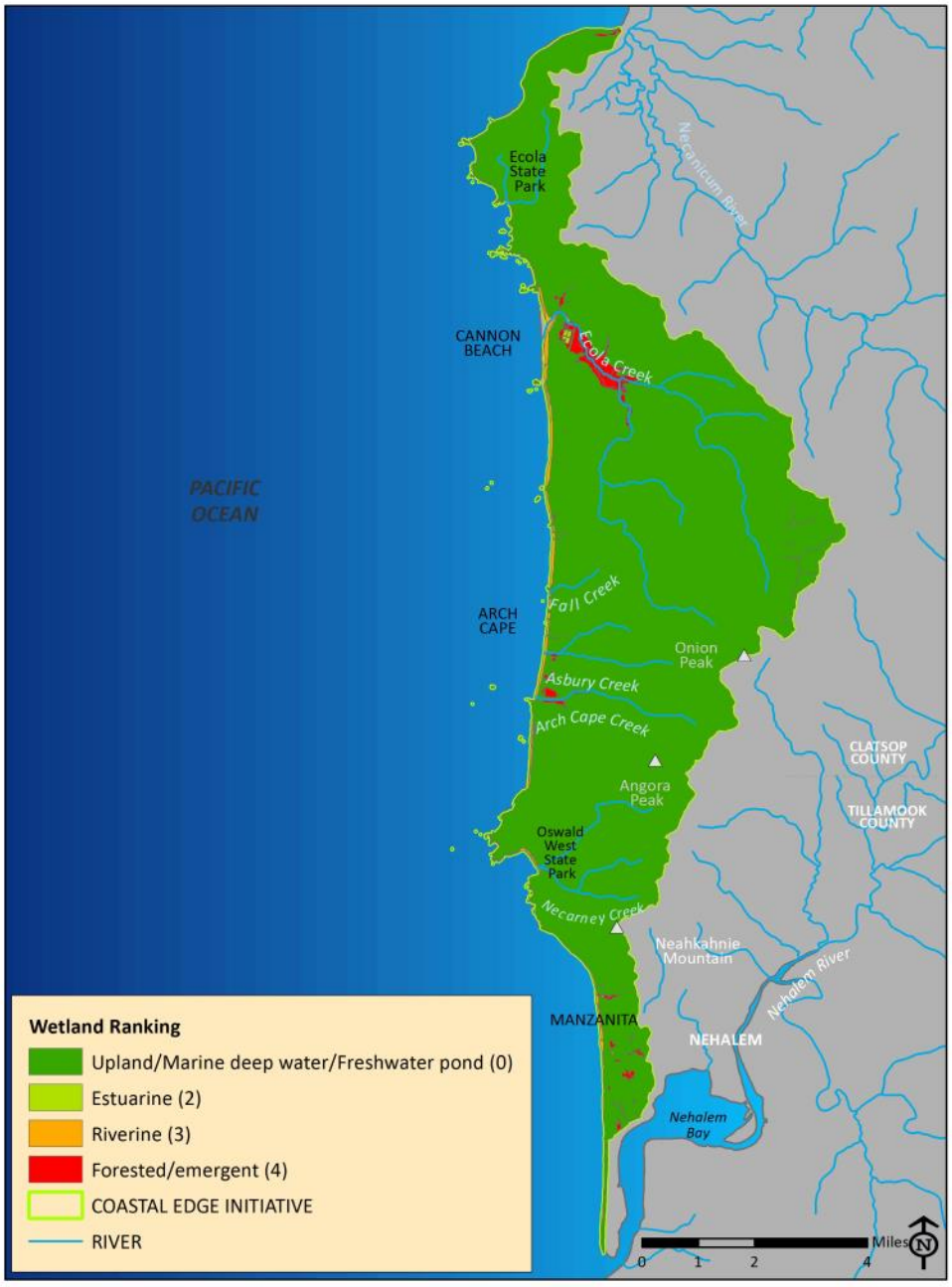


Figure 5. Wetlands in the Coastal Edge. Scoring is indicated in parenthesis in the legend.

Land use/land cover

Land use/land cover data was acquired from the National Land Cover database managed by the U.S. Geological Survey. This dataset categorizes land cover using aerial photography. We found this to be an accurate representation of land use patterns in our focus area. Land use categories distinguish between developed and undeveloped areas and identify broad vegetation types.

Because of the historic dominance of the temperate rainforest ecosystem within the Coastal Edge area, forests were ranked as the top priority. A goal of the Coastal Edge Initiative is to conserve existing coastal rainforest and areas with potential to return to this state under a different management regime.

Because wetlands provide a unique suite of ecosystem services and in this region are associated with riparian corridors and seeps where rare plant and invertebrate species are found, we have ranked wetlands as the second highest priority land cover type. Because wetlands are also ranked by the wetland layer, wetlands receive emphasis from multiple data sets.

Shrublands, grasslands, and areas dominated by herbaceous vegetation are ranked as moderate priorities, recognizing that in this region, the areas in these categories mostly coincide with recently harvested forestland with regrowth potential.

While undeveloped barren lands have the potential to provide connectivity between habitats, the areas designated as barren lands by this dataset are generally quarries or beaches. Quarries provide little to no ecological value and beaches are already in the public domain. Open water in this dataset highlights the estuarine and marine environments, which, while critically important and connected to the targeted terrestrial ecosystems, are not the focus of the Coastal Edge conservation plan.

Developed areas are identified as roads or building footprints. These developed areas can impede or obstruct connectivity between habitats and therefore are treated as a loss of green infrastructure.

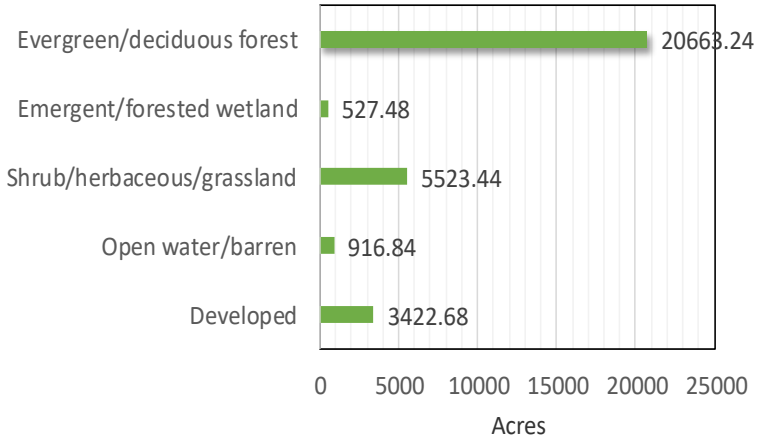


Figure 6. Land use, by acre, within the Coastal Edge.

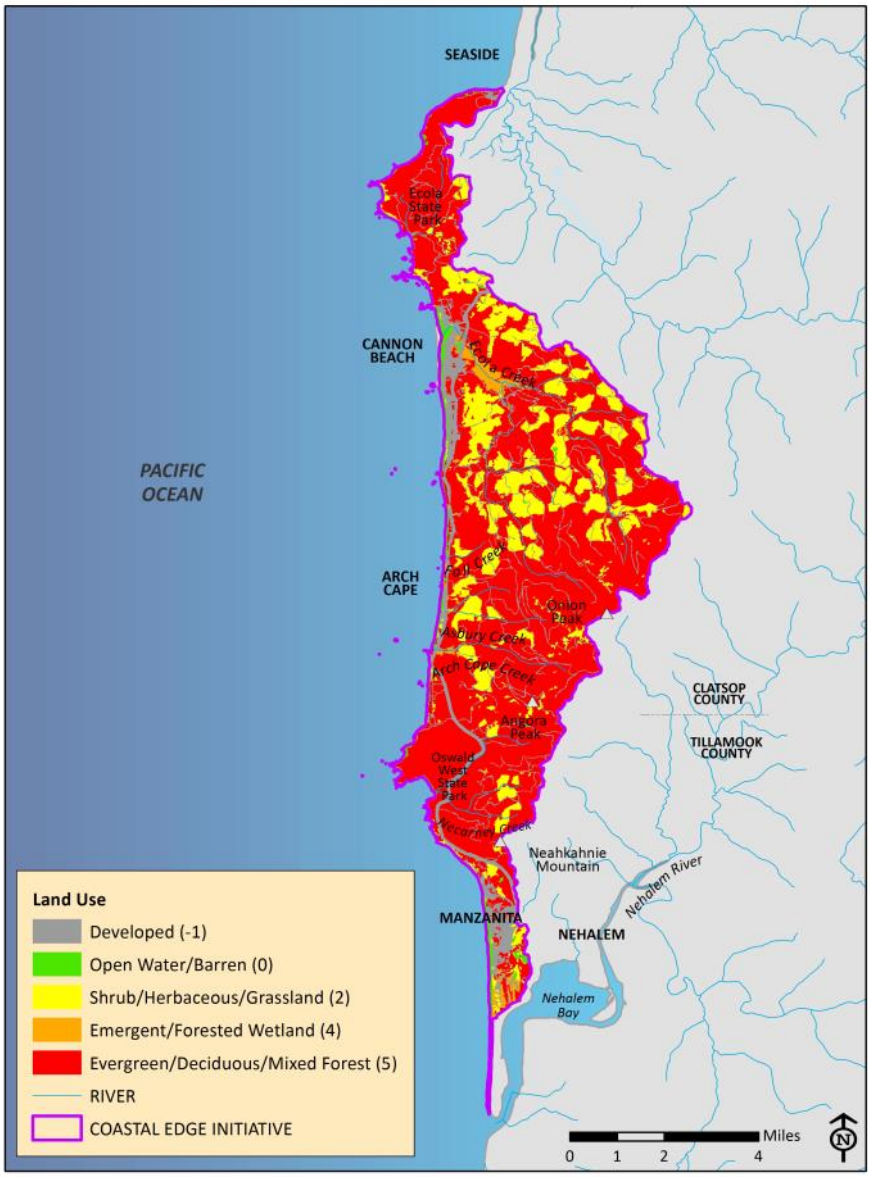


Figure 7. Land use within the Coastal Edge. Scoring is indicated in parenthesis in the legend.

Adjacency to conserved land

NCLC works within a green infrastructure model that prioritizes habitat connectivity at a landscape scale. One way to approach this concept is to build upon the existing network of public and conserved lands. In this vein, we highly prioritize land adjacent to parcels in public ownership or otherwise already conserved, thereby building green infrastructure and creating larger continuous corridors. Conserving parcels adjacent to already protected lands limits the fragmentation of habitats.

Parcels owned by local, county, or state government or conservation organizations such as North Coast Land Conservancy were identified using data obtained from Clatsop County's GIS Department. These parcels, as well as parcels with which they share a boundary, were highlighted and ranked highly in our model.

Parcels in this region vary greatly in size; thus, sometimes the parcel directly sharing a boundary with a conserved parcel encompasses a large area and sometimes this is not the case. At times parcels contiguous with parcels directly adjacent to conserved lands are owned by the same owner, and may also present an opportunity to increase habitat connectivity; however, only parcels sharing a boundary with conserved parcels are prioritized highly by the model.

The model yields an initial picture of possible opportunities to enhance habitat connectivity.

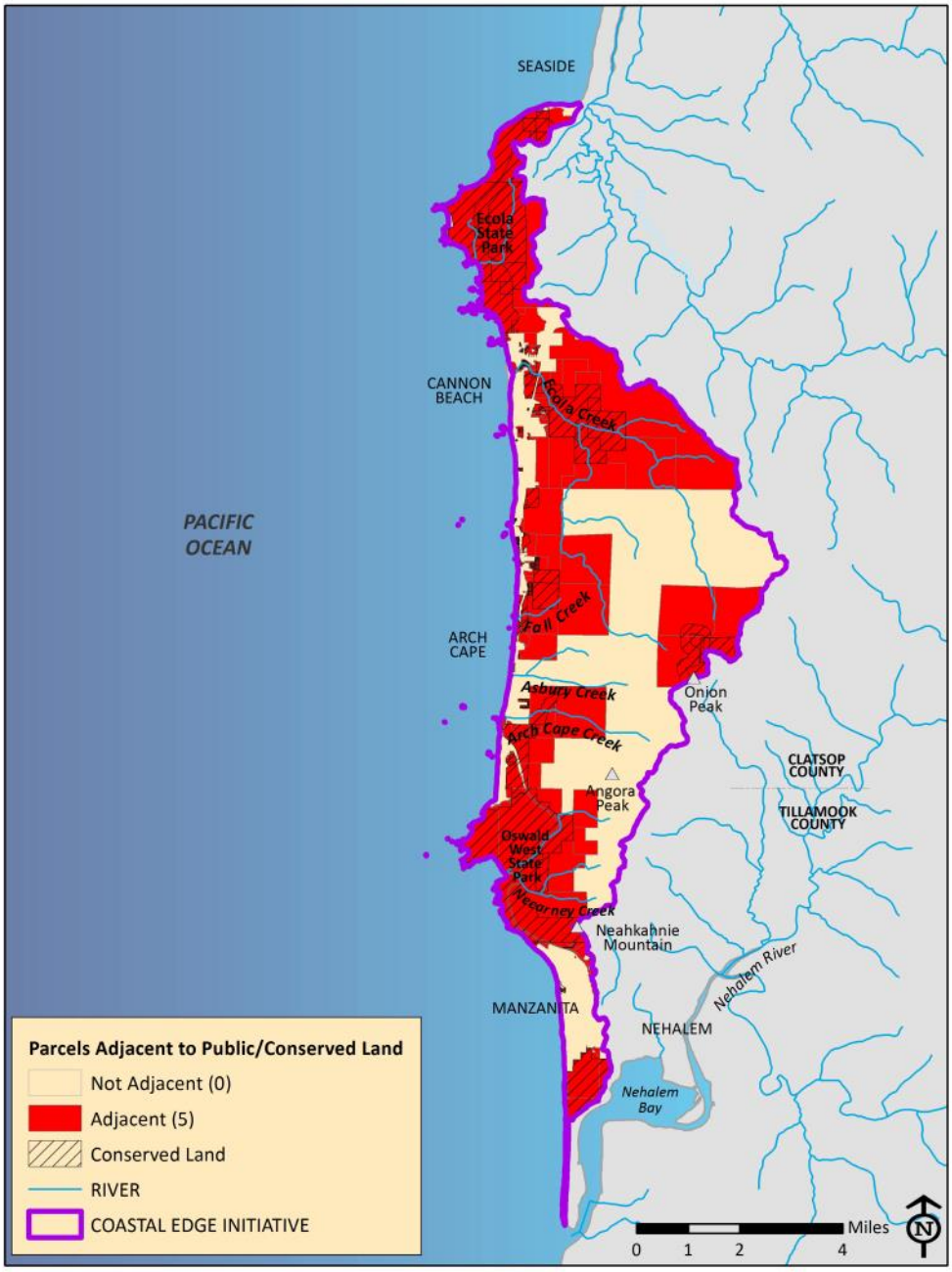


Figure 8. Currently conserved lands as well as adjacent parcels within the Coastal Edge initiative are shown in red. Scoring is indicated in parenthesis in the legend.

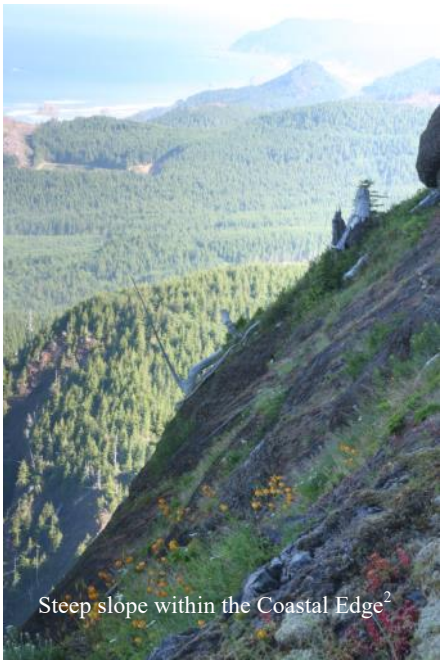
Slope

The Coastal Edge initiative is characterized by steep slopes rising sharply from the ocean to more than 3,000 feet. Many of these steep slopes support slow growing coniferous trees clinging to thin, rocky soils. NCLC has observed the difficulty forestland owners have experienced in successfully establishing planted seedlings following tree harvest on such slopes. A guidance document prepared for the Oregon Forest Research Institute suggests possible reasons: Oregon Coast Range soils generally become shallower and rockier as slope increases and south facing slopes and steep, rocky hillsides with shallow soils demand trees be able to withstand droughty summer conditions in which only 5-10% of annual precipitation occurs.[10]

As described below in the soil type section, steep slopes also have high erosion potential, and disturbance of such areas can, among other impacts, negatively affect water quality.

Because of the potential for erosion and associated implications for water quality, as well as the challenges to reestablishing trees on the steepest slopes (>70%) were highly prioritized followed by 40-70% and <40%.

Slope was calculated using digital elevation model data acquired from the U.S. Geological Survey.



Steep slope within the Coastal Edge[2]

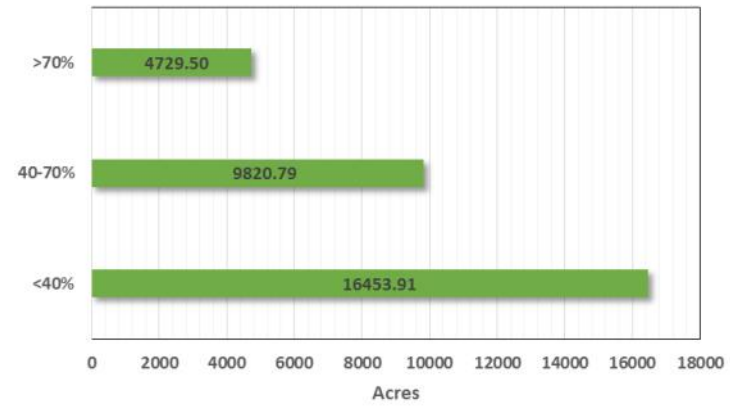


Figure 9. Slope classes, by acre, within the Coastal Edge.

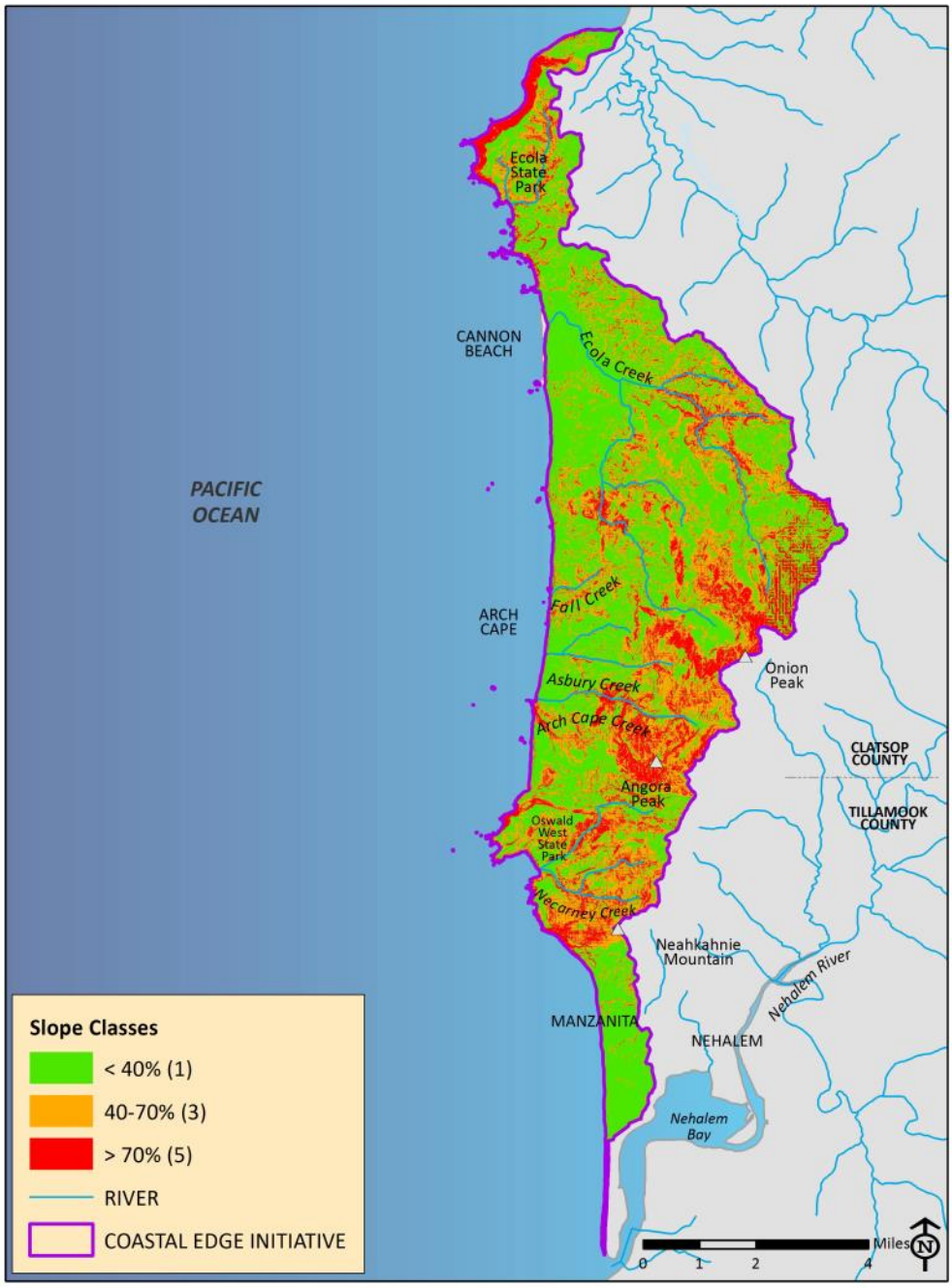


Figure 10. Slope classes within the Coastal Edge initiative. Scoring is indicated in parenthesis in the legend.

Soil type/rocky outcrops

Rocky outcrops and associated hilltop and hillslope meadows support the highest vascular plant diversity in an area known as the Swala-lahos Floristic Area,[6] which includes the Coastal Edge and, broadly, Pacific County in Washington and western Clatsop and Tillamook counties south to the Nehalem River. In addition to high diversity, these areas also support regionally endemic species as well as species at the edge of their distribution. While the locations of rare plants have not been mapped in a comprehensive manner across the Coastal Edge due to private ownership of the land, 10 of the 16 Clatsop County plant species identified by the Oregon Flora Project as rare have been identified in the rocky Angora-Onion Peak complex.

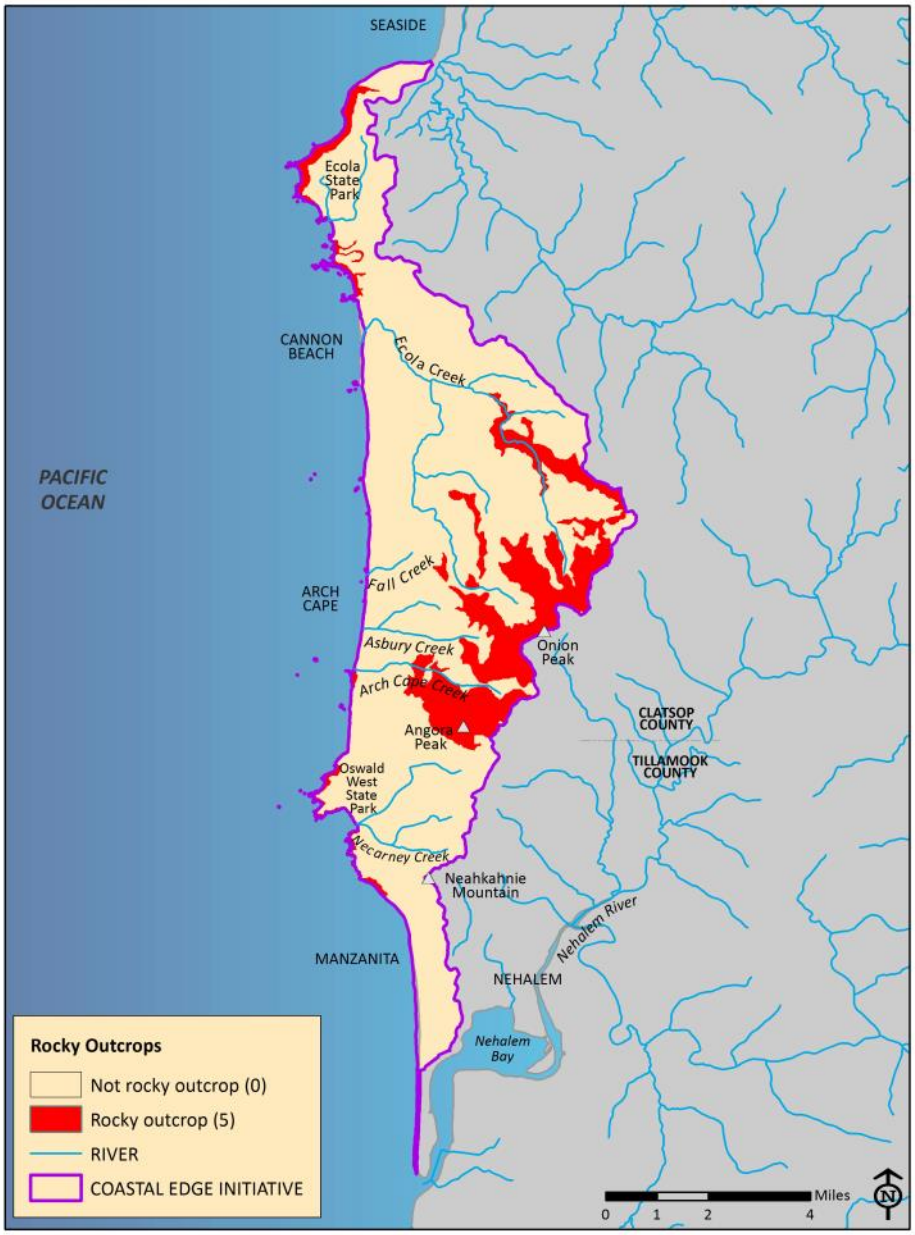


Figure 11. Areas with rocky outcrops within the Coastal Edge. Scoring is indicated in parenthesis in the legend.

In the absence of publicly available data on the location of rare plant species, USDA soil survey data was used to identify areas with rocky outcrops as a proxy for the habitat type in which many of theses species are found. The Laderly-Rock outcrop complex, Ascar-Rock outcrop complex, and the Killam-Fawceter-Rock outcrop soil types were assigned high scores (5) and all other soil types were ranked zero. The areas characterized by the selected soil types include between 25-60% rocky outcrops by area with the remaining areas covered by shallow soils. This dataset provides the closest approximation of the rocky outcrop and associated hilltop and hillslope meadow habitat that we were able to access.

These soil types are found on steep slopes (40 to >90%) and are also each characterized by a "severe hazard of erosion by water." These soil types also have high soil erodibility factors, which are a function of soil texture, structure, organic matter, and permeability. Per the soil surveys, the limited water holding capacity of these soils increases seedling mortality and shallow rooting depth (i.e., depth to bedrock) makes trees susceptible to windthrow. These features suggest that these areas are sensitive to disturbance and may be slow to revegetate if harvested.

Salmonid habitat

The waterways of the Coastal Edge provide habitat for Oregon Coast coho salmon (*Oncorhynchus kisutch*), an evolutionarily significant unit which is federally listed as threatened. Fall Chinook (*Oncorhynchus tshawytscha*) and winter steelhead (*Oncorhynchus mykiss*) are also vital to this system. These anadromous species are critical to the nutrient cycles of stream systems throughout their ranges, bringing ocean-derived nutrients upstream into watersheds and supporting aquatic and terrestrial species.

Data on historical stream usage by salmonid species was obtained from the Oregon Department of Fish and Wildlife. These data were used to identify priority stream corridors by giving weight to reaches used by salmonids as rearing and spawning habitat. Using these data, we were also able to identify platted parcels of land that provide, or have the potential to provide, vital upland buffers to salmonid streams. Parcels featuring habitat for one salmonid species were assigned a score of two. Parcels that contain habitat for all three salmonid species found in this initiative area are considered a high priority, with a cumulative score of six.

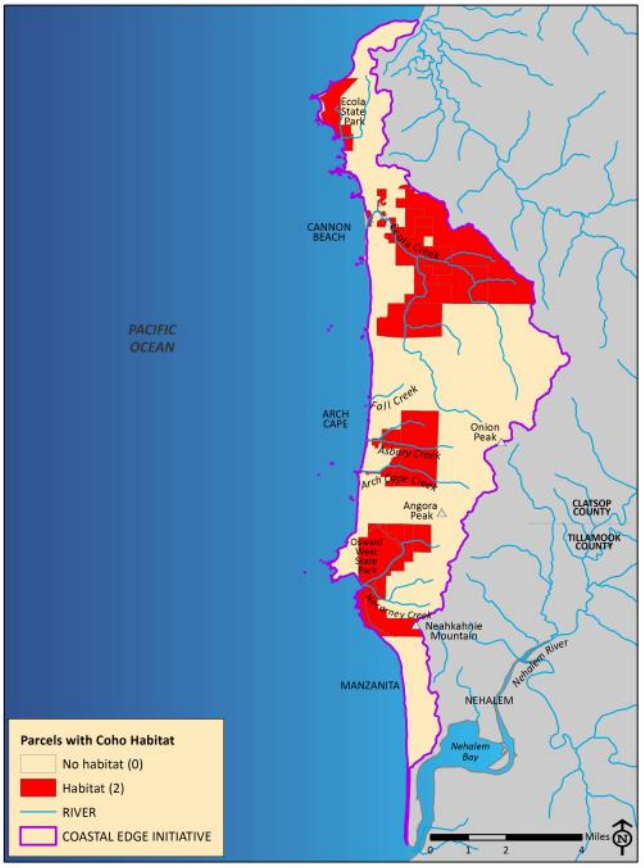


Figure 12. Parcels with streams supporting coho habitat. Scoring is indicated in parenthesis in the legend.

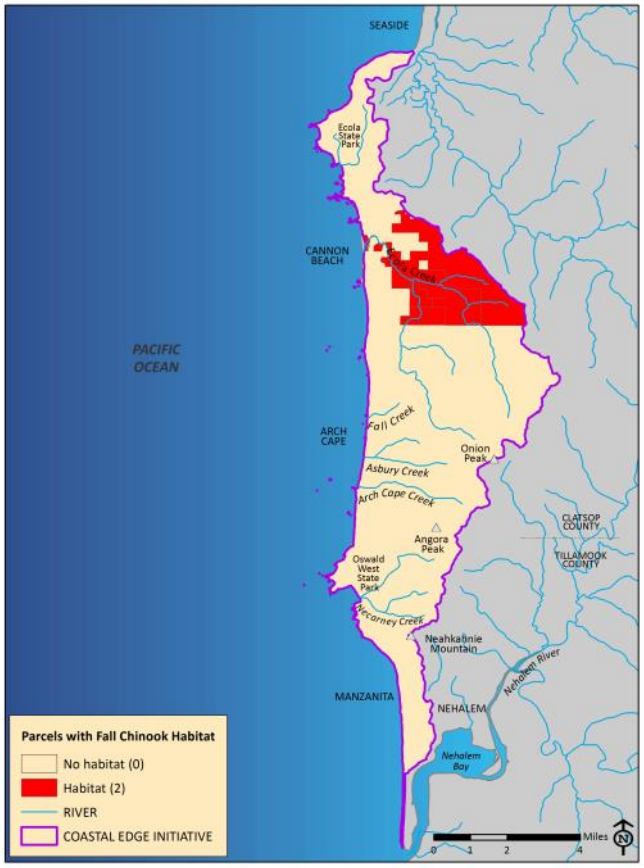


Figure 13. Parcels with streams supporting fall Chinook habitat.

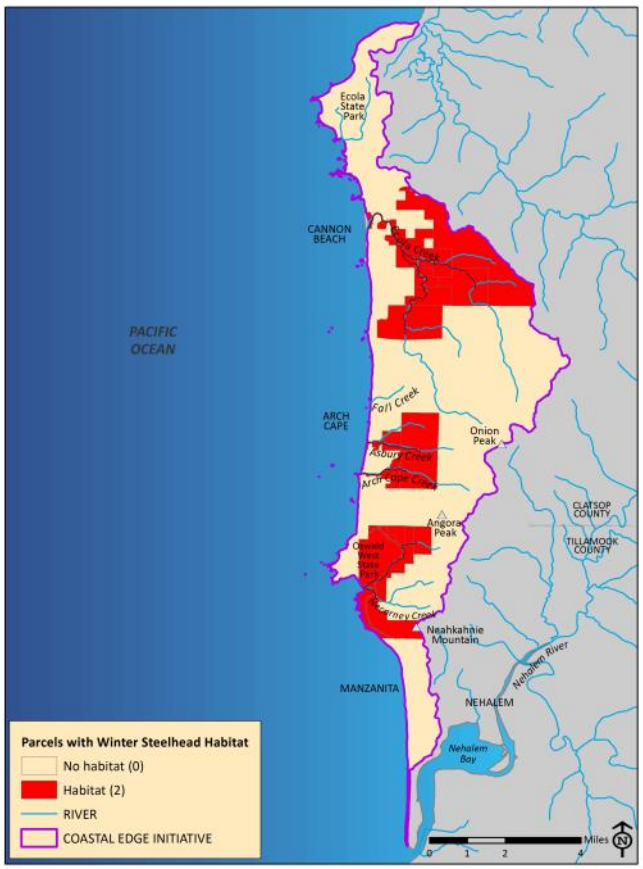


Figure 14. Parcels with streams supporting winter steelhead habitat.

Drinking water source areas

Clean water is critical to human, animal, and plant communities. Creating source protection areas that would buffer surface and groundwater sources of drinking water would cushion them from the impacts of land management activities conducted on surrounding lands. Management of the land upstream of city and rural water district intakes for the protection of water quality and quantity could minimize water treatment costs and health concerns often attributed to other land management strategies. Because they are sources of drinking water for the communities of Cannon Beach and Arch Cape, portions of the Ecola Creek, Shark, and Asbury watersheds are identified as source water protection areas by the Oregon Department of Environmental Quality. These same systems contain salmon populations, which would also benefit from the same land management measures that would protect drinking water.

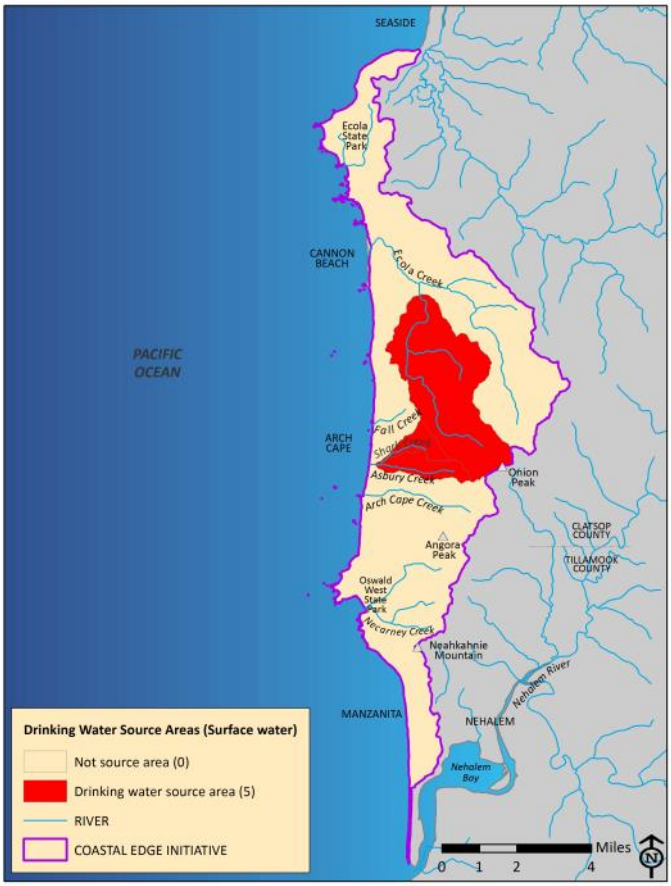


Figure 15. Drinking water source areas (surface water sources) within the Coastal Edge. Scoring is indicated in parenthesis in the legend.

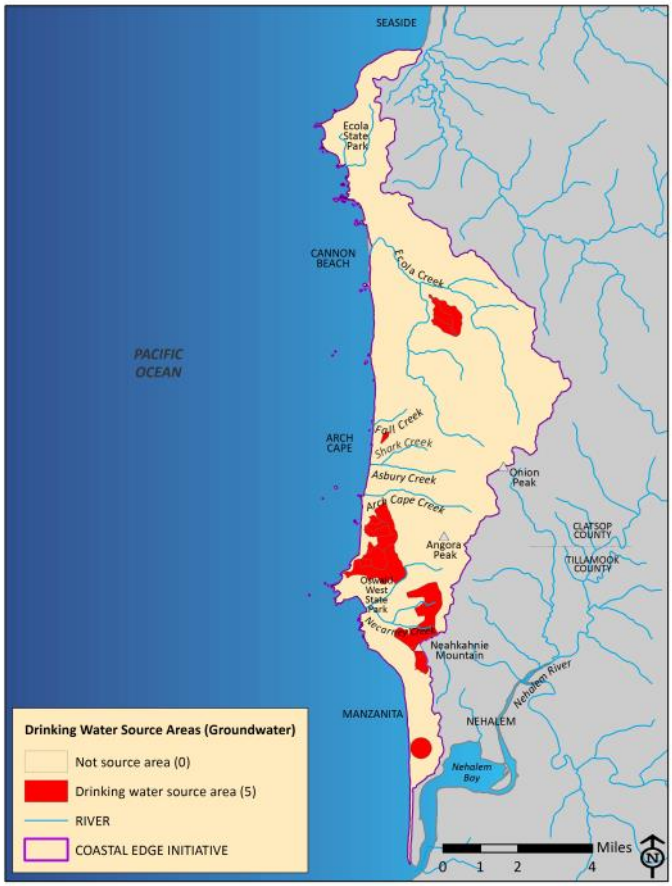


Figure 16. Drinking water source areas (groundwater sources) within the Coastal Edge. Scoring is indicated in parenthesis in the legend.

VIEWSHED

The Coastal Edge region contains some of the most iconic and visible peaks and headlands along Oregon's north coast. Providing a valued backdrop to several coastal communities, this portion of the Coast Range is highly recognizable to residents and visitors, many of whom feel a cultural connection to the peaks, whether they physically access them or just treasure them from below. Because of this, it seemed relevant to include an analysis of viewshed in our prioritization model. We used Highway 101 between Astoria and Wheeler as the basis for the viewshed analysis because it is a linear feature running the length of the Coastal Edge and beyond, passing through the communities of the north coast.

The scenic beauty visible from Oregon's Highway 101, also known as the Pacific Coast Scenic Byway, is nationally recognized. It is designated as an All-American Road by the Federal Highway Administration for its unique features of national significance.

Within our GIS program, a digital elevation model (DEM) was used to determine the lines of sight between points along Highway 101 and the landscape of the Coastal Edge. This analysis determined which parts of the Coastal Edge are and are not visible from Highway 101. This analysis does not; however, take vegetation into account, which may affect visibility between the highway and points on the landscape.

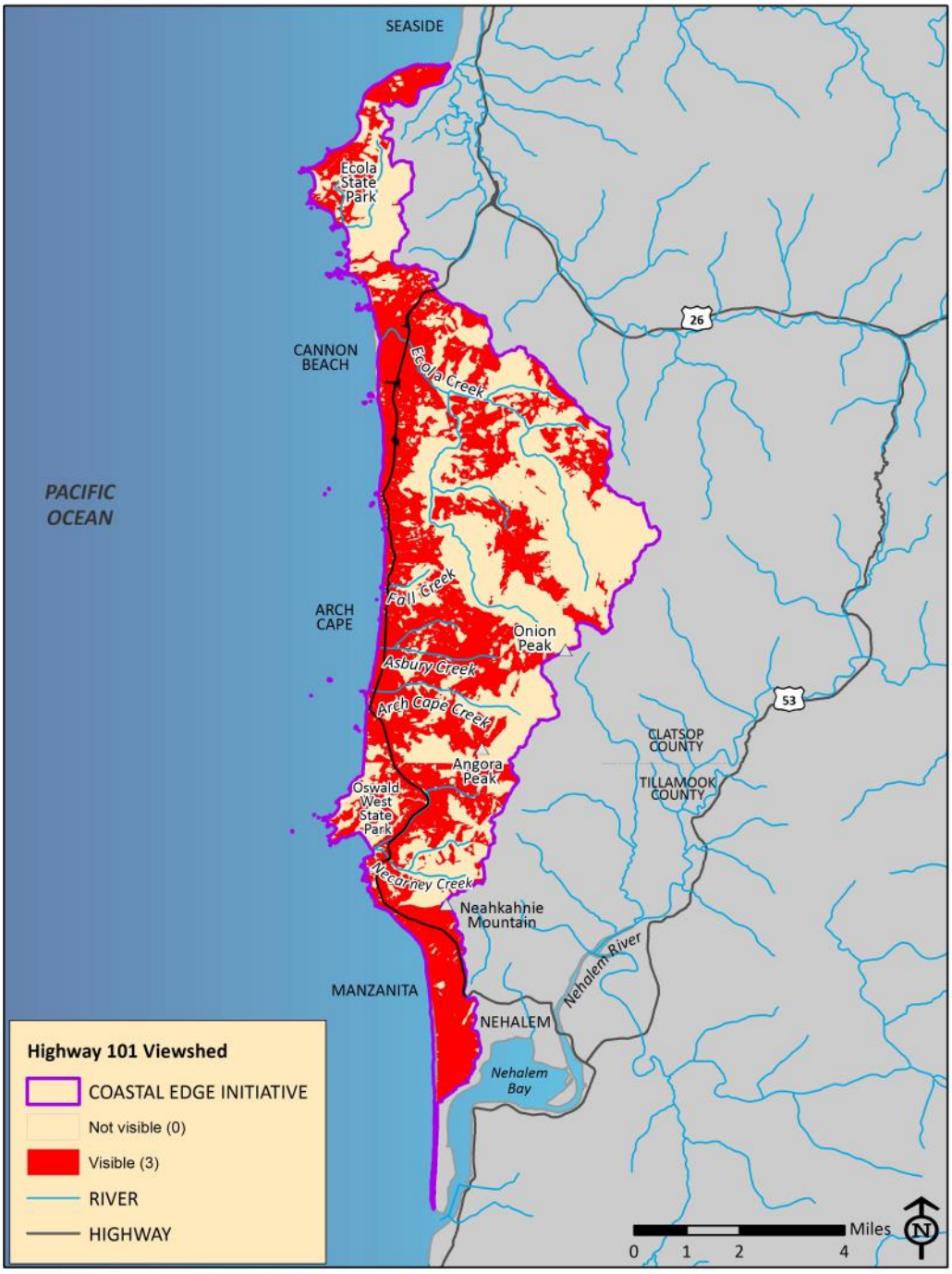


Figure 17. Portions of the Coastal Edge visible from Highway **101** are highlighted in red. Scoring is indicated in parenthesis in the legend.

Building the final map

All of the previously described criteria are pieces of the puzzle, but in concert they provide a comprehensive assessment of the landscape. In building our model, initial analysis determined that in this initiative, which targets coastal fronting watersheds and rocky balds, slope was outweighing these priorities. In order to compensate for this we weighted all criteria equally, except for rocky balds and slope. We devalued slope by 0.5 in order to allow our other criteria to rise to the top. The locations of rocky balds were used as proxy for the locations of the many rare species that exist in this habitat. These geologic features also represent areas with high erosion potential and limited capacity for supporting forest regeneration; thus, the protection of these areas from harvest is of added importance. We weighted rocky balds 2:1 over the remaining criteria to highlight the importance of the conservation of this habitat within the initiative.

Maps as an initial guide

GIS analysis has become a method commonly used by land use managers to visualize areas and develop conservation plans. These maps are an important piece of NCLC's science-based, initiative-driven conservation planning model and help prioritize and focus our work. The maps not only highlight high value areas already known to NCLC through fieldwork and working with landowners, but they also highlight high conservation potential in areas where NCLC has not worked. The maps also allow NCLC to take a step back and visualize, at a landscape level, how we can augment wildlife corridors or prioritize individual parcels within our initiatives. That said, the computer modeling in this conservation plan should be considered only a first step in gauging the land trust's interest in a property and how the property advances NCLC's overall goals within the initiative. NCLC is a conservation organization firmly rooted in the ground and nothing can replace the importance of on the ground site visits and the detailed knowledge of the land that is derived from these visits.

The Coastal Edge[1]

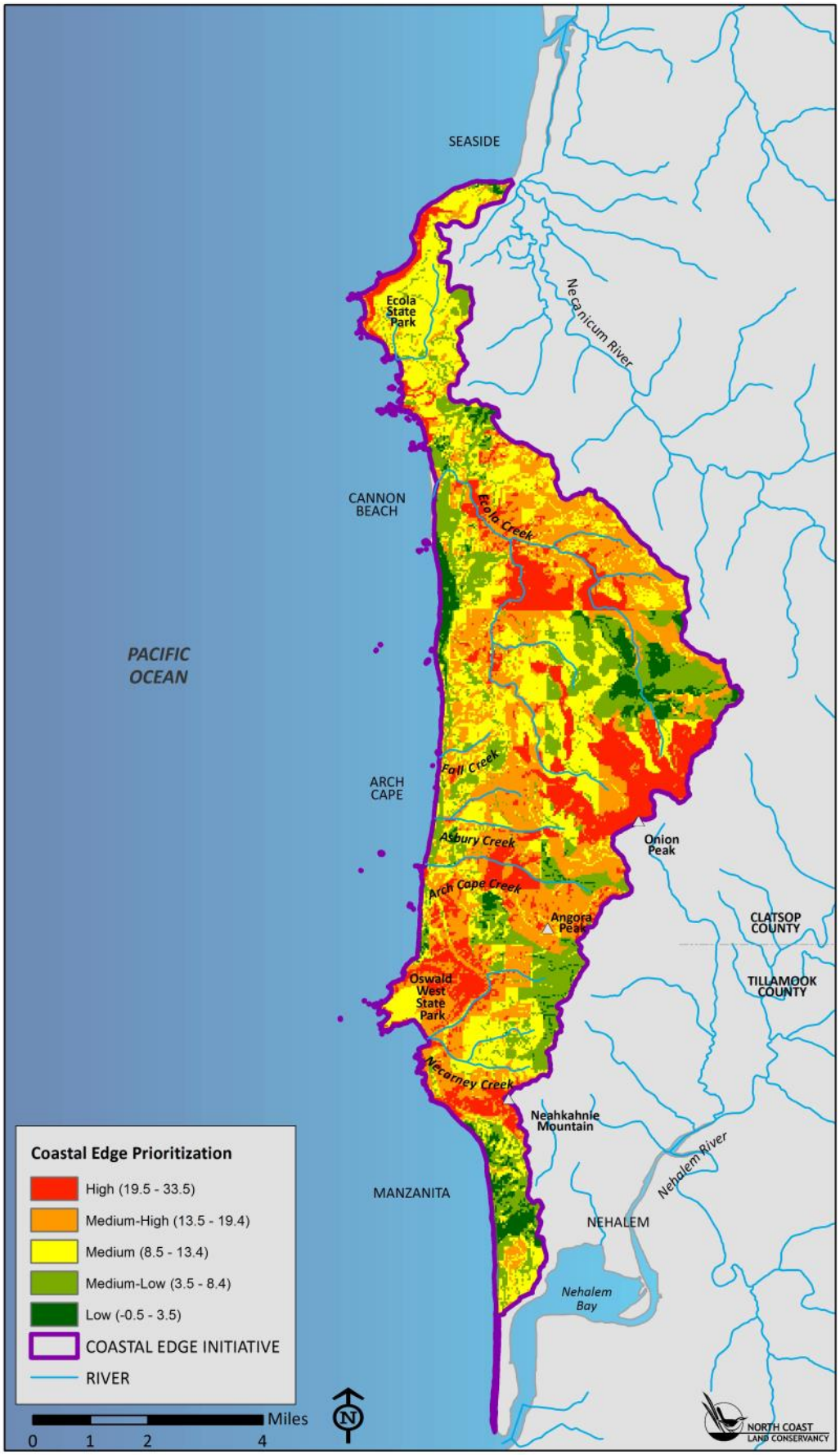


Figure 18. Final co-occurrence map. Conservation priority levels and cumulative scores are indicated in the legend.

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Photo Sources

[1] Neal Maine, Pacific Light Nature Images

[2] North Coast Land Conservancy staff, board member, or volunteer