



OREGON ROCKY SHORES

NATURAL RESOURCE INVENTORY

In Support of the
Oregon Territorial Sea Plan
Ocean Policy Advisory Council

Conducted by the
Oregon Department of Fish and Wildlife
Marine Region
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*Cover aerial photo of Gregory Point/Sunset Bay State Park
One of a series of low-tide aerial photos of Oregon's rocky shores taken as part of this inventory work*

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1. INTRODUCTION

This inventory presents a survey of natural resources on Oregon's coastal rocky shores. The inventory examines rocky intertidal areas, cliffs, offshore rocks and associated subtidal reef habitats, upland facilities adjacent to rocky shores, access, and human uses.

The purpose of this inventory is to support current and future resource planning and management programs for Oregon's rocky shores. In 1991, the Oregon Legislature created the Ocean Policy Advisory Council (OPAC) to prepare a plan for managing Oregon's territorial sea. A large part of OPAC's effort during the 1992-1994 planning phase was the development of a comprehensive strategy for managing Oregon's rocky shores. This inventory provides OPAC with the factual base needed to apply the management strategies to actual locations on the coast and is a companion document to the Territorial Sea Management Plan.

This document presents rocky shores data in both a summary section and a detailed site inventory section. The summary section (Section 2) distills the detailed site inventory information (Section 3) and presents it in a format that allows coastwide comparisons of sites. The site inventory section (Section 3) contains detailed descriptions of all rocky shores areas along the Oregon coastline. Both sections organize and present information using the geographic classification of rocky shores sites employed by OPAC's Rocky Shores Management Strategy. This system classifies geographically related rocky shores sites into 29 "cells" along the coast (Figures 1.1a and 1.1b). Section 3 also inventories resources on the jetties that form rocky shore areas at many of the river mouths along the coast.

2. SUMMARY OF RESOURCE INFORMATION

2.1 Site Summaries

OPAC and other resource management authorities require the means to make coastwide

evaluations and comparisons of rocky shores sites when formulating management plans. This section describes how detailed characterizations of rocky shores sites have been summarized and presented on a single map. Section 3 of this inventory characterizes rocky shores sites using biological, physical, and social data collected by the Oregon Department of Fish and Wildlife (ODFW), the Department of Land Conservation and Development (DLCD), U.S. Fish and Wildlife Service (USFWS), Parks and Recreation Department, and others. The data include information on habitats, bird and mammal locations and potential impacts, human access and visitation, park facilities, interpretive programs, and types of human uses. These data are from a variety of sources and have different formats and levels of detail. In this section, we have simplified these extensive and disparate data to provide basic information in a single format that allows coastwide comparison.

In order to create useful summaries, we have distilled the detailed site descriptive data into several key considerations that are useful for evaluating sites. The site evaluation criteria, and summary of the data elements used to represent them are listed below. The summary data represent key indicators of resources, impacts, activities, and opportunities at a site.

Criterion 1. Site Type

- a) Current (1994) ODFW management designation
- b) Shoreline vs. Offshore site

Criterion 2. Environmental Considerations

- a) Intertidal Habitat
 - Habitat size
- b) Animal Concentrations
 - Seabird colony size
 - Pinniped (seal and sea lion) haulout size
- c) Resource Conflict Concerns
 - Intertidal overuse concern
 - Bird and mammal conflict concerns
 - Presence of threatened or endangered species

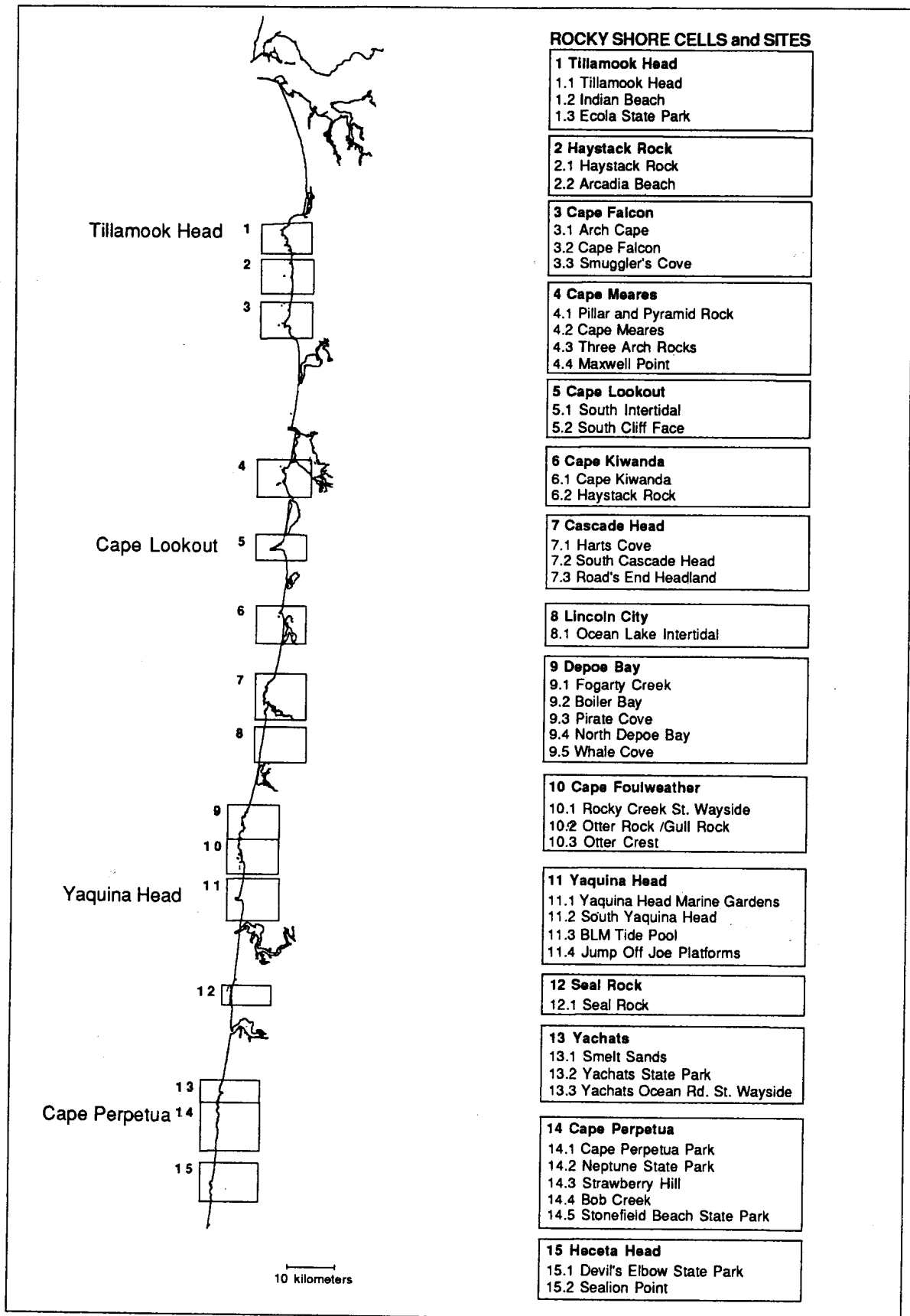


Figure 1.1a. Rocky Shores classification for the northern Oregon coast.

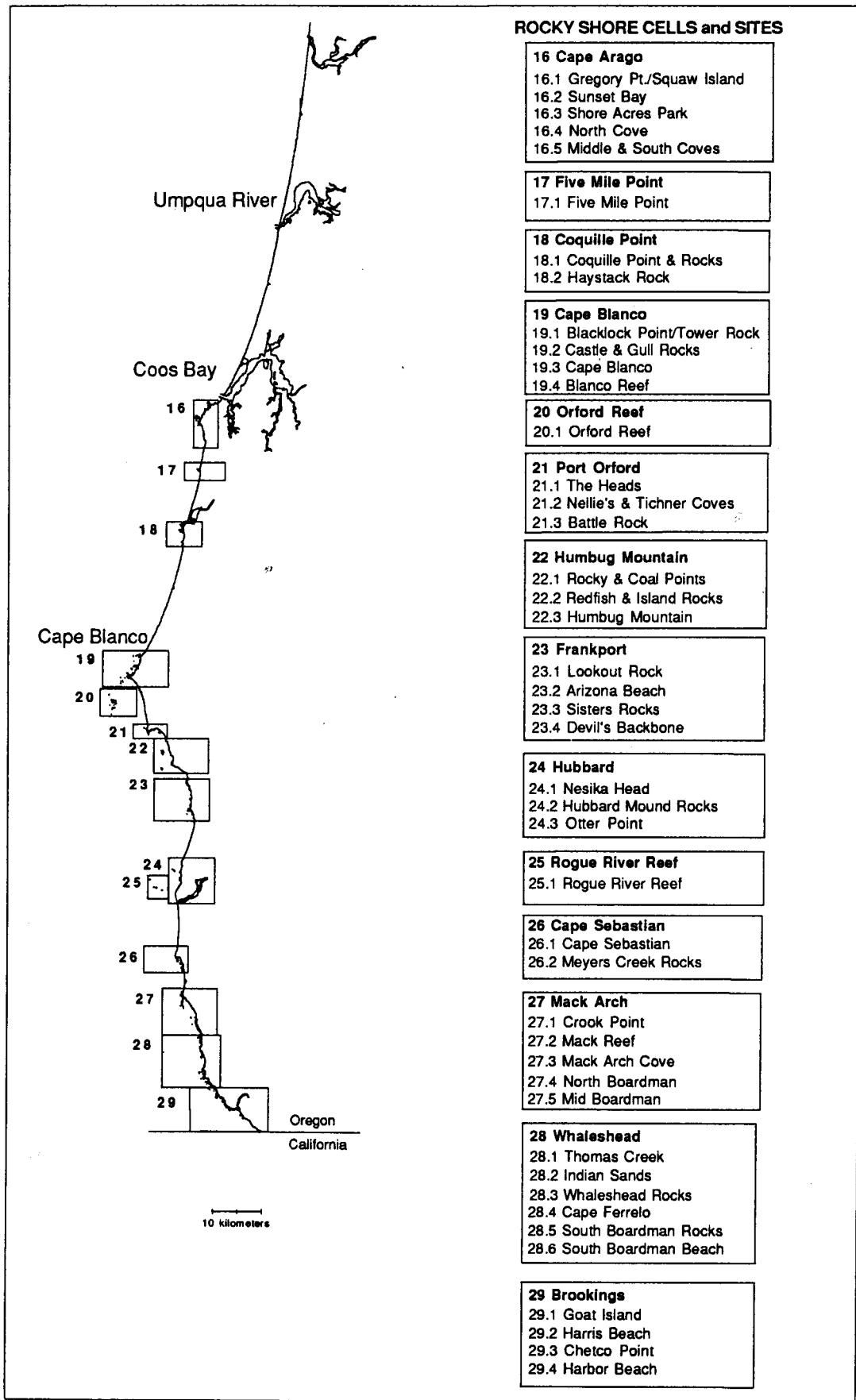


Figure 1.1b. Rocky Shores classification for the southern Oregon coast.

Criterion 3. Site Use

a) Current Use

- Visitation
- Accessibility

b) Type of Use

- Educational/interpretive use
- Commercial use
- Recreational use

Figures 2.1a and 2.1b present the summary data listed above. Each rocky shores site is ranked on a relative scale for each element of the environmental and site use criteria. Appendix 1 describes the ranking systems used for mapping the criteria. The relative rankings expressed in the summaries are comparable among sites along the coast, but are not intended to be comparable among elements within a site. For example, a high ranking for intertidal overuse concern does not equate with a high ranking for potential bird and mammal impact concern.

This summary should not be used in isolation when examining sites. Additional knowledge about sites and professional resource management experience play a large role in site evaluation. Also, the detailed descriptions of rocky shores areas in Section 3 should be referred to in order to fully understand the summarized data.

2.2 Coastwide Summary

This section summarizes coastwide totals of natural resources and human use to provide a perspective for the individual site information presented in Sections 2.1 and 3. The Oregon coastline totals 395 miles in length when measured along the shoreline depicted on U. S. Geological Survey 7.5' topographic map sheets. Of this, 161 miles (41%) is classified as rocky shores in this inventory (excluding jetties). Rocky intertidal habitat, a subset of the rocky shores, accounts for 82 miles (21%) of shoreline (excluding jetties). Table 2.1 shows the amount of rocky shores that fall within current management categories and within management categories proposed in the Territorial Sea Management Plan (OPAC 1994).

This document inventories a number of species and biological communities present on

rocky shores. Of the natural resources inventoried, total counts are only available for nesting seabirds and pinnipeds. A 1988 nesting seabird survey counted a total of about 1.2 million birds at a total of about 360 colony sites in the rocky shore areas included in the inventory (USFWS 1988). Seabird numbers vary from year to year. Table 2.2 breaks the count down by species and lists the 13 largest nesting colony sites. Pinniped counts amount to about 14,200 in the rocky shores, based on a 1993 survey (Brown 1993). Harbor seal and California sea lion populations have been increasing in recent years and the Steller sea lion population is currently stable in Oregon. Table 2.3 lists the pinniped counts by species and the largest pinniped haulouts.

Total visitor counts on the upland facilities adjacent to rocky shores amounted to 13 million visitor-days during the 1991 - 1992 season. This figure does not represent the total numbers of individual visitors at the sites because one person may visit more than one site during a day or may visit the same site on more than one day during the year. Thus a single person can contribute many visitor-days to the total count during a given year. Also, this figure does not represent the number of people that actually use the rocky shoreline; it only tells us how many people visit the adjacent upland facilities (see Appendix 1 for more discussion of visitor use). The inventory reports visitor use for facilities at 49 of the 75 rocky shoreline sites on the coast. Although we do not have data for 35% of the sites, the existing information covers nearly all of the moderate to high use areas and therefore accounts for the majority of rocky shoreline use. Visitor use of the shore varies from year to year, but has shown a general increase over the past 25 years (Figure 2.2).

Rocky shores accessibility has changed over the years. Section 2.1 ranks the relative accessibility of sites and Appendix 1 discusses the ranking system. About 70% of the rocky shoreline has an accessibility ranking of moderate or higher. A 1953 study of Oregon's rocky intertidal areas stated that 56% were accessible and only 38% were accessible with less than a one mile walk (McCauley and Marriage 1955). Virtually all of the areas ranked as

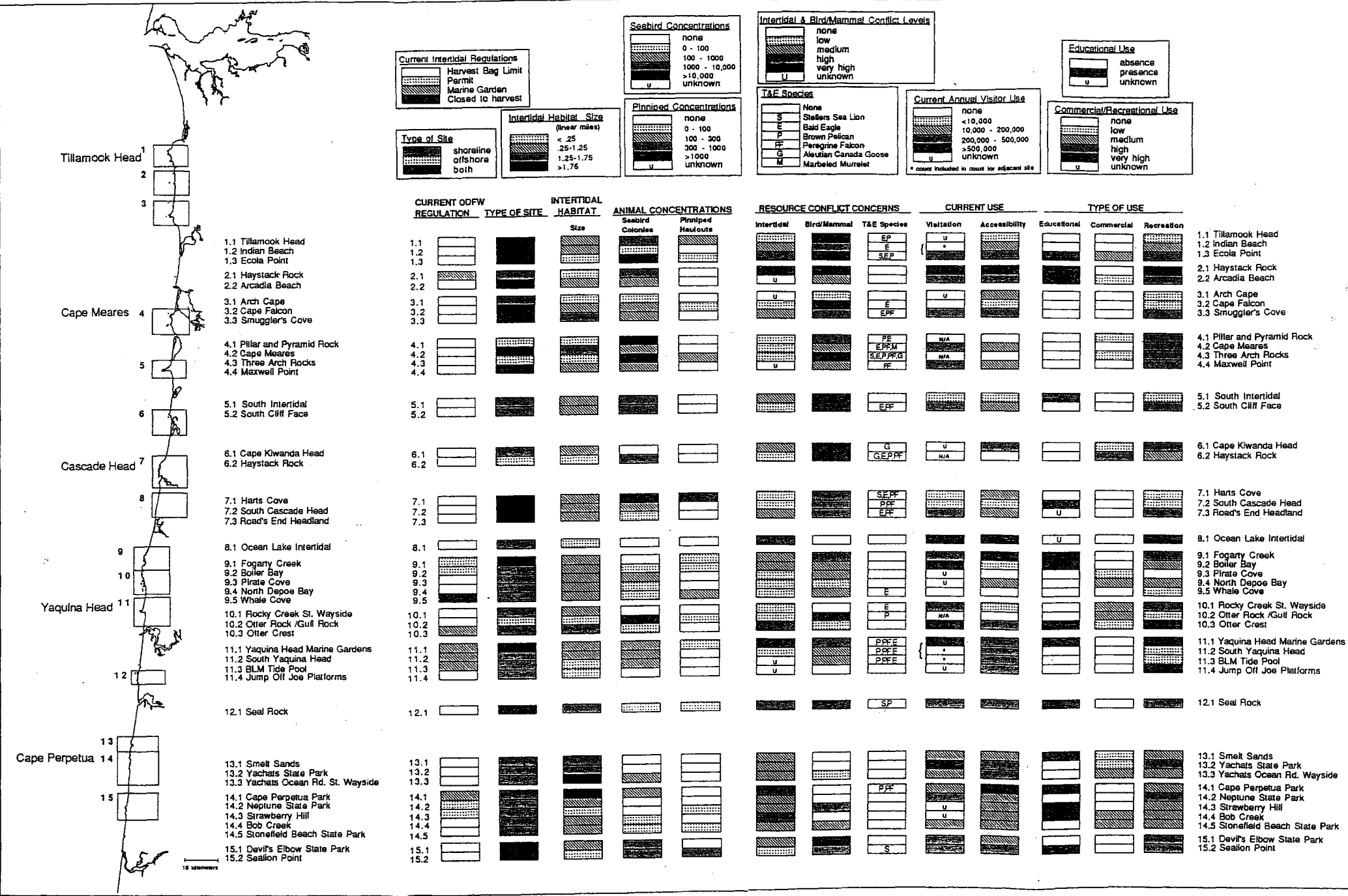


Figure 2.1a. Resource information for rocky shores sites on the northern Oregon coast.

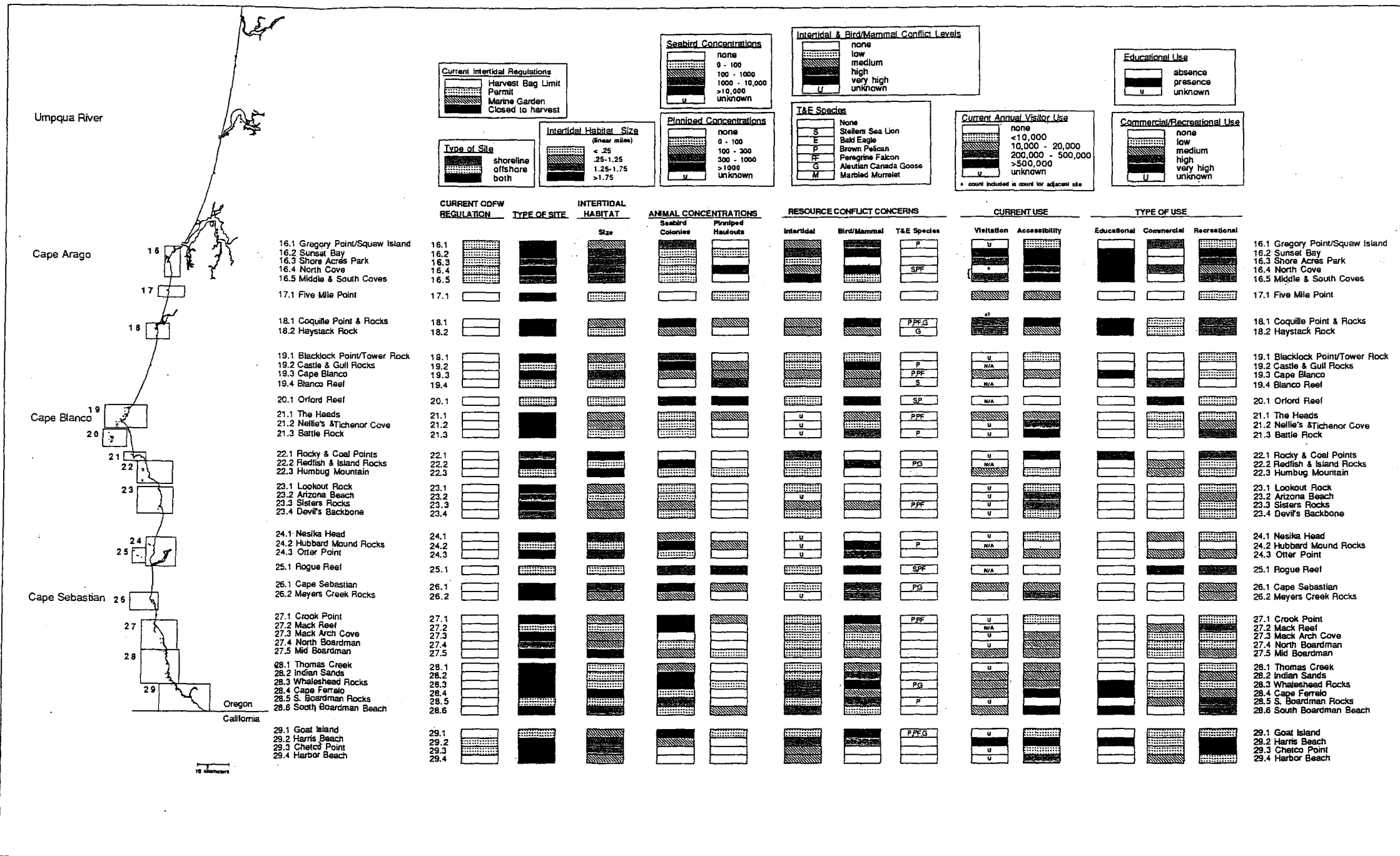


Figure 2.1b. Resource information for rocky shores sites on the southern Oregon coast.

Table 2.1. Total miles of rocky shoreline in current ODFW management categories and in management categories proposed by the Territorial Sea Plan (see Territorial Sea Plan for an explanation of management categories).

Current Management Category	Total Rocky Shores Miles	Proposed Management Category	Total Rocky Shores Miles
Marine Garden	4.5	Marine Garden	7.1
Research/Education Permit Area	15.4	Research Reserve	11.5
Reserve (Whale Cove)	0.9	Habitat Refuge	15.6
All Other Areas	140.2	Marine Shore	126.8
Total	161	Total	161

Table 2.2. Total counts of nesting seabird species on all of Oregon's rocky shores and total counts of all nesting seabirds at the 13 largest colony sites (based on USFWS 1988).

Species	Total Count	Colony Site	Total Count
Common murre	710,000	Three Arch Rocks (site 4.3)	226,000
Leach's storm-petrel	430,000	Crook Point Rocks (site 27.1)	187,000
Brandt's cormorant	23,000	Whaleshead Island and adjacent rock (site 28.3)	123,000
Western gull	17,000	Goat Island (site 29.1)	107,000
Pelagic cormorant	11,000	Coquille Point rocks (site 18.1)	52,300
Tufted puffin	5,000	Bird Rocks (Chapman Point - site 1.3)	49,500
Pigeon guillemot	4,900	Rock north of Whaleshead Island (site 28.2)	44,800
Double-crested cormorant	4,200	Gull Rock (Near Cape Blanco - site 19.2)	41,600
Rhinoceros auklet	950	Orford Reef (cell 20)	39,200
Black oystercatcher	360	Two Arches Rocks (Cascade Head - cell 7)	36,100
Cassin's auklet	240	Island Rock (site 22.2)	28,000
Fork-tailed storm-petrel	present	Dog Rock complex (Hubbard Mound - site 24.2)	25,500
Glaucous-winged gull	present	Colony Rock (Yaquina Head - site 11.1)	24,600

Table 2.3. Total counts of the primary pinniped species that haul out on Oregon's rocky shores and listing of the 5 largest rocky shore haulout sites (based on Brown 1993).

Species	Total Count	Five largest Haulout Areas	Species
California sea lion	7,973	Cascade Head (site 7.1)	California sea lions
Steller sea lion	3,478	Orford Reef (cell 20)	Steller sea lions
Harbor seal	2,780*	Rogue Reef (cell 25)	Steller sea lions, harbor seals
		Cape Arago (site 16.4)	Steller/Cal. sea lions, harbor seals, elephant seals
		Rocky shores from Cape Sebastian to Cal. border (cells 26 - 29)	Harbor seals

* This count represents rocky shores. An additional 2,565 seals use estuaries.

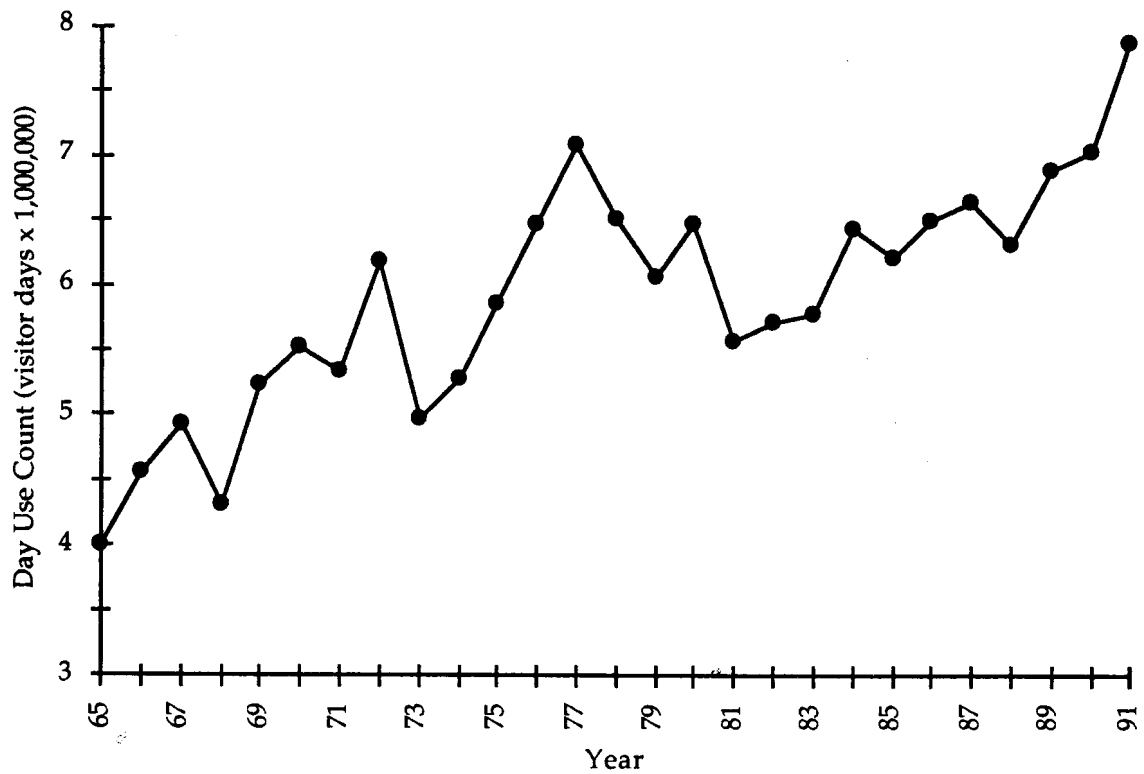


Figure 2.2. Human use trends for coastal state parks adjacent to rocky shores. Only those state parks that kept continuous records since 1965 are included in this graph (Source: PRD 1993).

medium or higher accessibility in this inventory have less than a one mile walk. The 1953 study and this inventory are not precisely comparable because the surveys used different criteria for determining accessibility. However, there has undoubtedly been a substantial increase in access to rocky shores over the past 40 years.

3. DESCRIPTIONS OF ROCKY SHORES CELLS AND SITES

The remainder of this inventory provides detailed descriptions of Oregon's rocky shores. Each subsection below presents information about rocky shores cells, including descriptions of location, use, access, natural resources, impact concerns, and opportunities for human use. Each subsection also includes maps depicting natural resources, use, and access. The cell descriptions present standardized sets of information according to the following outline:

- I. Introduction
 - A. Cell location and list of sites within the cell
 - B. General description of habitat types and upland features
- II. Rocky Shores Resources
 - A. Geology
 - B. Intertidal habitat description
 - C. Offshore rock habitat description (if applicable)
 - D. Subtidal reef habitat description (if applicable)
 - E. Seabird and pinniped use
 - F. Threatened and endangered species
- III. Human Use
current use types and amounts
- IV. Management Authorities and Jurisdictions
list of land/resource managers and their jurisdictional authorities
- V. Human Use Concerns and Possible Solutions
list of current human impact concerns and suggested approaches to addressing the concerns. (Note: concerns included on the list were derived from biologists and

resource managers familiar with the area and resource in question. The magnitude of impacts (if any) related to each concern have not necessarily been documented with scientific study. Each concern would need to be thoroughly documented before attempting a resolution.)

VI. Additional Opportunities

VII. Map of the cell depicting site location, upland uses, and access to rocky shores

VIII. Map of the cell depicting rocky shore habitats, seabird nesting colonies, and pinniped haulouts

Data for the rocky shores descriptions were developed from visits to the sites, scientific and technical literature, aerial photographic surveys, and interviews with knowledgeable land managers, users, biologists, and other individuals. ODFW staff biologists visited all of the rocky shores sites between February and July 1993, during low tides. During the visits, the biologists used standardized data forms to record information on intertidal, cliff, and offshore rock habitats, access trails, and upland facilities. The field data were recorded on photocopies of 1973 1:1200 scale black and white aerial photos of the coast (ODOT 1973). The biologists also recorded field notes that qualitatively described the rocky intertidal invertebrate and algal species composition. In addition, the habitats, access trails, and upland facilities at most of the sites were recorded on 8mm video tape with a hand held video camera. Still photography was used when a video camera was not available.

Although the site visits provided a standardized set of observational data for rocky intertidal habitats, a consistent quantitative description of the intertidal communities is not available. Universities have conducted and continue to conduct numerous rocky intertidal research projects on the coast; however, most of the research is confined to 5 or 6 sites. In 1994, ODFW and the Oregon Institute of Marine Biology conducted a quantitative survey of intertidal algal and invertebrate communities at 12 of the largest intertidal sites on the coast. Information from the 1994 survey will be summarized in a companion document to this inventory at a later date.

Literature information used in this analysis included a previous ODFW rocky intertidal survey (Osis 1975), a shoreline access inventory (Benkendorf Associates 1989), Oregon State Park Master Plans, the Oregon Ocean Plan (Oregon Ocean Resources Management Task Force 1991), and various sources that describe coastal geology. Information on seabird colonies and threatened and endangered birds were derived from unpublished USFWS surveys (USFWS 1988) and from interviews with Roy Lowe, USFWS. Seabird nesting colony counts came from a survey conducted by USFWS in 1988. Information on pinnipeds came from unpublished ODFW surveys (Brown 1993) and from interviews with Robin Brown and Susan Riemer, ODFW. Roy Lowe and Robin Brown also provided the principal information for developing the list of bird and mammal resource conflict concerns (Appendix 2). ODFW fisheries biologists provided information on commercial and recreational fisheries. Oregon Park and Recreation Department district managers and other personnel provided information on site use and access.

A computerized Geographic Information System provided the means for developing the cell resource maps. The rocky shores data exist as overlays on a coastal base map provided

by the State Geographic Information Service Center. The Service Center digitized the base map at a scale of 1:24,000 from USGS 7.5 minute topographic quad sheets. Sources of information for the mapped rocky shores data include the field, literature, and interview data described above, and a set of 1:7200 scale color infrared aerial photos taken at low tide during May and June of 1993 (ODFW 1993). Subtidal kelp bed locations shown on the maps came from a 1990 ODFW kelp inventory (Ecoscan 1991). Appendix 3 describes the data presented on the rocky shores cell maps.

Nearshore and rocky shore ecosystems are contiguous with adjacent upland ecosystems. Although comprehensive management of a site requires knowledge of these upland ecosystems, a complete inventory of adjacent upland resources was beyond the scope of this document. Information on the upland resources can be obtained from the Oregon Department of Parks and Recreation, the Oregon Natural Heritage Program, ODFW, and individual site managers. Similarly, knowledge of Native American cultural sites is a necessary part of shoreline management. This inventory does not contain cultural site information because of its sensitive nature. Tribal authorities and the Oregon Department of Parks and Recreation house this information.

CELL 1: TILLAMOOK HEAD

Tillamook Head is a massive headland feature located between Seaside and Cannon Beach. The cell has three rocky shores sites: 1.1 Tillamook Head (includes the westernmost tip of the headland), 1.2 Indian Beach, and 1.3 Ecola Point (Figure 3.1a). Shoreline features of the Tillamook Head site include primarily large cliffs up to 1,000 feet high with narrow cobble and boulder beaches at their base, and several offshore rocks. Indian Beach and Ecola Point sites consist of short pocket beaches bracketed to the north and south by small rocky points and associated intertidal areas and offshore rocks. Upland habitats in the cell include old growth Sitka spruce forests on Tillamook Head and near Ecola Point and the highly exposed Sitka spruce-salal community that lines the tops of the cliffs (PRD 1975). With the exception of some residential land on the south end of the cell, most of the land is within Ecola State Park. The state park has parking, restroom, and picnicking facilities at Ecola Point and Indian Beach. Foot trails link the park sites and cross over the headland. The shore can be accessed from Ecola Point, Indian Beach, and from a parking area on the north side of Tillamook Head (Figure 3.1a).

Rocky Shores Resources

Tillamook Head is a complex of large headlands, rocky points, coves, and offshore rocks. Although most of the headland is basalt, a complex intermixture of basalt and sedimentary rock is characteristic of some areas (Lund 1972a). Land between Chapman and Indian Points is unstable and subject to landslides. Most notable is Bald Point which is at the toe of a periodically active landslide (Lund 1972a). Some sea stacks and rocks exist off the main headland and rocky points. These are erosion resistant features that indicate the former extent of the headland (Lund 1972a).

Erosion of the cliffs has created boulder fields and offshore rocks that provide a fringe of rocky intertidal habitat along the shore. The most accessible areas are associated with Ecola and Bald Points in sites 1.2 and 1.3, respectively. These habitats consist of a series of basalt outcroppings separated by boulder fields and

sandy areas. In these habitats, mid-elevation intertidal communities consist of mussel/gooseneck barnacle beds typical of areas exposed to heavy surf action. Exceptionally large colonies of aggregating anemones occupy much of the rock surface in the upper intertidal elevations. Some of the rock surfaces near sand level are quite bare due to action of sand scour and seasonal sand burial. No information is available about the inaccessible intertidal boulder and bedrock habitats that line the base of cliffs in site 1.1. One of these areas is an 1800 by 300 foot rocky intertidal platform that may provide an interesting example of habitat that has not been disturbed by human use. A boulder intertidal area lines the shore on the north side of the headland. Rock surfaces in this habitat are relatively devoid of sessile invertebrates because the boulders grind against each other in the surf. Mobile invertebrates such as shore crabs are abundant under and between the boulders.

Seabirds and pinnipeds utilize the rocky shoreline habitats of the cell. There are small seabird nesting colonies on the tip of the headland (site 1.1), on Indian Point (site 1.2), and on Ecola and Chapman Points (site 1.3) (Figure 3.1b). Pigeon guillemot and Brandt's cormorant are the most common nesting species at these sites (USFWS 1988). Of the rocks and islands in the cell, Tillamook Rock, is the largest. Tillamook rock is noted for its historic lighthouse structure that has recently been converted to a columbarium. The rock has a major seabird colony with several thousand birds and is used by the endangered brown pelican as a roosting site (USFWS 1988). Common murre account for about 90% of the nesting birds on this rock; most of the remaining nesters are Brandt's cormorants. There are a total of 15 additional seabird nesting colonies on the other offshore rocks in the cell (Figure 3.1b), including large colonies off the tip of the headland, and off Ecola and Chapman Points (USFWS 1988). Common murre, Brandt's cormorant, pigeon guillemot, and western gull are the most common species in these offshore rock colonies. The nesting colonies off Chapman Point (site 1.3) typically have more than 40,000 birds, most of which are common murre. In addition to the seabirds, bald eagles utilize many of the cliffs and offshore rocks of the cell (Lowe, Pers. com., 1993). Harbor seals, California sea lions, and the threatened Steller sea lion haul out on Sea Lion Rock off Ecola Point (site 1.2). The

haulout is considered small because fewer than 100 animals of each species use the site. Harbor seals use the haulout during pupping season (Brown 1993). Use of this site by Steller sea lions and, possibly, by harbor seals appears to have declined over the past 10 years (Brown, pers. com., 1993). There are two harbor seal haulouts on cobble beaches near the tip of the headland in site 1.1 (Figure 3.1b). Together, these haulouts have between 100 and 300 animals and are pupping sites (Brown 1993). Tillamook Rock, Sea Lion Rock, and the rocks off Chapman Point are listed in the Oregon Ocean Plan as especially sensitive bird and mammal habitats (Oregon Ocean Resources Management Task Force 1991).

Human Use

Uses of the Tillamook Head cell include hiking, site seeing, tide pooling, commercial harvest, bird watching, angling, and surfing. Scenic overlooks at Ecola Point (site 1.3) are some of the most spectacular on the coast. Ecola Point is a very popular day use and picnicking area and receives relatively high use by school groups. This area is also an Oregon State Parks whale watching site. The Haystack Rock Awareness Program and Coastal Studies and Technology Program (see Cell 2) provide occasional guided tidepool walks at Ecola Point. There is some commercial mussel harvest at Chapman Point (site 1.3). Human use of the cell is high and will continue to grow due to its proximity to the two largest tourist towns on the north coast. The focus of use is at Ecola Point and Indian Beach, with over 450,000 visitor-days in 1992 (PRD 1993).

Management Authorities and Jurisdictions

ODFW	- Harvest regulations (marine invertebrates and finfish)
PRD	- Owner/manager of Ecola State Park property
	- Co-manager of beaches with DSL
DSL	- Manager of submerged and submersible lands
	- Co-manager of beaches with PRD
USFWS	- Owner/manager of the offshore rocks (above ordinary high water) that are separated from the shore at high tide (Note: Tillamook Rock is privately owned)

Clatsop County - Planning and zoning regulations
 Cities of Seaside and Cannon Beach - Planning and zoning regulations
 Private Property Owners

Human Use Concerns and Suggested Management Approaches

1) Sea Lion Rock (Ecola Point - site 1.3), Tillamook Rock, and Bird Rocks (Chapman Point - site 1.3) - Possible boat and aircraft disturbance to nesting colonies and a pinniped haulout .

Suggested Approach: Provide information to vessel and aircraft owners and operators concerning the need to minimize disturbance. The disturbances should be studied and management measures developed that are designed to address site specific concerns.

2) Sea Lion Rock and other rocks off Ecola Point (site 1.3) - Possible disturbance to bird nesting colonies and pinniped haulout from foot traffic.

Suggested Approach: Use interpretive signs to educate the public about disturbance to marine birds and mammals (Note: USFWS is currently planning to put a sign at the site). The magnitude of the disturbance should be examined and documented. Priority should be placed on further examination of the apparent decline in Steller sea lion and harbor seal use. It may become necessary to rope off access to the main rocks at low tides.

3) Nearshore accessible rocks off Chapman Point (site 1.3) - Possible disturbance to bird nesting colonies.

Suggested Approach: Use interpretive signs to educate the public about possible human impacts to seabirds.

4) Ecola Point (site 1.3) - Possible overuse of the rocky intertidal area .

Suggested Approach: Use interpretive signs and volunteers to educate the public about appropriate intertidal etiquette. Ecola Point should be considered a candidate for more intensive management.

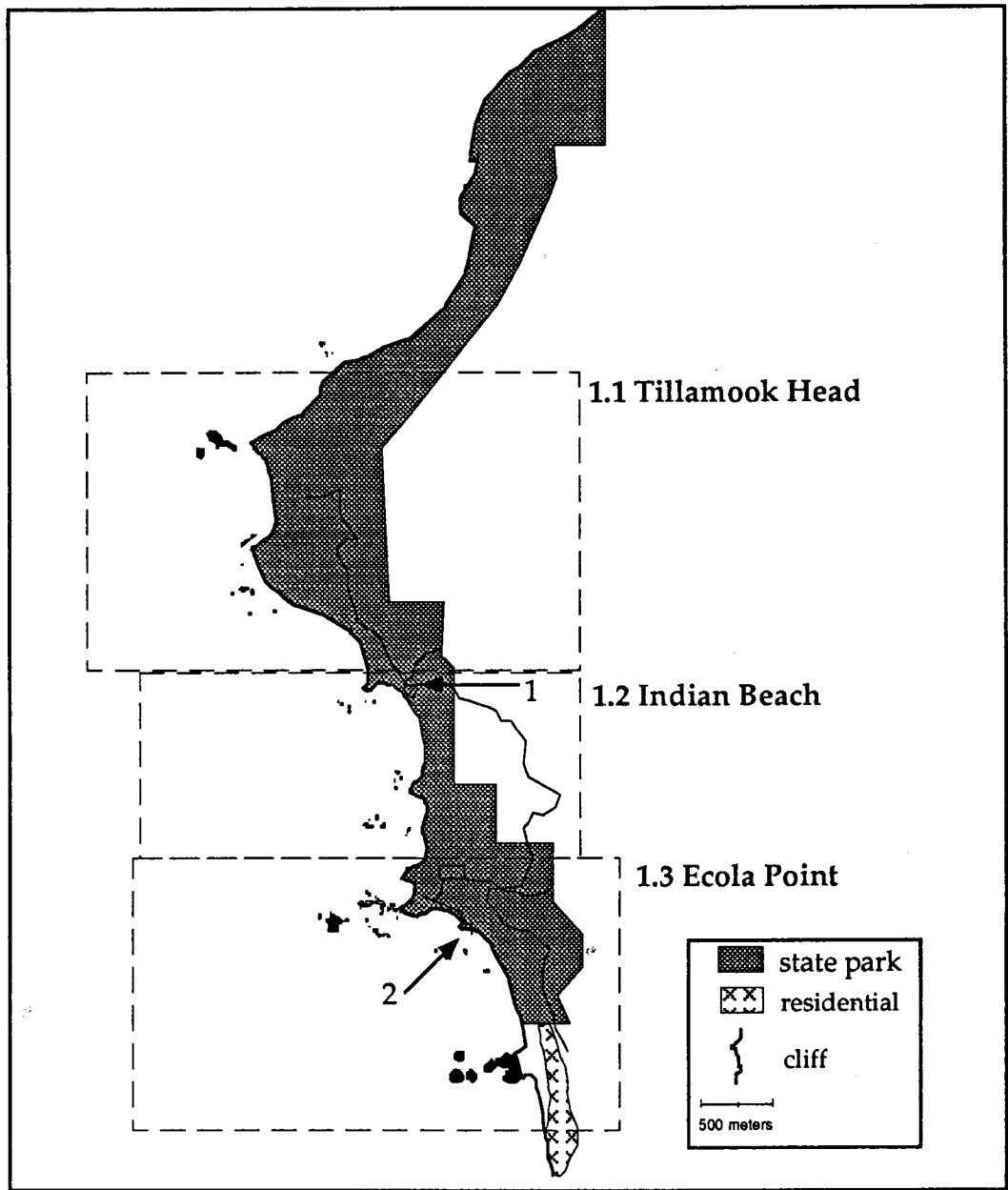
Additional Opportunities

All sites within the Tillamook Head cell are good candidates for interpretive programs due

their high use and the need to alleviate impacts. Information about the rocky intertidal, seabirds, marine mammals, and Native American use can be included in an educational effort at Ecola Point and Indian Beach (sites 1.2 and 1.3). Special attention should be given to Ecola Point where most of the rocky shores use is focused.

Volunteer guides or docents would be especially useful here. The Haystack Rock Awareness Program and Coastal Studies and Technology Program may be able to provide a structure within which to organize and support volunteers.

Tillamook Head Cell

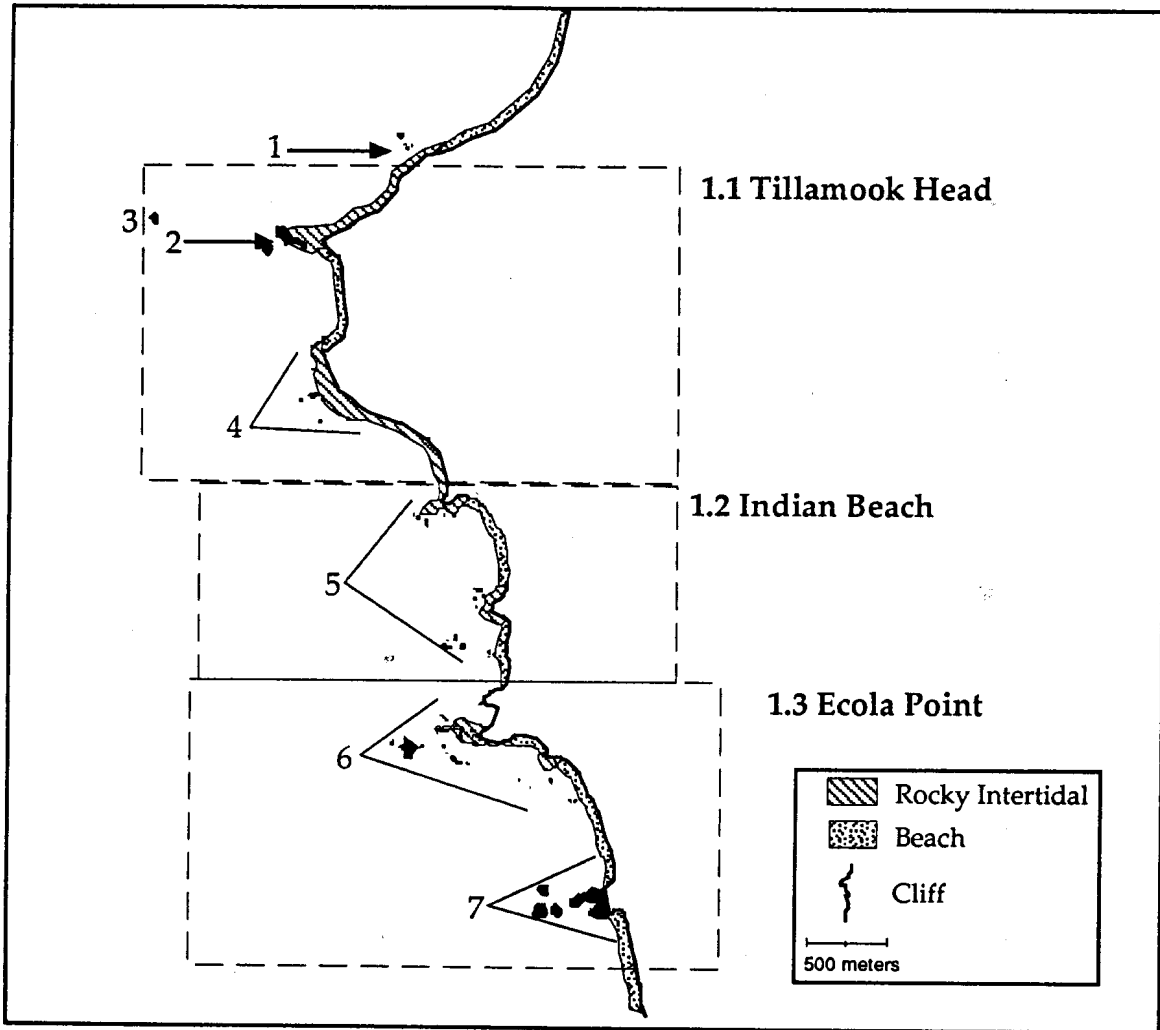


ID	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/ Difficulty*	Trail Length (ft)
1	Indian Beach	451,000†	15	steps/D	60
2	Crescent Beach		75	paved/D	660

* (E = easy M = moderate D = difficult)
 †Combined count for Indian and Crescent Beaches

Figure 3.1a. Rocky shore upland characteristics for the Tillamook Head Cell.

Tillamook Head Cell



ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
1	Seabird	1 small	Cliff	No	Aircraft
2	Seabird	1 small	Cliff/Rocks	No	Aircraft
2	Seabird	3 medium	Cliff/Rocks	No	Aircraft
2	Harbor Seal	1 small	Rocks	No	
3	Seabird	1 large	Rocks	No	Aircraft, Vessel
4	Seabird	1 small	Rocks	No	Aircraft
4	Seabird	2 medium	Rocks	No	Aircraft
4	Harbor Seal	1 medium	Rocks	No	
5	Seabird	3 small	Cliff/Rocks	Yes	Foot
6	Seabird	5 small	Cliff/Rocks	Yes	Foot, Vessel
6	Seabird	1 medium	Cliff/Rocks	Yes	Foot, Vessel
6	Seabird	1 large	Cliff/Rocks	Yes	Foot, Vessel
6	Steller/Calif.	1 small	Rocks	Yes	Foot, Vessel
6	Harbor Seal	1 small	Beach	Yes	Foot, Vessel
7	Seabird	1 small	Cliff	Yes	Aircraft, Foot
7	Seabird	1 medium	Rocks	Yes	Aircraft, Foot
7	Seabird	2 large	Rocks	No	Aircraft, Vessel
7	Seabird	1 x-large	Rocks	No	Aircraft, Vessel

T & E species that occur in cell: bald eagle, brown pelican, Steller sea lion

Figure 3.1b. Rocky shore natural resources for the Tillamook Head Cell.

CELL 2: HAYSTACK ROCK

The Haystack Rock cell extends from Cannon Beach to Hug Point, just north of the town of Arch Cape. The cell contains two sites: 2.1 Haystack Rock and 2.2 Arcadia Beach. Haystack Rock is a visually stunning landmark that rises approximately 235 feet above an otherwise unbroken stretch of sandy beach. It is accompanied by two narrow pinnacles on the south side known as The Needles. There are several prominent rocky shore features separated by long stretches of sand beach south of Haystack Rock. These include Silver Point Rock, Jockey Cap, and Lion Rock near Humbug Point. Site 2.1 is adjacent to the city of Cannon Beach, a major coastal tourist destination. The city has extensive commercial and residential developments along the shore and one state park facility. Site 2.2 contains two additional state park facilities and several small residential developments.

There is extensive public shore access throughout the cell (Figure 3.2a). Access to Haystack Rock is primarily at Gower Street and Second Street in Cannon Beach. Public facilities include a public parking lot, public restrooms, pay telephones, and considerable roadside parking close to the access. Hotels and restaurants border the path at Gower Street. A third major access to site 2.1 is Tolovana Beach State Wayside, which is located about one-third mile south of the site. There are an additional 15 to 20 less used access points available to visitors and residents of the City of Cannon Beach. Site 2.2 has two major access points, Arcadia State Wayside and Hug Point State Park. These facilities provide parking, restrooms, picnic areas, and paths to the beach.

Rocky Shore Resources

Haystack Rock and some of the rocky shore features of Cell 2 are composed of Columbia River basalt (Baldwin, 1981). Heavily eroded sandstone forms the cliffs and smaller rocks in the southern part of the cell.

Haystack Rock contains a variety of rocky shore habitat types. A wave-sheltered boulder field partially encircles the rock and links up

with a second small boulder bed directly to the south. These boulder areas contain a large variety of invertebrates and plants. The Haystack Rock intertidal habitat was seriously impoverished due to overuse before becoming a Marine Garden (Oregon Ocean Resources Management Task Force 1991). Although some recovery has occurred, recent research has shown that trampling impacts have depleted some parts of the intertidal habitat (Brosnan and Crumrine 1992). Summer sand accumulation generally covers a cobble/pebble zone adjacent to the rock and occasionally covers the boulder zone. There may be a cycle of approximately ten years with one or two years in which the boulder intertidal zone becomes completely covered (Haystack Rock Awareness Program staff, pers. com. 1993). Arcadia Beach and vicinity (Site 2.2) contains approximately seven widely spaced rock outcroppings made of basalt or sandstone. These are subject to sand burial and scour, and provide a foothold to hardy intertidal invertebrates such as aggregating anemones and acorn barnacles.

The cell contains one large and a number of smaller seabird nesting colonies (Figure 3.2b). Haystack Rock supports the largest colony with about 2,000 nesting birds (USFWS 1988). Principal nesting species include western gull, pelagic cormorant, tufted puffin, and pigeon guillemot. Two endangered species, bald eagle and brown pelican, also use the rock (Haystack Rock Awareness Program 1992). Jockey Cap supports seabird colonies with about 300 birds, principally western gull and pelagic cormorant (USFWS 1988). There are several small seabird colonies on the cliffs and rocks between Silver Point and Hug Point (Figure 3.2b). The principal nesting species include western gull and pigeon guillemot. Colonies on Silver Point Rock and Lion Rock (near Humbug Point) are accessible at low tide.

Human Use

Human use in the cell includes picnicking, photography, beach combing, bird watching, sight seeing, school field trips, and interpretive programs. Arcadia Beach and Hug Point state parks each recorded in excess of 200,000 visitor-days in 1992. The visitor use at Haystack rock is probably much greater, but total counts are only available for Tolovana Park. Most of the people using Haystack Rock access the beach from

central Cannon Beach. The Haystack Rock Awareness Program provides interpretive sessions at the rock. A total of 5,374 visitors took part in the sessions in 1992. On summer weekends, during low tide, program staff set up displays containing invertebrate, fish and plant species from the Haystack Rock intertidal habitat. They provide microscopes, spotting scopes, and binoculars for use by visitors and interpreters give talks explaining various aspects of plants and animals that use the rock. The Center for Coastal Studies and Technology, made up of students and staff of the Seaside School District, also runs interpretive efforts at Haystack Rock and surrounding areas.

Management Authorities and Jurisdictions

- ODFW - Harvest regulations (marine invertebrates and finfish)
- Haystack Rock Marine Garden
- PRD - Owner/manager of state park properties
- Co-manager of beaches with DSL
- DSL - Manager of submerged and submersible lands
- Co-manager of beaches with PRD
- USFWS - Owner/manager of the offshore rocks (above ordinary high water) that are separated from the shore at high tide
- Clatsop County - Planning and zoning regulations
- City of Cannon Beach - Planning and zoning regulations
- Private Property Owners

Human Use Concerns and Suggested Management Approaches

1) Haystack Rock (site 2.1) - Overuse of rocky intertidal area (both trampling and collecting impacts).

Suggested Approach: Continue and expand existing intertidal interpretive programs. Place interpretive signs at beach access points to educate the public about appropriate intertidal etiquette. Place ODFW Marine Garden Signs at Haystack Rock and at the primary beach access points. Distribute fliers to local hotels and businesses that stress the need to treat rocky intertidal habitats gently.

2) Haystack Rock (site 2.1) - Disturbance to seabird nesting colony from climbing on rock and from aircraft.

Suggested Approach: Improve current signs on the rock to make it absolutely clear that climbing is not allowed. Include information on the seabird nesting colony in interpretive signs and fliers mentioned in #1, above. To help alleviate the aircraft disturbance, provide information to aircraft owners and operators concerning the need to minimize disturbance. The Haystack Rock Awareness Program has already collected a great deal of information on disturbance. Human disturbances should be further studied and additional management measures developed that are designed to address site specific concerns.

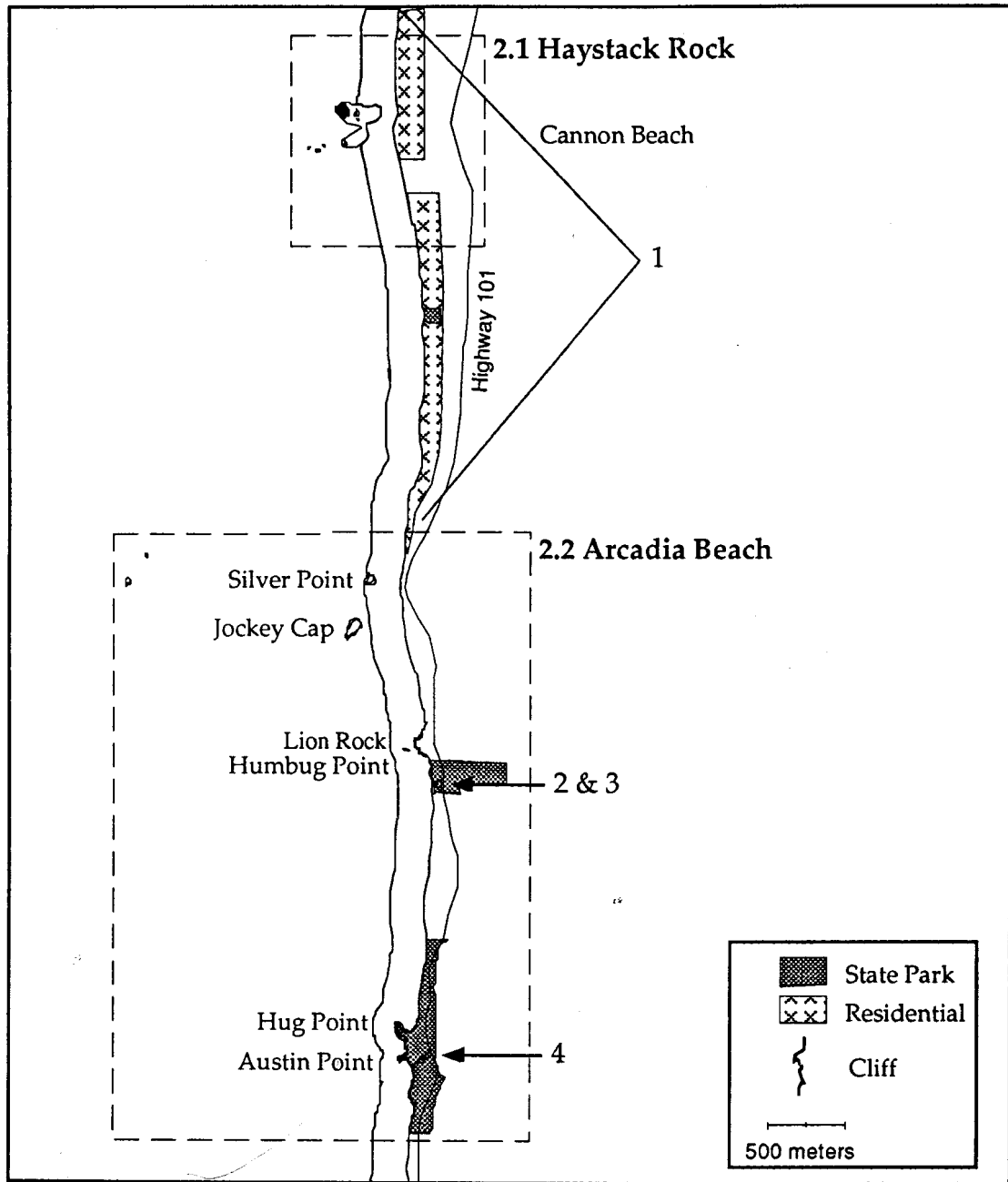
3) Silver Point Rock and Lion Rock (near Humbug Point - site 2.2) - Possible disturbance to seabird nesting colonies due to climbing on rocks.

Suggested Approach: Both of these rocks are accessible at low tide. The rocks should be clearly posted with no climbing signs. Interpretive signs should be placed at access points that explain the need to minimize disturbance.

Additional Opportunities

Haystack Rock is one of the best locations on the coast for an interpretive program because of its accessibility and its sandy beach location. The beach provides a good location to set up displays and spotting scopes, and allows visitors to learn about the rocky intertidal zone and seabird nesting colonies without disturbing them. By drawing crowds away from the base of the rock to the interpretive displays, the Haystack Rock Awareness Program has reduced trampling and seabird disturbance directly. Knowledge gained by visitors at Haystack Rock, including the concept of stewardship, has farther reaching effects as these people travel to other coastal areas. The Haystack Rock Awareness Program provides a good example to follow for interpretive programs elsewhere on the Oregon Coast.

Haystack Rock Cell

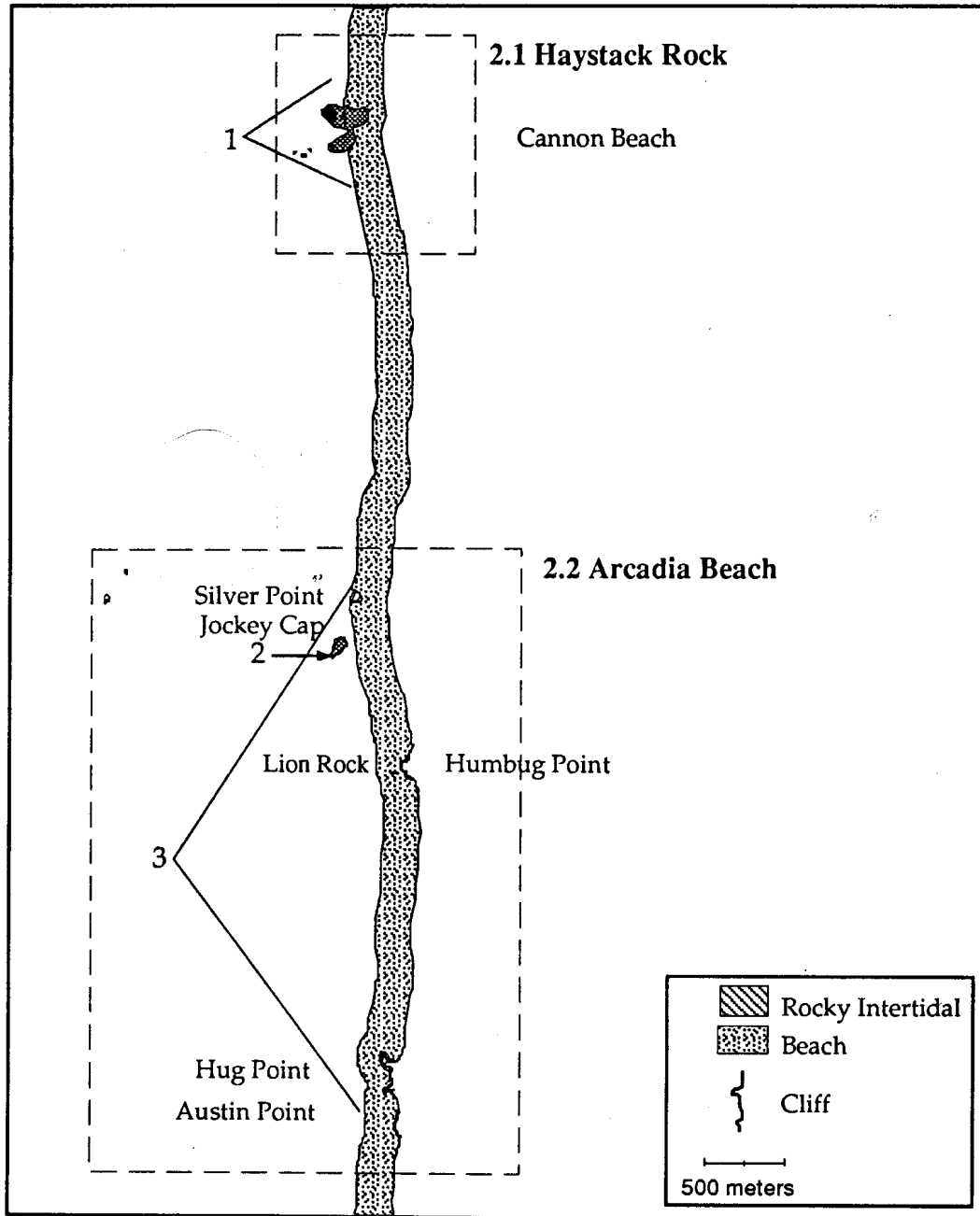


ID No.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/ Difficulty*	Trail Length (ft)
1	Tolovana St. Wayside	315,000	>150	sand beach/E	no trails
2	Arcadia State Park	220,000†	20+	gravel/E	190
3	Arcadia State Park			primitive/M	100
4	Hug Point State Pk	227,000	50	paved/E	150

* (E = easy M = moderate D = difficult)
 † Combined count for both access trails in Arcadia State Park

Figure 3.2a. Rocky shore upland characteristics for the Haystack Rock Cell.

Haystack Rock Cell



ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
1	Seabird	1 large	Rocks	Yes	Aircraft, Foot
1	Seabird	2 small	Rocks	No	Aircraft
2	Seabird	1 medium	Rocks	No	
3	Seabird	6 small	Cliff/Rocks	Yes	Foot

T & E species that occur in cell: None

Figure 3.2b. Rocky shore natural resources for the Haystack Rock Cell.

CELL 3: CAPE FALCON

The Cape Falcon cell extends from 1.5 miles north of Arch Cape south to Manzanita. Within the cell there are three rocky shore sites: 3.1 Arch Cape, 3.2 Cape Falcon, and 3.3 Smugglers Cove (Figure 3.3a). The most prominent features in the cell are the massive headlands of Cape Falcon and Neahkahnie Mountain. These headlands rise nearly vertically from the sea with cliffs ranging in height from 300 to 600 feet. The narrow, rugged coastline below consists of small sand coves bordered by rocky points that support rocky intertidal communities. Arch Cape is a small headland that extends across a sand beach with a few associated rocks. The landward portion of the cell is dominated by Oswald West State Park, one of the largest coastal state parks. The park extends from Arch Cape south to Neahkahnie Beach and includes the headlands and most of the mountain (Figure 3.3a). The 2475 acre park is densely forested with the Sitka spruce, western hemlock, and sword fern forest community (PRD 1986). Grassy meadows and shrubland appear throughout the park and along the mountains edge, providing habitat for deer and elk. There are also three rare and endangered species of plants in the park (PRD 1986). The Pacific Coast Trail meanders throughout the park and along the cliffs, offering hiking, picnicking, panoramic ocean views and limited camping.

The shore along the northern face of Cape Falcon is accessible from the residential area along the sand beach just north of the headland (Figure 3.3a). Short Sands Beach (Smuggler's Cove) provides access to the south side of Cape Falcon and the north side of Neahkahnie Mountain. Most of the rocky shoreline along Neahkahnie mountain is inaccessible.

Rocky Shores Resources

Cape Falcon (site 3.2) is a rugged headland composed principally of basalt lava masses overlain by sedimentary rock (Green 1973). Steep cliffs rise to 300 feet above the ocean at some points. The southernmost point bordering Smuggler's Cove appears to be mainly sedimentary rock, but the exposed sea cliff reveals a basalt base (Lund 1972a). A hard layer

of sandstone at the waters edge is unusually resistant to erosion. Along the rest of Cape Falcon, wave erosion and fracturing of the rock mass over time have carved a scalloped shoreline. Like Cape Falcon, Neahkahnie Mountain (site 3.3) is composed of sedimentary rock interspersed with basaltic rock (Lund 1972a). At 1700 feet, it is one of the most prominent headlands on the coast (PRD 1986). Wave erosion has worked to break off large slabs of base rock that lie against the cliff. Arch Cape (site 3.1) is the northernmost headland in the cell. It is similar to headlands to the north in that the bedrock is sedimentary and the shoreline is sand beach. A few large boulders provide rocky intertidal habitat.

There are several stretches of rocky intertidal habitat in the cell. On the north side of Cape Falcon (site 3.2) the intertidal area consists of large basalt and sandstone boulders that lie at the base of the cliff. Smaller, sand-scoured rocks cover the sand beach. Common invertebrates include black turban snails, giant green anemones, and aggregating anemones in the upper intertidal zone, and young mussel beds, gooseneck barnacles and seastars in the mid to lower intertidal zones. There is no access beyond the northern point of Cape Falcon. Aerial photographs and scenic overlooks from the highway provide a distant look at the rest of Cape Falcon. It consists of three sand coves each bordered to the north and south by rocky points (Figure 3.3b). There is no information about the intertidal communities that live there. Rocky shoreline on the south side of Cape Falcon (site 3.3) consists of highly convoluted sandstone boulders and large individual sandstone platforms that lie atop a sand beach at the base of the cliff.

On the north side of Neahkahnie Mountain, there are high relief rocky shelves at the base of the cliffs (site 3.3). Sand-scouring has kept much of the lower rock surfaces devoid of sessile organisms. Most of Neahkahnie Mountain consists of vertical cliffs with fractured columns of basalt rock that rise dramatically from the ocean. A small cobble beach outlines the base of the northern half of the cliff. Aerial photographs indicate that some rocky intertidal habitat is present. The southern half of the shoreline has almost no exposed beach at low tide.

There are several important seabird and pinniped sites within the cell (Figure 3.3b). Castle and Gull Rocks located off Arch Cape support 2 large nesting seabird colonies (about 10,000 birds total). Approximately 95% of the nesting birds in the colony are common murre; the remainder include primarily Brandt's cormorants and western gulls (USFWS 1988). Castle Rock is also used seasonally by the endangered brown pelican. Castle Rock and Gull Rock are listed in the Oregon Ocean Plan as especially sensitive seabird and pinniped habitats (Oregon Ocean Resource Management Task Force 1991). The western cliff face and associated rocks of Cape Falcon provide habitat for 6 seabird colonies (about 1,000 birds total) (USFWS 1988). The primary seabird species in these colonies include Brandt's cormorant, pelagic cormorant, pigeon guillemot, and western gull (USFWS 1988). These colonies provide prey animals for the bald eagles that nest nearby on the headland. Harbor seals also use the rocks as breeding and haulout sites. The cliff face of Neahkahnie Mountain provides habitat for another 8 seabird colonies (about 700 birds total), one of which is the only breeding colony of double-crested cormorants between the Columbia River and Three Arch Rocks.

Human Use

Oswald West State Park receives the bulk of human use in the cell. In 1992, the Park recorded 360,000 visitor-days (PRD 1993). Human use throughout the Cape Falcon Cell includes sight seeing, hiking, beach combing, camping, surfing, and angling. Although much of the rugged shoreline is inaccessible on foot, there are several scenic overlooks on Highway 101. The Pacific Coast Trail along the edge of the cliff provides the hiker with a few opportunities to glimpse the pristine rocky shoreline below. An overlook on Neahkahnie Mountain is an Oregon State Parks whale watching site. There is little use of most of the rocky shoreline in sites 3.2 and 3.3 because of the lack of access. Rocky shores that border Smuggler's Cove receive the most use because it is the only accessible cove along this several mile stretch of coastline (Figure 3.3a).

Arch Cape was formerly a commercial mussel harvest area. ODFW closed the area to commercial harvest in 1985 due to depletion of

the mussel bed and local citizen concerns about the harvest.

Management Authorities and Jurisdictions

- ODFW - Harvest regulations (marine invertebrates and finfish)
- PRD - Owner/Manager of Oswald West State Park
- Co-manager of beaches with DSL
- DSL - Manager of submerged and submersible lands
- Co-manager of beaches with PRD
- ODOT - Owner of highway right-of-way (includes pull offs from Highway 101 not owned by PRD)
- USFWS - Owner manager of the offshore rocks (above ordinary high water) that are separated from the shore at high tide
- Tillamook County - Planning and zoning regulations
- Clatsop County - Planning and zoning regulations
- Private property owners

Human Use Concerns and Suggested Management Approaches

1) Castle and Gull Rocks - Potential boat and aircraft disturbance to large nesting seabird colonies.

Suggested Approach: Provide information to vessel and aircraft owners and operators concerning the need to minimize disturbance. The disturbances should be studied and management measures developed that are designed to address site specific concerns.

2) Cape Falcon cliff and rocks (site 3.2) - Potential aircraft disturbance to several nesting seabird colonies and harbor seal pupping area.

Suggested Approach: Provide information to aircraft owners and operators concerning the need to minimize disturbance.

3) North and west facing cliffs of Neahkahnie mountain (site 3.3) - A hiking trail along the edge of the cliff leads directly into a seabird nesting site.

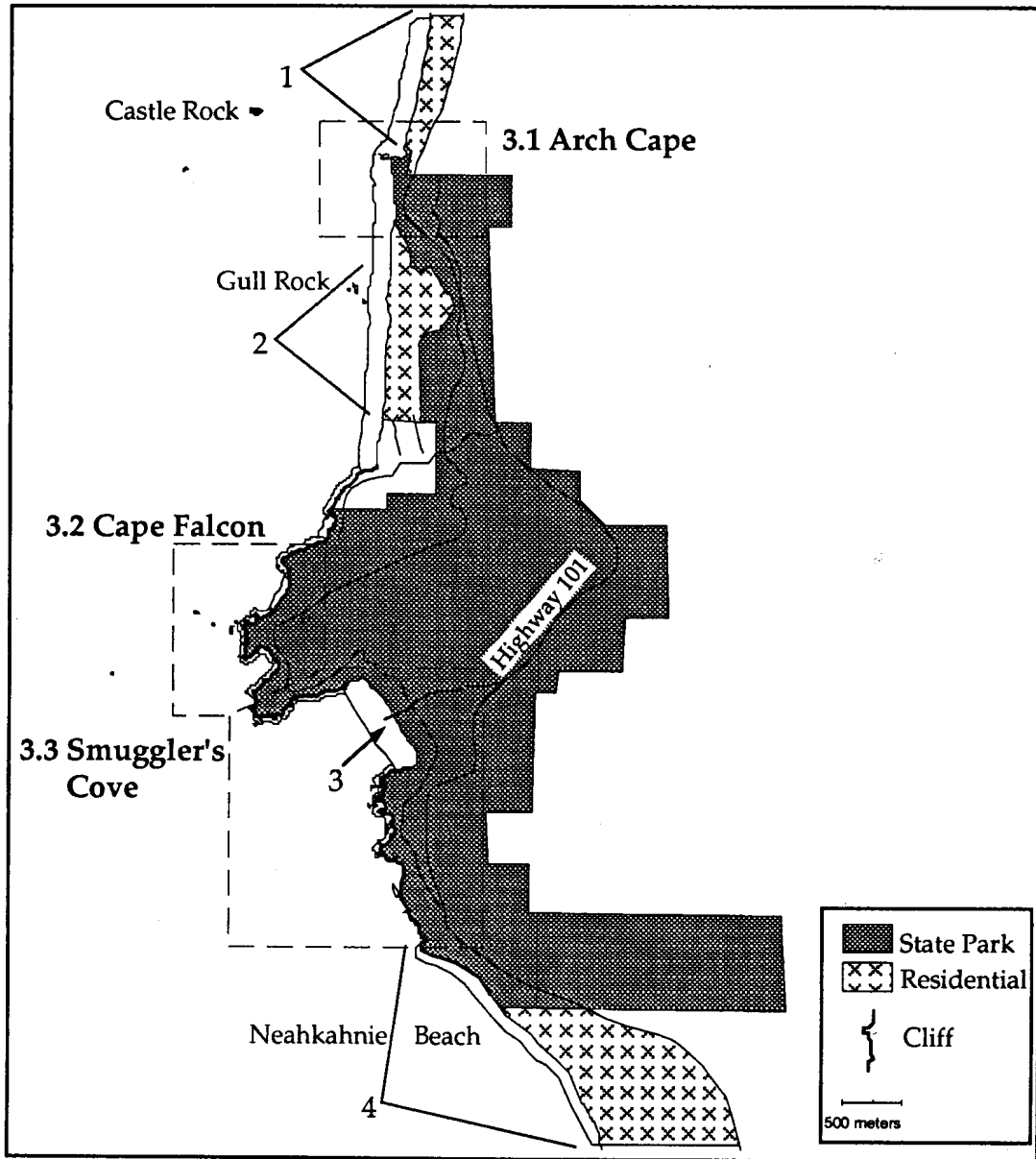
Suggested Approach: The trail should be redirected away from this area. Signs should be posted informing hikers to stay on designated trails so as not to disturb nesting seabirds.

Additional Opportunities

Interpretive signs at the end of the trail to Short Sands Beach would provide educational

and safety information about the rocky shores bordering the beach. Some of the highway overlooks would also be good areas for interpretive signs.

Cape Falcon Cell

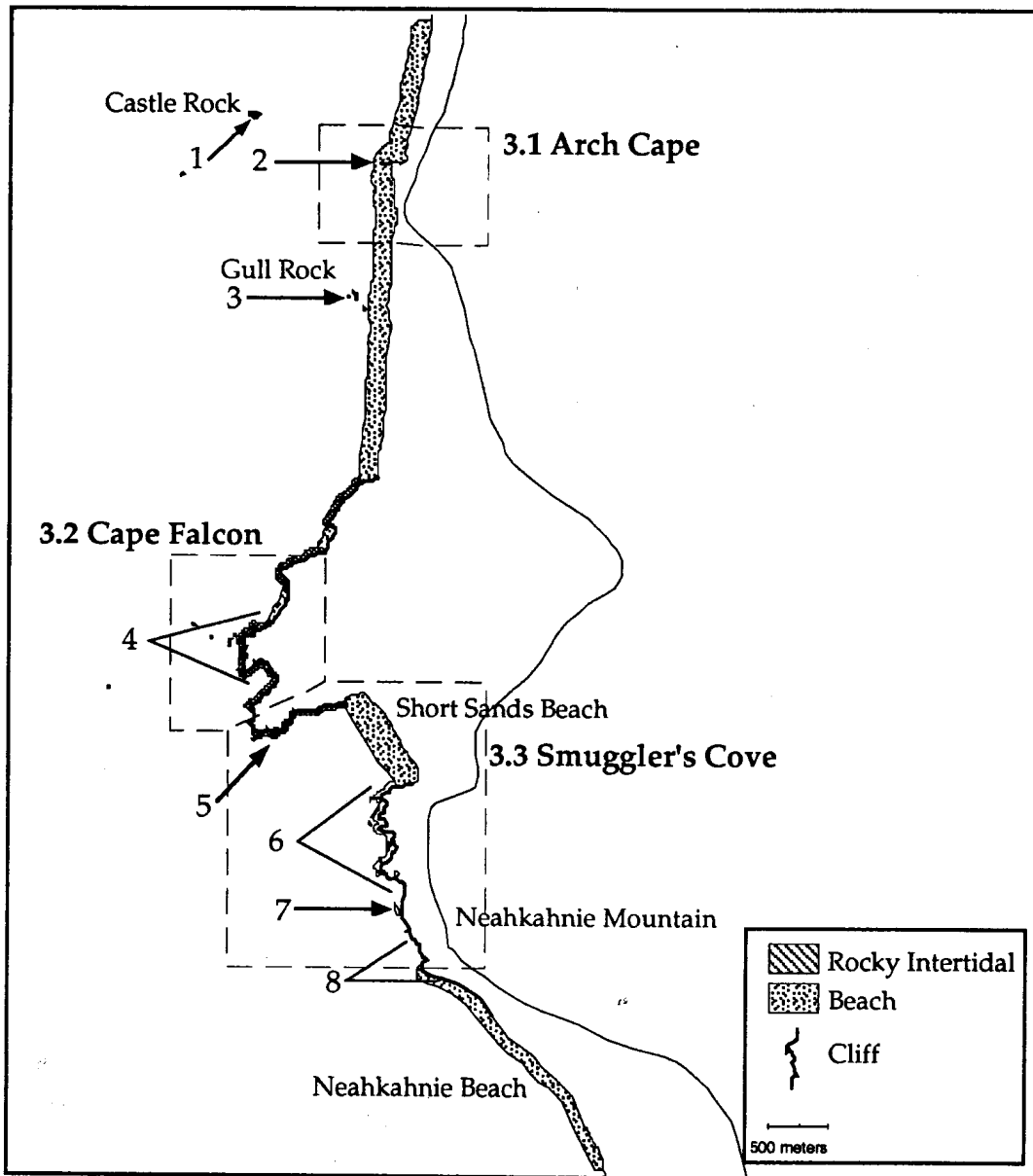


ID no.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/ Difficulty*	Trail Length (ft)
1	Arch Cape Beach			beach /E	150+
2	Cove Beach			beach /E	varies
3	Short Sands Beach	360,000	400	gravel-chips/M	1320
4	Neahkahnie Beach			beach /E	varies

* (E = easy M = moderate D = difficult)

Figure 3.3a. Upland Characteristics for the Cape Falcon Cell.

Cape Falcon Cell



ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
1	Seabird	1 large	Rocks	No	Aircraft, Vessel
2	Seabird	1 smal	Rocks	Yes	
3	Seabird	1 large	Rocks	Yes	Aircraft, Foot, Vessel
3	Seabird	1 small	Rocks	Yes	Aircraft, Foot, Vessel
4	Seabird	3 small	Cliff	No	Aircraft, Vessel
4	Seabird	1 medium	Rocks	No	Aircraft, Vessel
4	Harbor Seal	2 small	Rocks	No	
5	Seabird	2 small	Cliff	No	
6	Seabird	4 small	Cliff	No	
7	Seabird	1 medium	Cliff	Yes	Aircraft
8	Seabird	3 small	Cliff	Yes	Aircraft

T & E species that occur in cell: Brown pelican, bald eagle, Peregrine falcon

Figure 3.3b. Rocky shore natural resources for the Cape Falcon Cell.

CELL 4: CAPE MEARES

The Cape Meares cell lies between Tillamook Bay to the north, and Netarts Bay to the south. It is an area of rugged coastline made up of headlands, small boulder coves, associated rocks and islands, and short sandy beaches (Figure 3.4a). The four sites within this cell are: 4.1 Pillar and Pyramid Rocks, 4.2 Cape Meares, 4.3 Three Arch Rocks, and 4.4 Maxwell Point (Figure 3.4a). State Parks and USFWS jointly manage Cape Meares National Wildlife Refuge and Scenic Research Area. Just offshore, Three Arch Rocks is also a National Wildlife Refuge (site 4.3), consisting of six small rocks and three larger islands. State Parks also owns and manages parts of Maxwell Point. The remaining upland portions of the cell are privately owned.

The upland habitat of Cape Meares (site 4.2) consists of old growth Sitka spruce/hemlock forests, exposed Sitka spruce/salal forest, and exposed shrubland (PRD 1986). The Cape Meares National Wildlife Refuge covers approximately one-half of the headland. It provides habitat for such species as bald eagles, American peregrine falcons, and osprey. The refuge is designated as a natural scenic research area under joint USFWS and State Parks jurisdiction, protecting one of the few remaining coastal old growth forest ecosystems (PRD 1986). There has been an expansion of residential development at Oceanside and within the privately owned land between Cape Meares (site 4.2) and Maxwell Point (site 4.4). Cape Meares Lighthouse and Oceanside, have state waysides that provide access to both upland and shore habitats. Other access is from a small turnout just south of Cape Meares (site 4.2), and another is from the town of Cape Meares to the north of the headland (Figure 3.4a).

Rocky Shores Resources

Cape Meares and Maxwell Point are basaltic headlands overlain in places by sedimentary rock (Lund 1974a). Differential erosion of the rock has created prominent points, small, deep coves, and the adjacent rocks and islands. Vertical and near-vertical cliffs on the headlands rise to elevations between 200 to 400 feet. Pillar and Pyramid Rocks, and the seastacks that form the Three

Arch Rocks complex are basalt structures that were formerly connected to the mainland.

Rocky intertidal habitats in the cell consist primarily of ledges and vertical faces around the bases of the cliffs and islands, and some scattered boulder areas. Mussel bed communities typical of wave exposed environments are prominent on most of the intertidal habitats at the bases of cliffs. There is a stretch of rocky intertidal habitat at the toe of a historically active landslide on the north side of Cape Meares (site 4.2) consisting largely of sandstone and soft mudstone boulders (Figure 3.4b). The smaller boulders are mostly bare, probably due to a combination of sand and cobble scour, and intermittent burial. Larger rocks are covered with aggregating anemones, with many using depressions left by burrowing piddocks. Mussels and barnacles are also present. Another rocky intertidal area on the south side of Cape Meares (Figure 3.4b) consists of boulders also covered primarily with aggregating anemones.

Seabird colonies are found throughout the cell. The offshore islands of Three Arch Rocks (site 4.3), and Pillar and Pyramid Rocks (site 4.1) receive the greatest seabird use. The Oregon Ocean Plan has listed these rocks as especially sensitive bird and mammal habitats (Oregon Ocean Resources Management Task Force 1991). The Three Arch Rocks complex supports the largest seabird nesting colony in Oregon. Over 200,000 seabirds, representing twelve of the thirteen breeding seabird species in Oregon, nest on the rocks. The common murre colony is the largest south of Alaska, and the population of tufted puffins is the largest in Oregon (Oregon Ocean Resources Management Task Force 1991). Other prominent nesting species include western gull and double-crested cormorant (USFWS 1988). Endangered species found at Three Arch Rocks (site 4.3) include the peregrine falcon, bald eagle, Aleutian Canada goose (October through April), and the California brown pelican (June through November) (Oregon Ocean Resources Management Task Force 1991). Seven species of marine birds nest on Pillar and Pyramid Rocks. More than 12,000 common murrelets and almost 300 Brandt's cormorants were nesting on the rocks in 1988 (USFWS 1988). Endangered brown pelicans are also found here.

There are 11 other nesting colonies on the cliffs and nearshore rocks of the cell. Nesting seabirds using these areas include pigeon guillemot, common murre, western gull, tufted puffin, black oystercatcher, pelagic cormorant, and rhinoceros auklet. Cape Meares supports one of the largest breeding populations of tufted puffins on the Oregon Coast, and one of only two mainland populations (PRD 1986). Although most of the rocks and cliffs are inaccessible, some small nesting colonies on rocks off Maxwell Point can be disturbed from the beach (Figure 3.4b). Leaches storm petrels are the primary nesters on this group of rocks (USFWS 1988) and are especially susceptible to disturbance.

Seal Rock, within the Three Arch Rocks Complex (site 4.3), is one of the larger haulouts for Steller sea lions in Oregon. In recent years it has begun to also serve as a breeding location for the Steller sea lion, making it the only breeding location in Oregon north of Cape Blanco. A small number of California sea lions also haul out on this rock from fall through spring (Oregon Ocean Resources Management Task Force 1991).

Human Use

Human uses within the Cape Meares cell include hiking, camping, sight seeing, whale watching, bird watching, tide pooling, SCUBA diving, angling, and picnicking. The 1992 visitor count at Cape Meares was 385,000 visitor-days (PRD 1993). Interpretive signs at the wayside highlight seabird nesting on Pillar and Pyramid Rocks. The wayside is also an Oregon State Parks whale watching site. The north and south intertidal and cliff areas around Cape Meares (site 4.2) are difficult to access and appear to be used primarily by local residents. Use at Maxwell Point (site 4.4) has been limited to the north side since a landslide has blocked the tunnel that formerly lead through to Agate Beach and Lost Boy Cave to the north. There are currently no plans to re-open the tunnel since rockfalls and further landslides have made this a hazardous area (PRD 1986). Oceanside State Wayside, adjacent to Maxwell Point (site 4.2), had a visitor count of 310,000 visitor-days in 1992 (PRD 1993). Much of the use from this wayside is associated with the adjacent stretch of sandy beach. Boat traffic is relatively heavy in the Three Arch Rocks vicinity because it is a popular sports fishing and SCUBA diving area. ODFW

and USFWS have sponsored an observation program at Three Arch Rocks to document disturbance to nesting seabirds and pinnipeds caused by boats, aircraft, and other uses.

Management Authorities and Jurisdictions

- ODFW - Harvest regulations (marine invertebrates and finfish)
- PRD - Cape Meares State Park, Oceanside State Park Wayside, and Maxwell Point.
 - Co-manager of Cape Meares National Wildlife Refuge.
 - Co-manager of beaches with DSL.
- USFWS - Owner/manager of the offshore rocks (above ordinary high water) that are separated from land at high tide.
 - Co-manage of Cape Meares National Wildlife Refuge with State Parks.
- DSL - Manager of submerged and submersible lands
 - Co-manager of beaches with PRD
- Tillamook County - Planning and zoning regulations
- Private Property Owners

Human Use Concerns and Suggested Management Approaches

1) Three Arch Rocks (site 4.3) - boat and aircraft use results in disturbance to nesting seabirds and pinnipeds.

Suggested Approach: In 1993 and 1994, ODFW and USFWS conducted a study of bird and mammal disturbance at Three Arch Rocks. As a result of the study OPAC determined that a 500 foot seasonal buffer needed to be placed around the rocks to alleviate vessel disturbance; a 2,000 minimum aircraft altitude be placed over the rocks to reduce aircraft disturbance; and informational signs be placed in key locations to inform the public about the closure (OPAC 1994). In 1994, the Oregon State Marine Board enacted a 500 foot vessel closure around the principal rocks from May 1 to September 15.

2) Pillar and Pyramid Rocks (site 4.1) - Potential boat and aircraft disturbance to nesting seabirds.

Suggested Approach: Provide information to vessel and aircraft owners and operators concerning the need to minimize

disturbance. The disturbances should be studied and management measures developed that are designed to address site specific concerns.

3) Northeast cliff face of Cape Meares (site 4.2) - possible disturbance of nesting seabirds. Nesting pigeon guillemots on the cliff are less than 50 feet up from the beach.

Suggested Approach: Place interpretive signs on disturbance concerns along the Big Spruce Trail, and possibly on the cliff itself.

4) Cape Meares mainland (site 4.2) - disturbance to nesting bald eagles in the refuge has occurred in the past along a trail through the national wildlife refuge.

Suggested Approach: The trail is now closed and will remain closed.

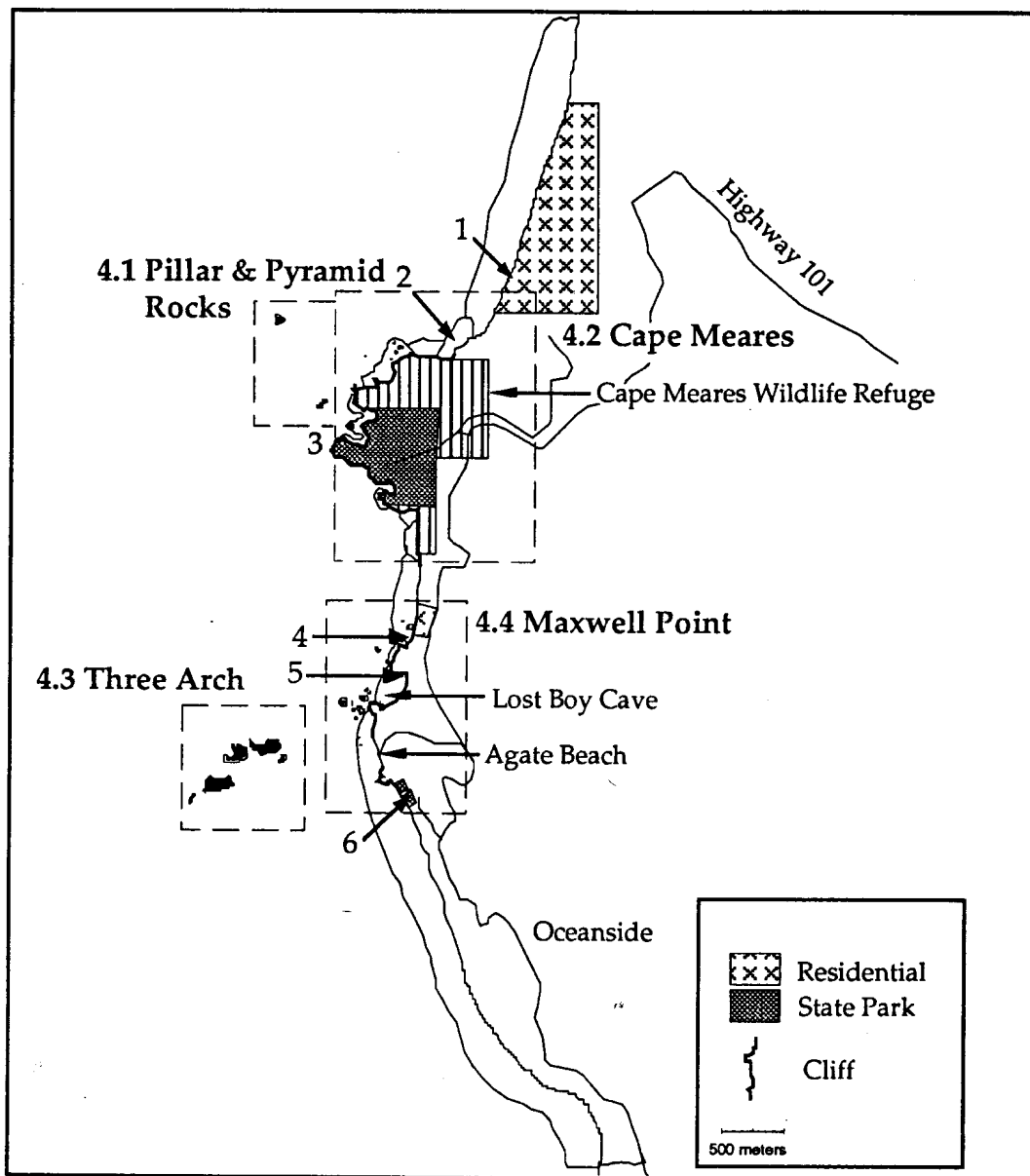
5) Rocks just off Maxwell Point (site 4.4) - possible disturbance to seabirds nesting on rocks accessible from the beach. Leaches storm petrels are especially susceptible.

Suggested Approach: Use interpretative signs at the Oceanside State Park Wayside; combine them with the Three Arch Rocks interpretation.

Additional Opportunities

The large number of visitors within this cell creates an opportunity for interpretive programs on the natural resources. Increasing the number and variety of interpretive signs at Cape Meares would prove valuable. Also, volunteer staffing at Cape Meares State Park and at Oceanside State Wayside could provide the opportunity for controlled tours and education on the marine and upland ecosystems and history. Since most of the upland and marine habitats of this cell are isolated and undisturbed, they retain their natural characteristics. This provides an opportunity for further research and preservation measures. The topography, soil types, and forest conditions at Cape Meares (site 4.2) discourage any further development of the area. Any increase in interpretation and other uses at Cape Meares should be consistent with USFWS management goals for the Cape Meares National Wildlife Refuge.

Cape Meares Cell

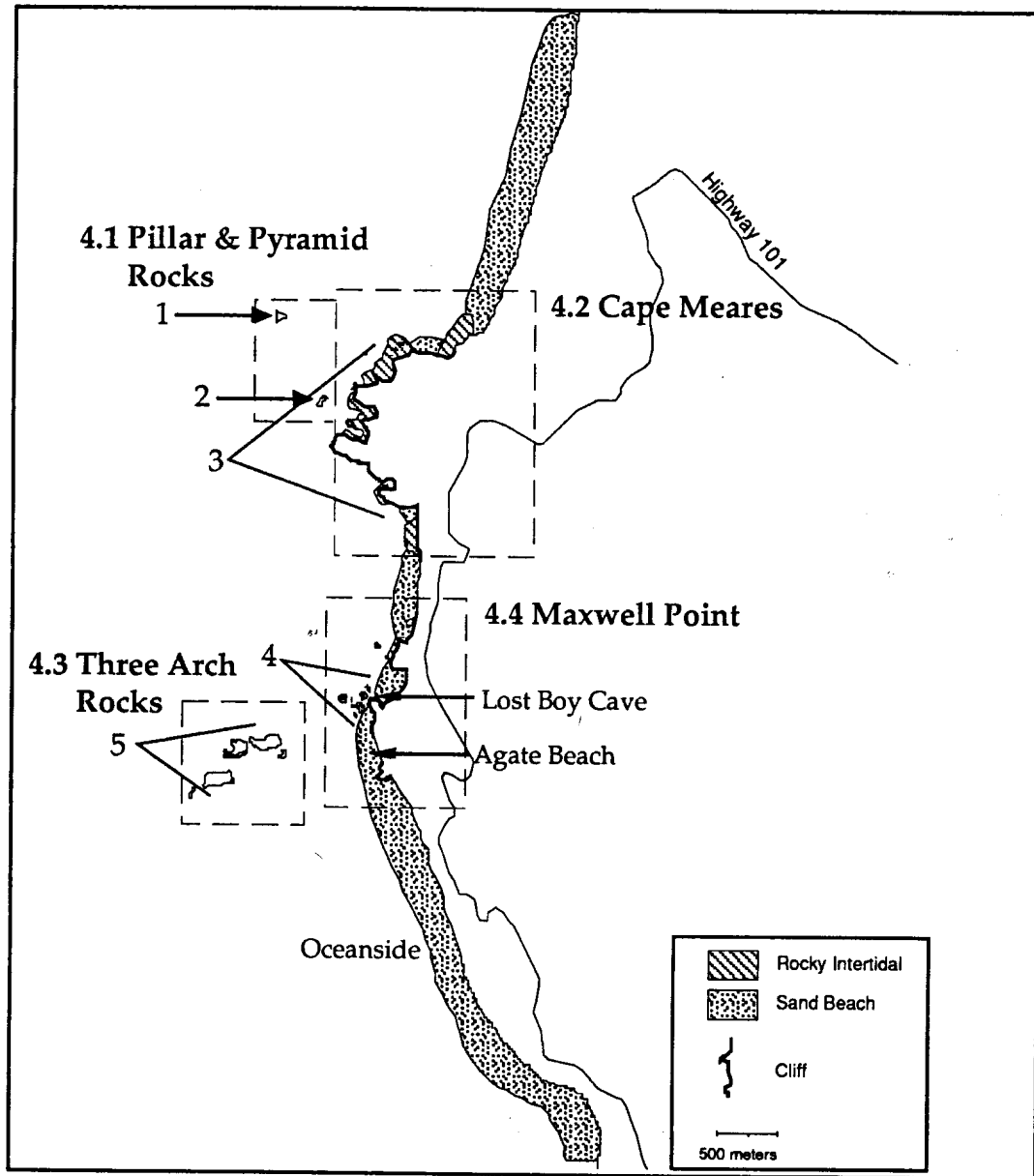


ID no	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/ Difficulty*	Trail Length (ft)
1	Cape Meares beach			beach/E	varies
2	Big Spruce Trail			primitive/M	5280
3	Lighthouse Trail	385,000	31+	paved/E	1000
4	Short Creek Trail		5	primitive/M	U
5	Lost Boy Cave			primitive/M	U
6	Oceanside Wayside	310,000	45	beach/E	1320

* (E = easy M = moderate D = difficult) U = unknown
 † Combined parking spaces for access points 2 and 3.

Figure 3.4a. Upland characteristics for the Cape Meares Cell.

Cape Meares Cell



ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
1	Seabird	1 large	Rocks	No	Aircraft, Vessel
2	Seabird	1 large	Rocks	No	Aircraft, Vessel
3	Seabird	6 small	Rocks	No	
3	Seabird	2 medium	Cliff	No	
4	Seabird	2 small	Rocks	Yes	Aircraft, Foot
4	Seabird	1 medium	Rocks	Yes	Aircraft, Foot
5	Seabird	3 x-large	Rocks	No	Aircraft, Vessel
5	Seabird	1 small	Rocks	No	Aircraft, Vessel
5	Steller sea lion	1 medium	Rocks	No	Aircraft, Vessel

T & E species that occur in cell: brown pelican, Peregrine falcon, bald eagle, Aleutian Canada goose, Steller sea lion, Marbled Murrelet

Figure 3.4b. Rocky shore natural resources for the Cape Meares Cell.

CELL 5: CAPE LOOKOUT

The Cape Lookout cell is located 12 miles southwest of Tillamook. This cell contains two rocky-shore sites: 5.1 South Intertidal Area and 5.2 South Cliff Face (Figure 3.5a). Shoreline features include basalt cliffs, boulder and sandy areas at the base of the headland, and small offshore rocks. The cape and some surrounding shoreland areas are within Cape Lookout State Park. The state park has restroom, parking, picnicking, and camping facilities, and access to the beach north of Cape Lookout. Access to the rocky shoreline is limited because of the cliffs. A hiking trail runs the length of the cape and provides excellent view points. Access to the intertidal area on the south side of the cape (site 5.1) is through private property or along a 2 mile trail beginning at the Cape Lookout trailhead parking lot.

In 1975, the cape was registered as a Natural Heritage Conservation Area in the Oregon Natural Heritage Plan. The purpose of the registration was to: "1) protect sea bird nesting habitat; 2) protect old growth spruce stands; 3) protect headland ecosystems; and 4) highlight this area to scientists and educators as an undisturbed standard from which to accumulate baseline data on coastal headland terrestrial and marine ecosystems" (Juday 1975).

Rocky Shores Resources

Cape Lookout is a very striking and scenic headland. The two-mile-long headland is a narrow wedge of basaltic lava with vertical sea cliffs 800 feet high (Mangum 1967). Sandstone of the Astoria formation underlies the basaltic cliffs on the south side of the cape. Erosion of both the sandstone and basaltic cliffs has formed a large boulder field providing rocky intertidal habitat along the south side of the cape.

Basaltic cliffs with a few small wave cut bedrock platforms forms most of the rocky intertidal habitat along the north and west sides of the headland. On the south east corner of the cape, there is a large boulder intertidal area with numerous shallow pools (site 5.1). Much of this large boulder field has a diverse intertidal invertebrate community and relatively dense

algal cover. Sections of the boulder habitat nearest to the sandy beach are subject to sand/cobble scour and have a less diverse community. A *Laminaria* algal bed lines the lower fringe of the intertidal area. This gives way to a *Nereocystis* kelp bed where the boulder field extends into the subtidal zone.

Cape Lookout provides nesting habitat for several seabird species and haulout sites for harbor seals (Figure 3.5b). Seabirds nest on virtually all of the cliff faces of the cape. The south cliff face (site 5.2) supports the largest nesting colony in the cell with over 8,800 birds representing 8 species (USFWS 1988). The common murre is the primary species at this site; other abundant nesting species include double-crested cormorant and pigeon guillemot. The Oregon Ocean Plan lists the south cliff face as an especially sensitive bird and mammal habitat (Oregon Ocean Resources Management Task Force 1991). The west and north cliff faces provide nesting habitat for common murre, western gull, Brandt's cormorant, pigeon guillemot, and tufted puffin (USFWS 1988). Offshore rocks just north of the cape also support nesting colonies (Figure 3.5b). The threatened bald eagle and endangered peregrine falcon use Cape Lookout. Harbor seals haul out on both the north and west sides of the cape (Brown 1993).

Human Use

Human activities in the cell include hiking, sight seeing, angling, bird watching, whale watching, picnicking, camping, tide pooling, surfing, and SCUBA diving. Although activities are numerous, use of the rocky shoreline is limited because of steep cliffs and difficult trails. School groups and Boy Scouts from Camp Clark Boy Scouts camp use the south intertidal area (site 5.1) for educational experiences. Personnel from Oregon State Parks and Camp Clark provide guided tours of the southern intertidal site. Use of this site has been estimated at 6,000 people per year (Terry Clark, pers. com. 1993). Other parts of the cape and beach to the north are more accessible and receive much greater use. Cape Lookout is also an Oregon State Parks whale watching site. In 1992, day use visitor counts for Cape Lookout State Park exceeded 300,000 visitor-days and campground counts recorded about 188,000 camper-nights (PRD 1993). The south side of the cape provides a

protective anchorage used frequently by commercial fishing boats. Recreational charter fishing vessels fish off the tip of the cape and in the subtidal kelp bed south of the cape. The kelp bed on the south side is also a popular recreational SCUBA diving site.

Management Authorities and Jurisdictions

- ODFW - Harvest regulations (marine invertebrates and finfish)
- PRD - Owner/manager of Cape Lookout State Park
 - Co-manager of beaches with DSL
- DSL - Manager of submerged and submersible lands
 - Co-manager of beaches with PRD
 - Manager of kelp harvest leases
- USFWS - Owner/manager of the offshore rocks (above ordinary high water) that are separated from the shore at high tide
- Boy Scouts - Owner/manager of Camp Clark and associated beach access
- Tillamook County - Planning and zoning regulations
- Private property owners

Human Use Concerns and Suggested Management Approaches

1) South Cliff Face (site 5.2) - Possible seabird disturbance from boats, aircraft, and climbing.

Suggested Approach: Post signs at key points to warn climbers of potential impacts to nesting seabirds. Provide information to vessel and aircraft owners and operators concerning the need to minimize disturbance. Recreational SCUBA divers and fishermen out of Garibaldi should be a target of the information campaign. Potential disturbance to the nesting colonies should be studied and additional management measures developed that are designed to address site specific concerns.

2) Tip of headland (site 5.2) - Disturbance to seabird colonies from people climbing down the face of the cliff. Access is prohibited, but there is only a cable barrier and no sign.

Suggested Approach: Place a more substantial barrier and install interpretive signs to educate the public about possible human impacts to seabirds.

3) Offshore rock north of headland - Possible seabird disturbance from aircraft and boat traffic.

Suggested Approach: Provide information to vessel and aircraft owners and operators concerning the need to minimize disturbance. The disturbances should be studied and management measures developed that are designed to address site specific concerns.

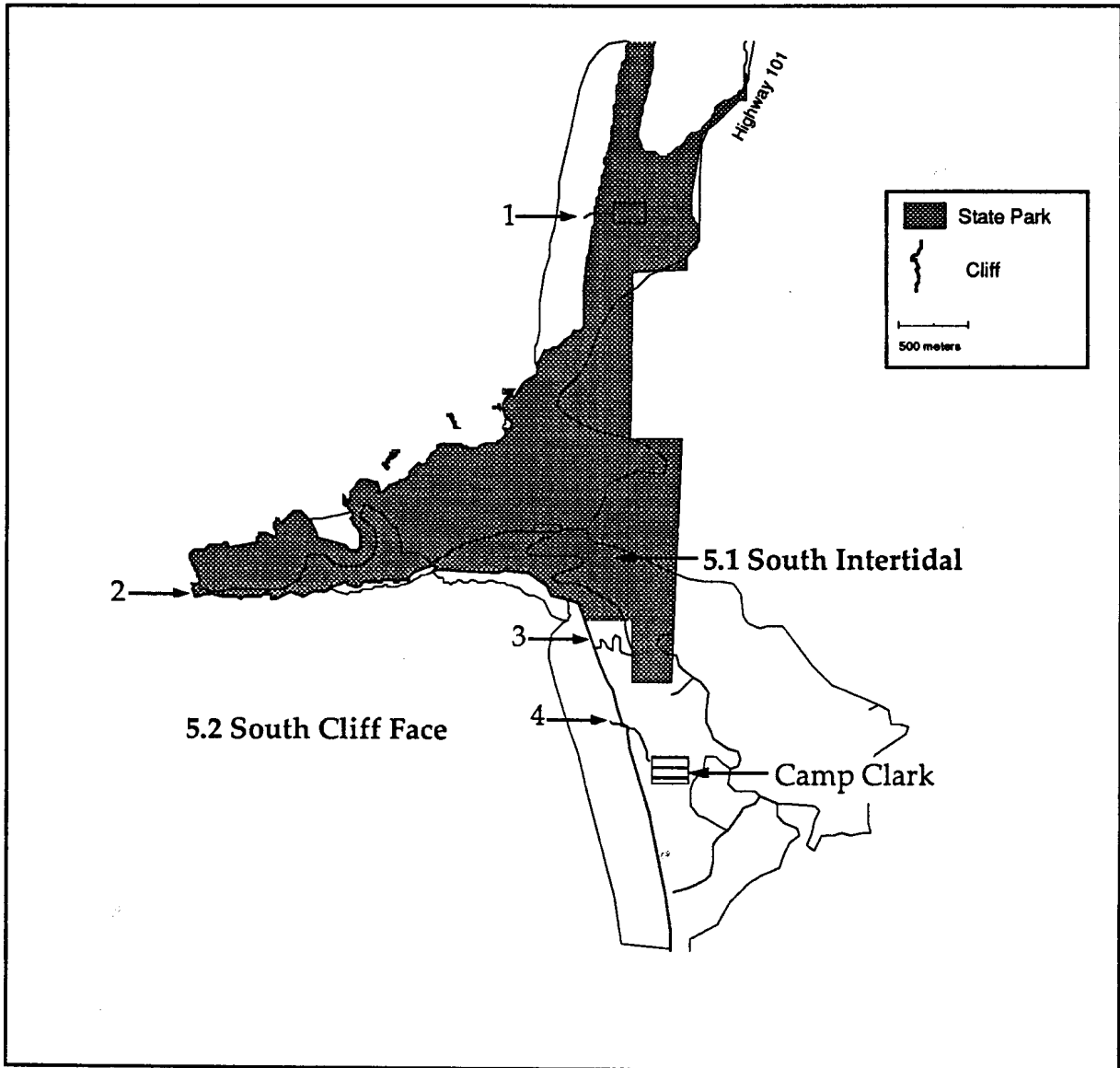
4) South intertidal area (site 5.1) - Personnel from Camp Clark have stated they frequently find garbage on the beach and in the rocky intertidal area. They attribute much of this garbage to boats seeking refuge from the weather on the leeward side of the cape.

Suggested Approach: Increase educational efforts to discourage dumping garbage in the ocean. Use interpretive signs at boat docks and launch sites in surrounding areas.

Additional Opportunities

Interpretive efforts on the south intertidal area are excellent and should be encouraged to continue. The close proximity of Cape Lookout State Park campground and the popularity of the hiking trail on the cape provides an excellent potential for additional educational and interpretive efforts. Interpretive signs explaining seabird use, whale migration, and the unique upland forest community could be placed at the end of the cape and along the hiking trails.

Cape Lookout Cell

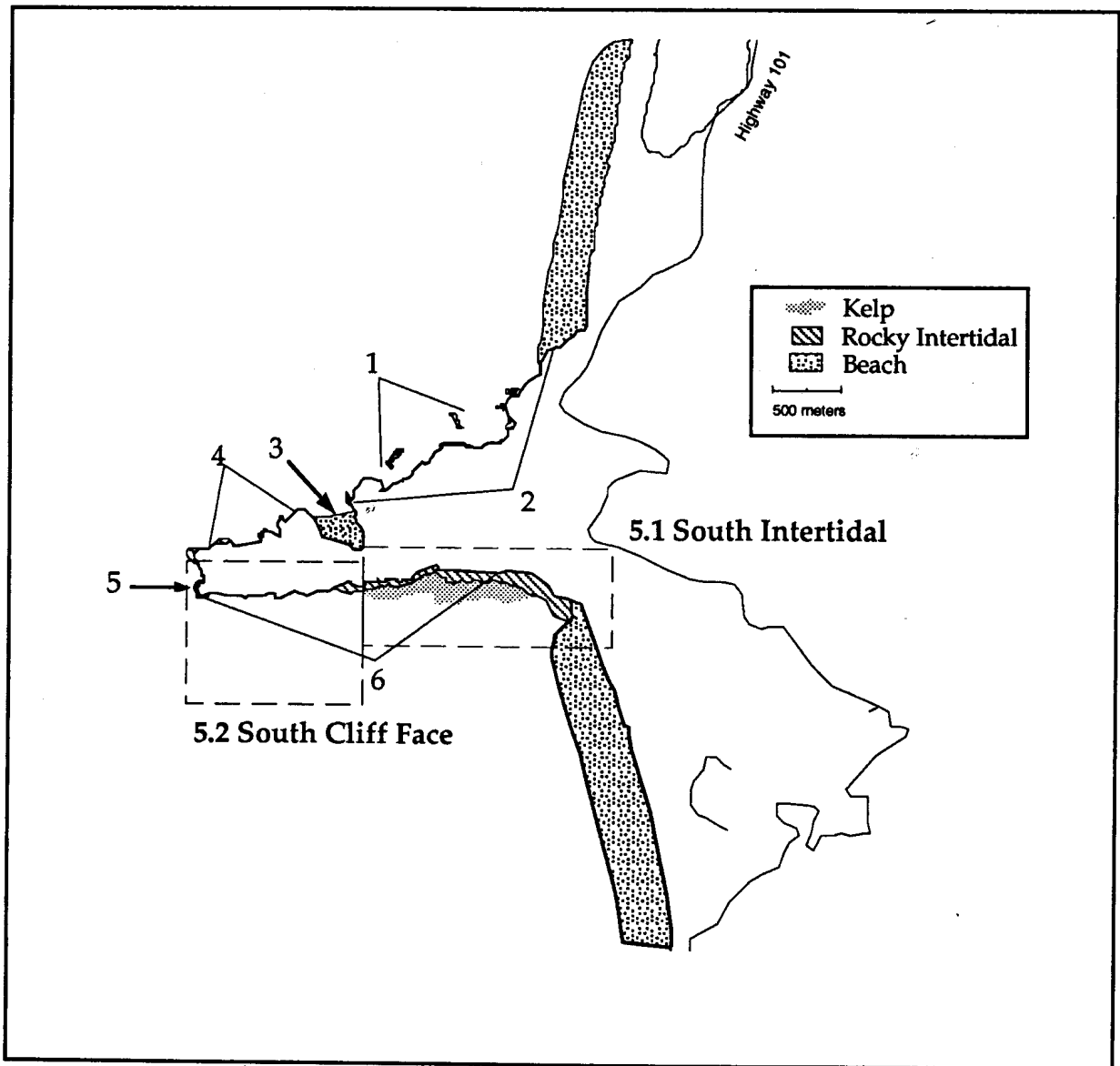


ID	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/ Difficulty*	Trail Length (ft)
1	Cape Lookout St. Park	318,000†	60	beach/E	1500
2	C. Lookout trail		U	primitive/M	14,000
3	South intertidal trail		6	primitive/M	U
4	Camp Clark (boyscout)	6000	U	beach/M	1000

* (E = easy M = moderate D = difficult) U = unknown
 †Combined count for Access points 1, 2 and 3

Figure 3.5a. Upland characteristics for the Cape Lookout Cell.

Cape Lookout Cell



ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
1	Seabird	1 small	Rocks	No	
1	Seabird	1 large	Rocks	No	
2	Seabird	1 small	Cliff		
3	Seabird	1 small	Cliff		
3	Harbor Seal	1 small	Rock	No	
4	Seabird	1 medium	Cliff		
4	Harbor Seal	1 small	Rock	No	
5	Seabird	1 medium	Cliff		Aircraft, Foot, Vessel
6	Seabird	1 large	Cliff		Aircraft, Foot, Vessel

T & E species that occur in cell: Bald eagle, peregrine falcon.

Figure 3.5.b Rocky shore natural resources for the Cape Lookout Cell.

CELL 6: CAPE KIWANDA

The Cape Kiwanda cell lies just north of Pacific City. Sites within this cell include 6.1 Cape Kiwanda and 6.2 Haystack Rock. Cape Kiwanda is a scenic headland dominated by high cliffs and expansive sand dunes. It is unusual in that it is the only prominent headland of northern Oregon which is almost entirely of sandstone (Lund 1974). Haystack Rock is of basalt origin and lies just southwest of the headland. Oregon State Parks owns the headland and the land immediately to the north (Figure 3.6a).

There are several shoreline access points in the cell. Access to the northern beach (McPhillips beach) is possible from three access points (Figure 3.6a). The northern access is Miles Creek Road, off McPhillips Drive. Beach users camp and picnic at this site and vehicles can access the beach there. The middle access is from the abandoned Coast Guard road, also off McPhillips Drive (PRD 1974). The third, southernmost access to northern Cape Kiwanda, is from Ridge Road, off McPhillips Drive. Access south of the headland to North Kiwanda Beach is provided by the Tillamook County Parking Area. This is the primary access point for the dory fleet and for visitors to Cape Kiwanda (PRD 1974). Parking of boats and vehicles on the beach is allowed year-round (PRD 1974).

Rocky Shores Resources

The Cape Kiwanda headland is composed of sandstone bedrock interbedded by siltstone. At one time, the headland extended seaward to Haystack Rock. The cliffs of the headland are mostly a hundred feet or more in height. There are caves, arches, small coves, and deep chasms formed along the weaker zones of the rock. The headland is topped by remnants of sand dunes with some areas stabilized, or partially stabilized, by vegetation. The unvegetated areas are extremely unstable, and the vegetated areas are prone to sand burial. About one-half mile north of the headland there is a small sandstone promontory with a few small rock platforms and wash rocks in the surf. The land surrounding this promontory is undergoing active erosion in

the form of a terrace slump (North and Byrne 1965).

Intertidal areas of Cape Kiwanda exist as smooth undercut sandstone benches and platforms extending out from around the base of the headland, and as vertical bands at the bases of the cliffs. Boulders originating from rockfalls off the cliffs litter the platforms. On the north side of the headland the rocky intertidal area consists of a fragmented, sloping bedrock platform adjacent to the northeastern cliff face (Figure 3.6b). Boulders and cobbles extend over most of the platform and spread north and west through the mid to low intertidal. Sand scour, intermittent sand burial, and grinding from wave tossed boulders and cobbles appear to be important forms of erosion and disturbance within the intertidal area. Barnacles and mussels are prevalent within the nearshore wash rocks and small platforms. On the south side of Cape Kiwanda fragmented bedrock platforms separated by irregular projections of the headland form intertidal areas. Boulders introduced through rock falls from the cliffs are also present but not as concentrated as on the northern platforms. Young barnacles and mussels, and large aggregating anemone colonies cover many boulder and platform areas. The intertidal area of Haystack Rock is limited to vertical bands and some narrow ledge areas. A small subtidal kelp bed lies just landward of Haystack Rock (Figure 3.6b).

Haystack Rock (site 6.2) receives most of the seabird use within the cell. It is the breeding site for over 3,000 seabirds. Western gull, Brandt's and pelagic cormorant, tufted puffin, and pigeon guillemot are the most prevalent nesting species (USFWS 1988). Threatened and endangered species including the brown pelican, peregrine falcon, and bald eagle utilize this area. The Oregon Ocean Plan lists Haystack Rock as an especially sensitive seabird and pinniped habitat (Oregon Ocean Resource Management Task Force 1991). Haystack Rock is also an important roosting site for the endangered Aleutian Canada goose from October through April (Oregon Ocean Resources Management Task Force 1991). The geese visit the beach north of the headland during morning hours and are very susceptible to human disturbance while on the beach (Lowe, pers. com. 1993).

During this survey, harbor seals were seen hauled out on one of the Cape's intertidal platforms. This haulout is not included in the ODFW pinniped surveys (Brown 1993), and would be considered a new haulout site if use continues.

Human Use

Human activities in Cape Kiwanda cell include commercial and recreational fishing, beach combing, sunbathing, surfing, SCUBA diving, picnicking, tide pooling, sight seeing, camping, hang gliding, whale watching, and off-road vehicle driving (PRD 1974). Dory boats stage and launch from the beach at Pacific City. The dory fleet fishes both commercially and recreationally for rockfish, salmon, and halibut. The principal rockfish grounds are on reefs and associated subtidal kelp beds that lie between Haystack Rock and Cape Kiwanda. Boats also fish a reef just north of the cape. Halibut are fished about one-half mile outside of Haystack Rock and salmon are fished in the adjacent nearshore areas.

Management Authorities and Jurisdictions

- ODFW - Harvest regulations (marine invertebrates and finfish)
- PRD - Owner/manager of Cape Kiwanda State Park
 - Co-manager of beaches with DSL
- USFWS - Owner/manager of the offshore rocks (above ordinary high water) that are separated from the shore at high tide.
- DSL - Manager of submerged and submersible lands
 - Co-manager of beaches with PRD
- Tillamook County - Planning and zoning regulations
 - Tillamook County Beach Access Area
 - (North Kiwanda Beach parking area/beach access and dory launch)
- Private Property Owners

Human Use Concerns and Suggested Management Approaches

- 1) Haystack Rock (site 6.2) - Potential boat and aircraft disturbance to large nesting seabird colonies. The level of concern about disturbance

at Haystack Rock is very high relative to other rocks and islands along the coast.

Suggested Approach: Provide information to vessel and aircraft owners and operators concerning the need to minimize disturbance. The disturbances should be studied and management measures developed that are designed to address site specific concerns.

- 2) Beach north of Cape Kiwanda (site 6.1) - Potential disturbance to Aleutian Canada Geese on the beach north of the cape.

Suggested Approach: This disturbance needs to be examined in more detail. It may be necessary to close parts of this beach in the morning hours from October through April.

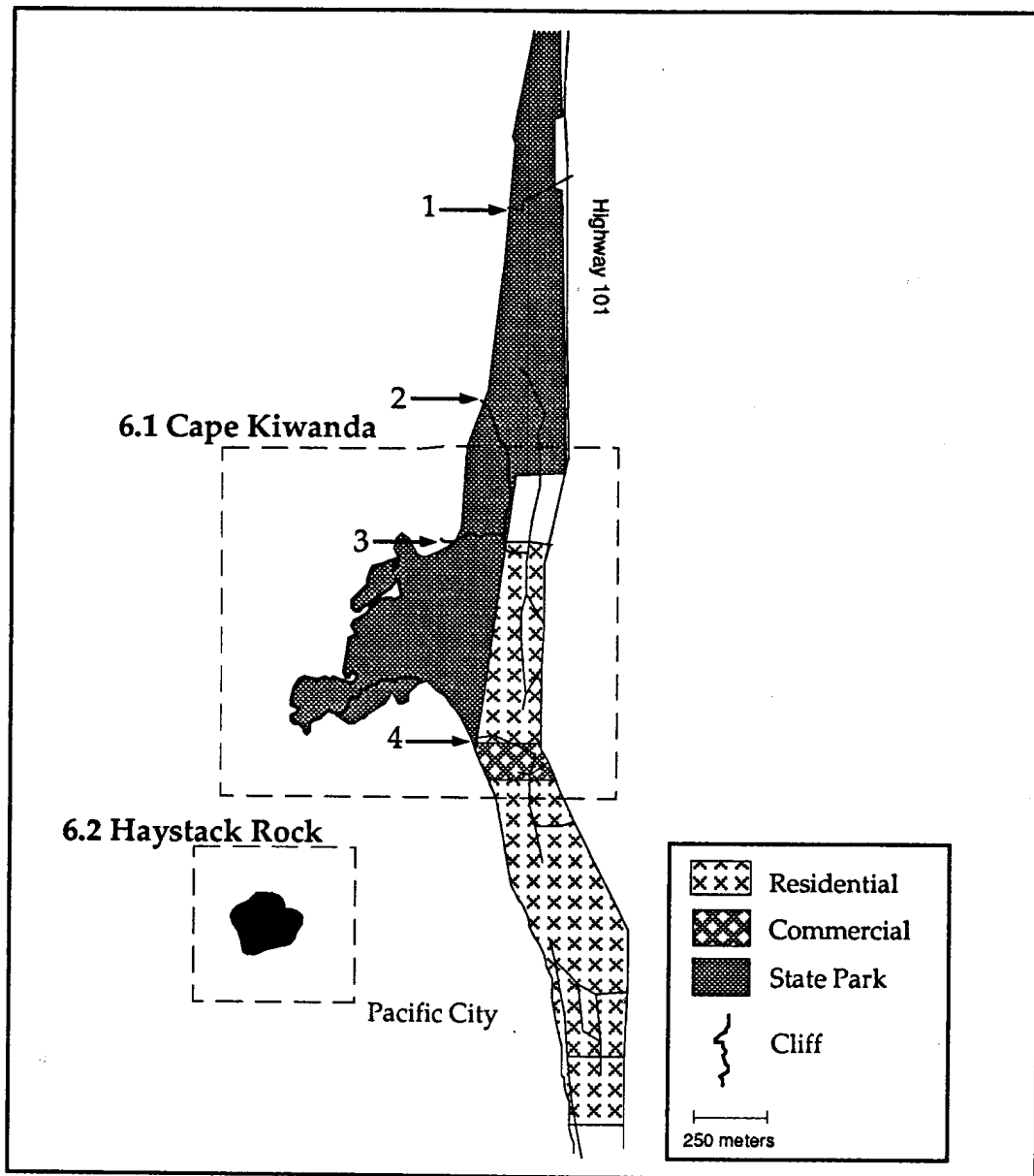
- 3) Upland areas on cape (site 6.1) - Overuse of sensitive upland areas by pedestrians and off-road vehicles. The State Parks master plan for Cape Kiwanda describes these concerns in more detail (PRD 1974).

Suggested Approach: Public education about these concerns is very important. In addition, the existing upland fence around the headland needs to be replaced. The southwestern promontory of the headland may need to be closed off from upland use. More visible signs are needed and can be used to educate the public on dune-stabilizing vegetation and the importance of limiting disturbance. Current informal trails are causing runoff and erosion problems. An official, and maintained interpretive trail could limit wandering, and provide education on the surrounding natural resources.

Additional Opportunities

More information on human use patterns and disturbance types is needed. Various user groups or civic organizations from Pacific City and surrounding areas could be asked to cooperate in gathering this information. The cell provides excellent interpretive opportunities for Haystack Rock resources, and the sensitive dune resources of Cape Kiwanda.

Cape Kiwanda Cell

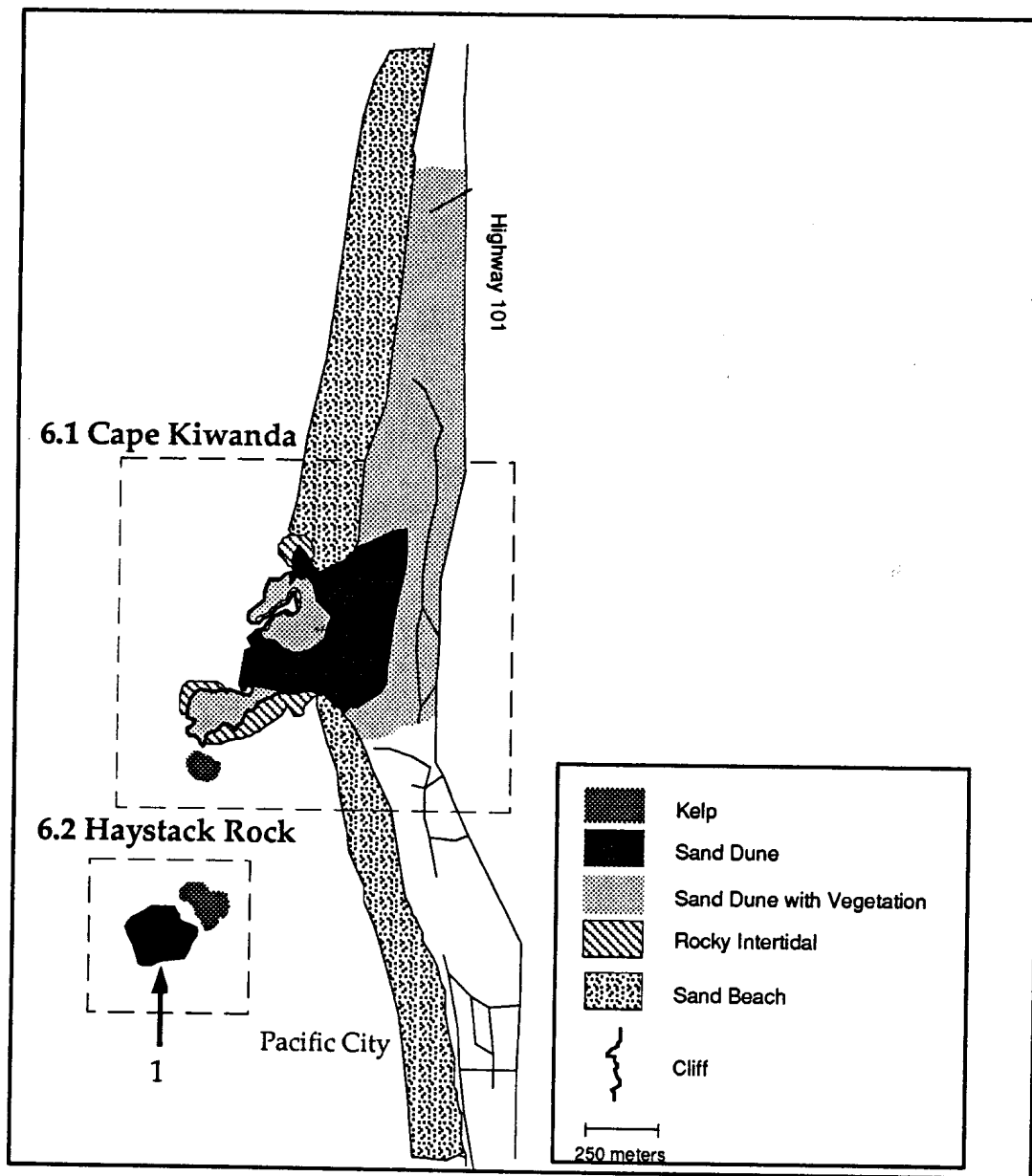


ID No.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/ Difficult	Trail Length (ft)
1	Miles Creek Road		4	primitive/E	3500
2	Old Coast Guard Rd.		2	primitive/M	3000
3	Ridge Road		U	primitive/M	100
4	Boat Launch		100	beach/E	600

* (E = easy M = moderate D = difficult) U = unknown

Figure 3.6a. Upland characteristics for the Cape Kiwanda Cell.

Cape Kiwanda Cell



ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
1	Seabird	1 large	Rocks	No	Aircraft, Vessel

T & E species that occur in cell: brown pelican, Peregrine falcon, bald eagle, Aleutian Canada goose

Figure 3.6b. Rocky shore natural resources for the Cape Kiwanda Cell.

CELL 7: CASCADE HEAD

The Cascade Head cell extends from Proposal Rock on the north to the beaches at the community of Roads End on the south. The cell has three rocky shores sites: 7.1 Harts Cove, 7.2 South Cascade Head, and 7.3 Roads End Headland (Figures 3.7a and 3.7b). Shoreline features of Cascade Head include primarily high basalt cliffs with many small coves and small inaccessible offshore rocks. The Roads End headland is separated from Cascade Head by the Salmon River and a strip of sandy beach. The Nature Conservancy owns a part of Cascade Head just north of the mouth of the Salmon River. This land is designated as The Cascade Head Natural Area Preserve. Siuslaw National Forest owns most of the remaining headland and manages it as a scenic-research area. The YWCA owns property on the south side of the mouth of the Salmon River and operates a summer camp, Camp Westwind. Neskowin State Wayside is located at the northern end of the cell and provides parking and restroom facilities (PRD 1986).

Most of the shoreline in the cell is inaccessible due to the high cliffs and the nature preserve status of much of the upland area. Neskowin Beach State Wayside provides easy access to Proposal Rock and the northern end of Cascade Head. Access to Harts cove (site 7.1) is by a steep hiking trail beginning at a Forest Service road off Highway 101. The South Cascade Head site (7.2) is accessible via a difficult route at low tide, about one half mile along the north shore of the Salmon River. The north side of the Roads End Headland site (7.3) is accessible by boating across the Salmon River from the county boat ramp, then walking approximately one half mile along the beach. The south side of this site is accessible by walking approximately three-quarters of a mile along the open beach from Roads End Wayside (Figures 3.7a and 3.7b).

The Forest Service's Cascade Head Scenic-Research Area (CHSRA) was established in 1974 as the first Scenic-Research Area in the country (Forest Service 1976). In addition to the Scenic-Research Area designation, portions of the area have other administrative designations. The Neskowin Crest Research Natural Area, located

in the northwest corner of the CHSRA, was established in 1941 as an example of Sitka spruce, western hemlock forest growing adjacent to the ocean. This Research Natural Area was established to provide a baseline study area, a site for study of natural processes, and a gene pool reserve for all types of organisms, especially rare, threatened and endangered species. The Cascade Head Scenic Area, located along the coast south of the Neskowin Crest Research Natural Area, was established in 1966 and is to be managed "in as nearly an undisturbed condition as possible". The Cascade Head Experimental forest was established in 1943 and has been the center for silvicultural and related research in the Sitka spruce-western hemlock forest type. The entire CHSRA, in conjunction with the Olympic National Park are part of a recently designated Biosphere Reserve established by the United Nations Educational, Scientific, and Cultural Organizations. These areas are regarded as essential for studies of ecosystems of various kinds since they represent baselines or standards against which change can be measured (Forest Service 1976).

Rocky Shores Resources

Much of the shoreline of the Cascade Head cell consists of rocky basalt cliffs, many rising more than 500 feet above the sea, and a shorefront of more than 5 miles, making it one of Oregon's largest headlands. On the shore front of the southern half of Cascade Head, the basalt walls have been breached in several areas, exposing sedimentary rock and creating small coves. Roads End Headland is a small headland similar to the southern half of Cascade Head. The many offshore sea stacks are the basalt remnants of a once larger Cascade Head (Lund 1974a).

Most of the rocky intertidal habitats in this cell are extensions of the basaltic cliffs with some shelf areas. Boulder and platform areas exist within the coves. Access to most of these coves is either non-existent or very dangerous. The intertidal area in the South Cascade Head site consists of a narrow shelf jutting out from the mainland cliff and sloping to the sandy beach. Boulders of various sizes are scattered and embedded in the sand. Mussel bed communities cover much of the narrow shelf. The intertidal area on the south end of the Roads End

Headland site consists of high relief bedrock with platforms, outcroppings, overhangs, and vertical surfaces. There are many pools and channels between and among the rocks. Some rocks are inaccessible at low tide because of steep walls and channels. Invertebrates in this area include large patches of aggregating anemones and mussel and barnacle beds. Invertebrate and algal species resistant to sand scour and burial inhabit the transition from rocky areas to sandy beach.

Cascade Head cliffs and nearshore rocks provide extensive seabird nesting habitat. USFWS has surveyed 24 colony sites (Figures 3.7c and 3.7d). Two Arches Rocks support the largest nesting colony, with over 20,000 birds (USFWS 1988). The common murre is the most common species at this site. The Oregon Ocean Plan lists Two Arches Rocks as especially sensitive bird and mammal habitats (Oregon Ocean Resources Management Task Force 1991). The nearshore rocks and mainland cliffs just south of Cliff Creek Cove provide habitat for nearly 5,000 nesting seabirds. The principal species on these rocks is the common murre, while the principal species on the mainland is Brandt's cormorant (USFWS 1988). Pigeon guillemot, pelagic cormorant, and western gull nest in numerous other smaller colonies along the cliff faces and rocks. The threatened bald eagle, endangered peregrine falcon, and endangered brown pelican also use the headland.

California sea lions, Steller sea lions, and harbor seals haul out in Cliff Creek and Harts Coves (Figures 3.7c and 3.7d). Cliff Creek Cove is one of the larger haulout areas on the coast with about 1,000 California sea lions, 100 Steller sea lions, and some harbor seals (Brown 1993). The Oregon Ocean Plan lists Cliff Creek Cove as an especially sensitive bird and mammal habitat (Oregon Ocean Resources Management Task Force 1991).

Human Use

The rocky shoreline in much of the cell receives little human use due to difficult access. The primary human uses include hiking, sight seeing, bird watching, whale watching, and fishing. The shoreline of Harts Cove (site 7.1) receives some use by anglers. The Nature Conservancy estimates 10,000 people use the hiking trail through Conservancy's preserve

annually. The YWCA summer camp on the south side of the Salmon River utilizes the northern part of Roads End Headland (site 7.3) for interpretive and educational programs. About 3,000 people use the camp annually, and camp personnel lead approximately 400 people on guided walks of the rocky shore area (Callaghan, pers. com. 1993). Residents and visitors to the Roads End area use the intertidal area at the southern portion of the Roads End Headland site. The small coves are popular agate collecting sites.

Management Authorities and Jurisdictions

- ODFW - Harvest regulations (marine invertebrates and finfish)
- PRD - Owner/manager of Neskowin State Wayside
- Co-manager of beaches with DSL
- DSL - Manager of submerged and submersible lands
- Co-manager of beaches with PRD
- USFWS - Owner/manager of the offshore rocks (above ordinary high water) that are separated from the shore at high tide
- USFS - Owner/manager of uplands in Siuslaw National Forest
- Lincoln County - Planning and zoning regulations
- Tillamook County - Planning and zoning regulations
- The Nature Conservancy - Owner/manager of the Cascade Head Natural Area Preserve
- YWCA - Owner/manager of Camp Westwind
- Other Private Property Owners

Human Use Concerns and Suggested Management Approaches

1) Cliff Creek Cove and cliff area to the south (site 7.1) - Possible seabird disturbance from boats, aircraft, and access.

Suggested Approach: Post signs at key points on the Harts Cove trail to discourage access and warn people of bird and mammal impact concerns. Provide information to vessel and aircraft owners and operators concerning the need to minimize disturbance. The disturbances should be studied and additional management measures developed that are designed to address site specific concerns.

2) Harts Cove (site 7.1) - Possible disturbance to an endangered bird species and harbor seals if use of the shoreline increases significantly beyond current levels.

Suggested Approach: Use of Harts Cove is relatively low and there is currently no significant concern about human impacts at the site. Use of the cove has been increasing over the past years and may eventually reach a point where impacts become significant. The level of use and potential impacts need to be monitored to determine if and when impact-reduction actions would be required.

3) Two Arches Rocks and adjacent mainland - Possible seabird disturbance from aircraft and boat traffic (primarily from aircraft).

Suggested Approach: Manage area to ensure foot access is not developed to the site. Provide information to vessel and aircraft owners and operators concerning the need to minimize disturbance. The disturbances should be studied and management measures developed that are designed to address site specific concerns.

4) Three Rocks (site 7.2) - Possible seabird disturbance from aircraft and boat traffic.

Suggested Approach: Provide information to vessel and aircraft owners and operators

concerning the need to minimize disturbance. The disturbances should be studied and management measures developed that are designed to address site specific concerns.

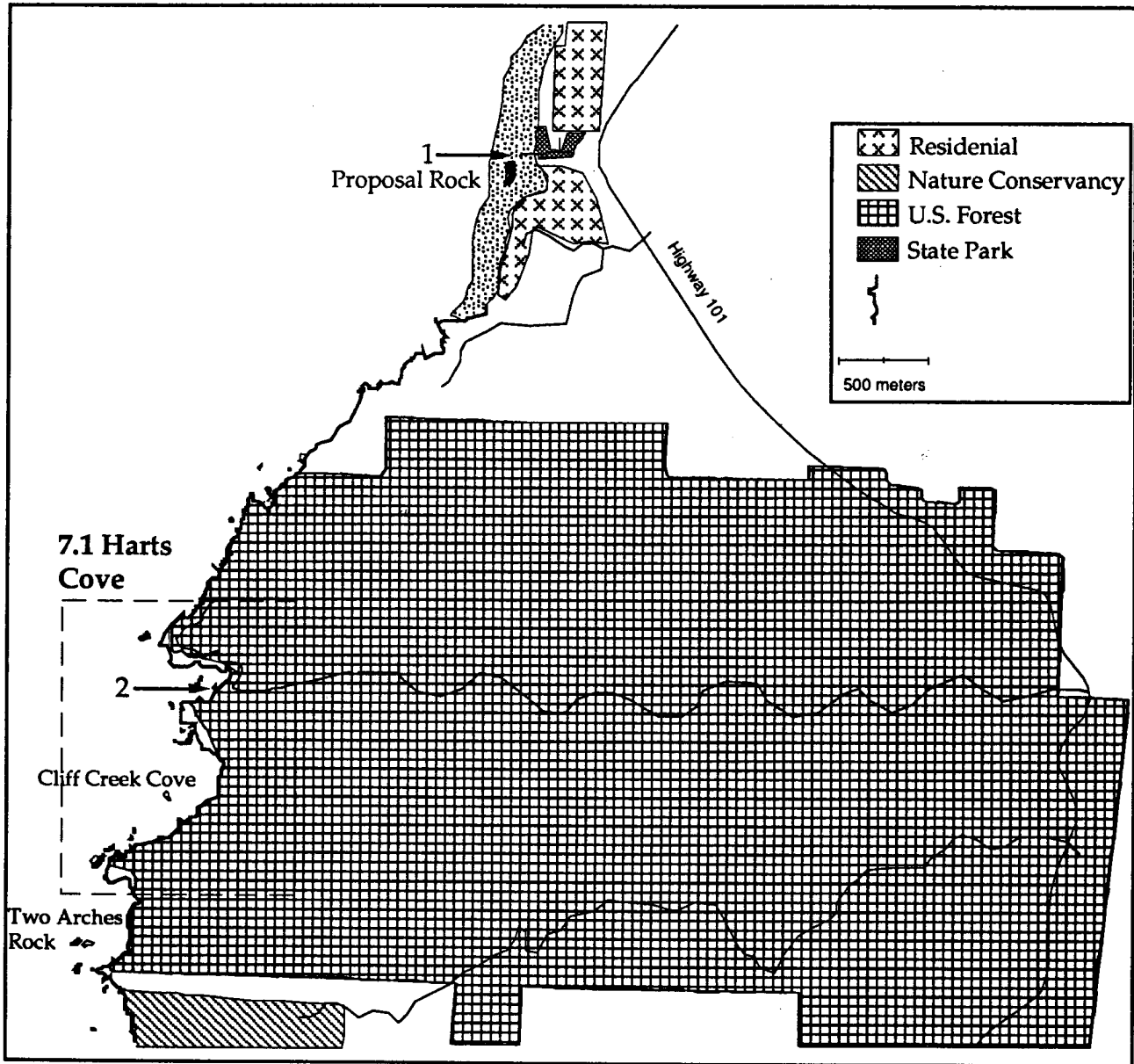
5) Roads End Headland (site 7.3) - Possible future disturbance to seabird colonies if development occurs on headland.

Suggested Approach: Future development may significantly increase human use of the headland. Any proposed development needs to be designed to minimize impacts to the seabird colonies. The residents in the development should be informed of the need to protect the nesting areas.

Additional Opportunities

The lack of access to most of the shoreline areas in this cell precludes intensive educational efforts on the rocky shores. Some additional educational signs could be utilized on the trail to Harts Cove (site 7.1) and the south side of Roads End Headland (site 7.3). There are a large number of educational groups using the upland areas for field trips and study, providing an opportunity to teach people about upland and shoreline resources and impact concerns.

Cascade Head Cell (north)

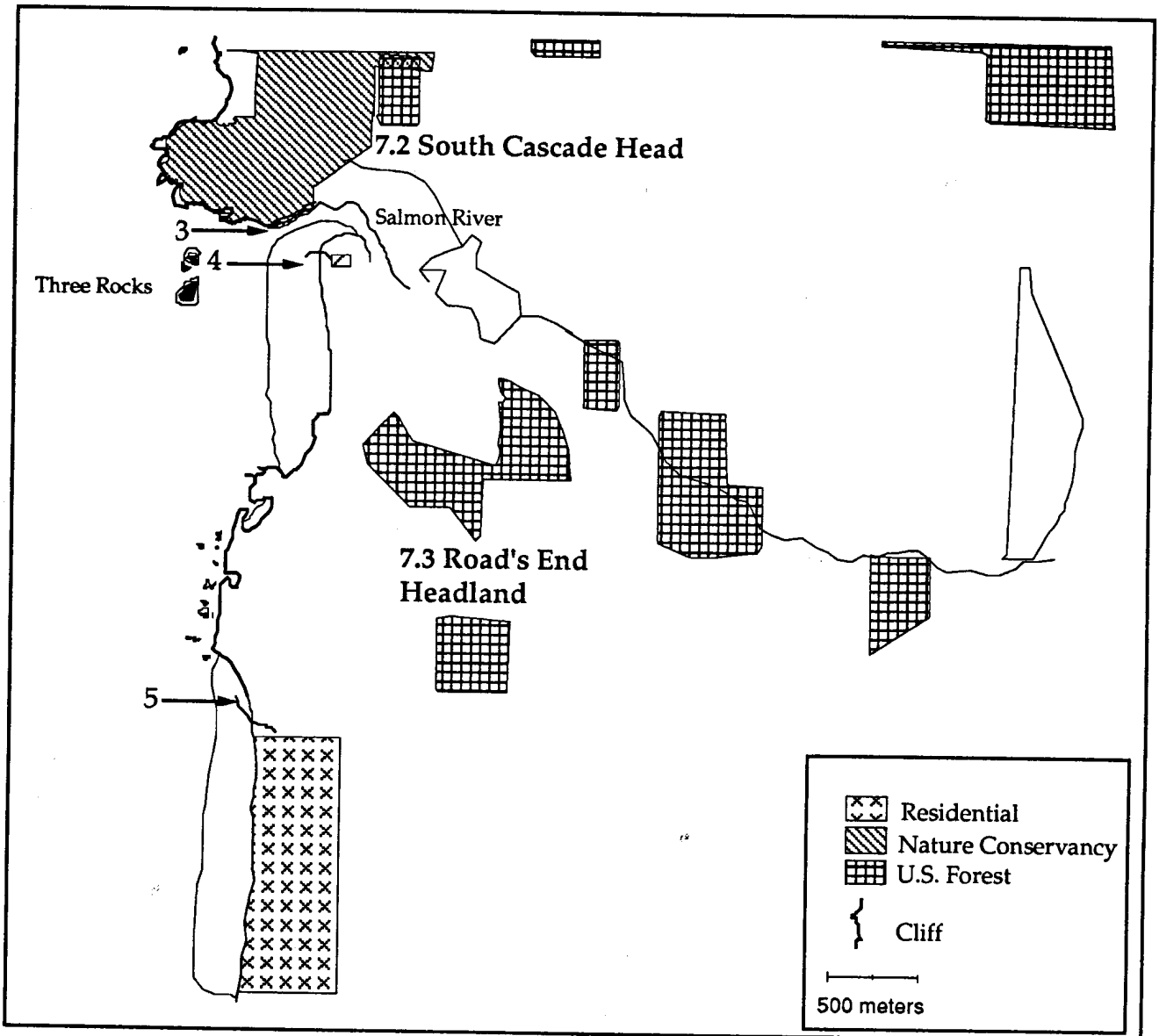


ID No.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/Trail Difficulty*	Length (ft)
1	Proposal Rock		2	beach/E	200
2	Hart's Cove trail	10,000	15	primitive/D	22,000

* (E = easy M = moderate D = difficult) U = unknown

Figure 3.7a. Upland characteristics for the northern Cascade Head Cell.

Cascade Head Cell (south)

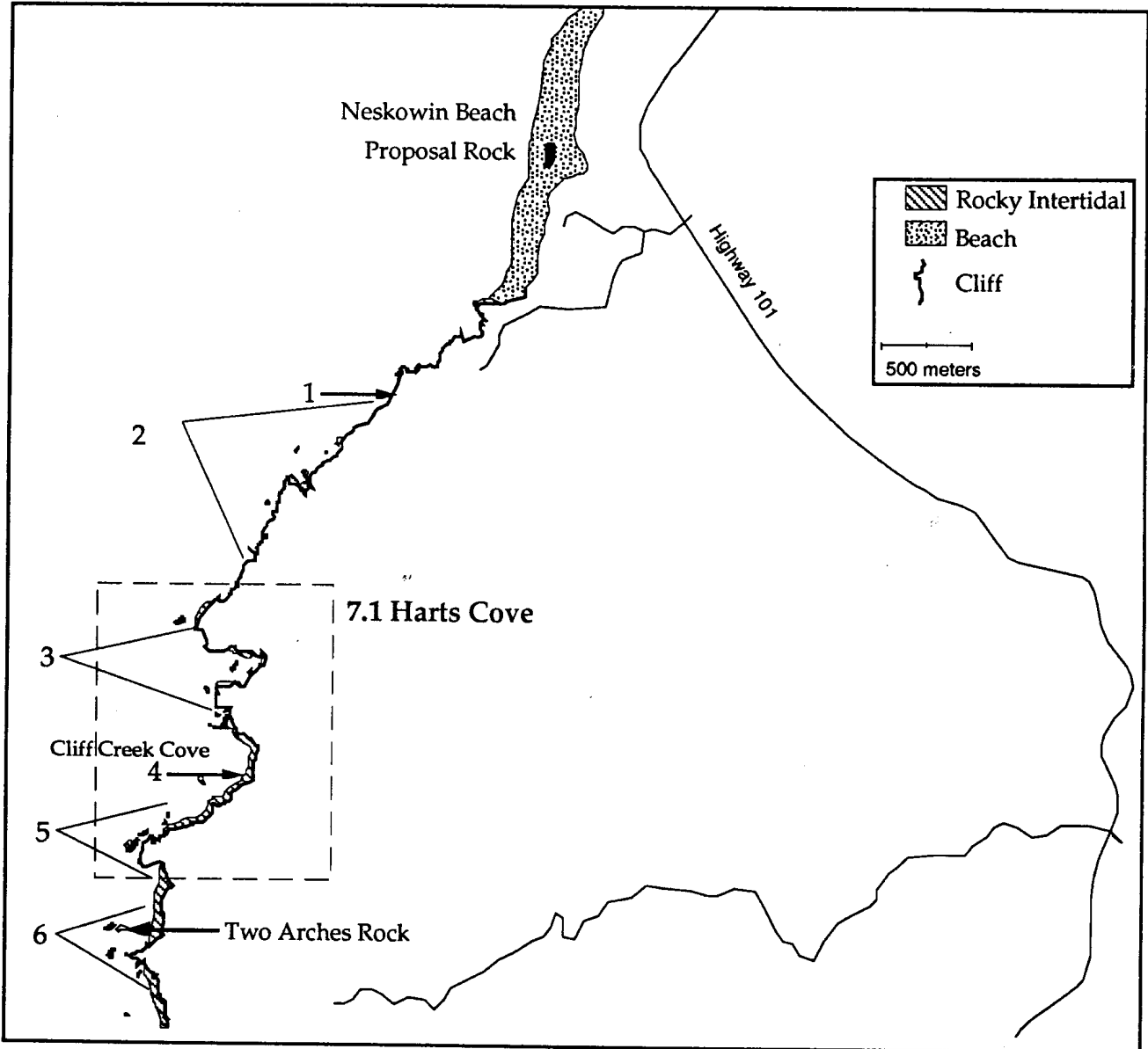


ID No.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/Trail Difficulty*	Length (ft)
3	Cascade Head south		U	beach/D	2640
4	Camp Westwind	3000	U	beach/E	1800
5	Road's End	438,000	U	beach/E	1000

* (E = easy M = moderate D = difficult) U = unknown

Figure 3.7b. Upland characteristics for the southern Cascade Head Cell.

Cascade Head Cell (north)

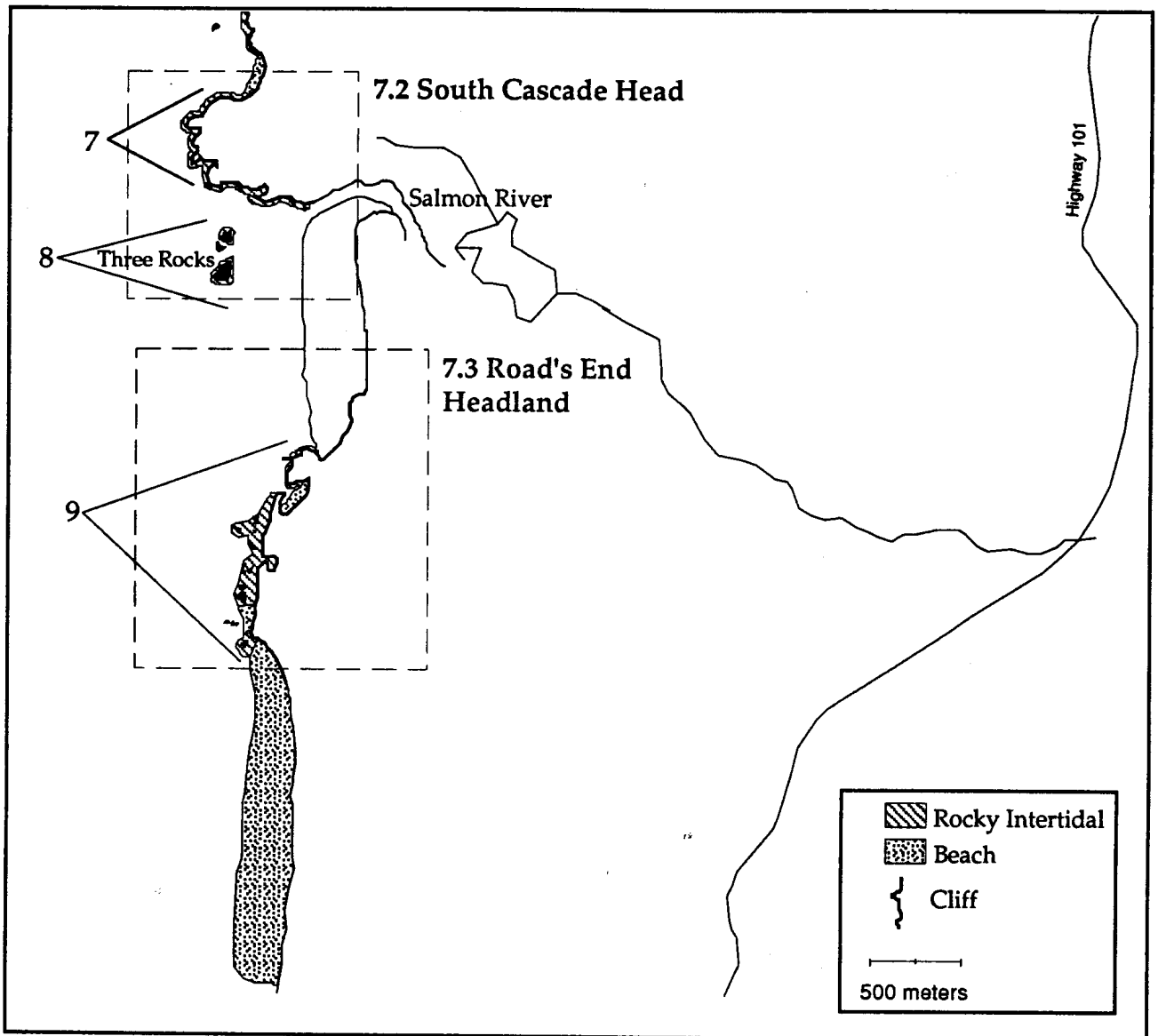


ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
1	Seabird	1 small	Cliff	Yes	
2	Seabird	3 small	Cliff	Yes	
2	Seabird	2 medium	Cliff	Yes	
3	Seabird	1 small	Cliff	Yes	Foot, Aircraft
3	Seabird	1 medium	Cliff	Yes	Foot, Aircraft
3	Harbor Seal	1 small	Rocks	Yes	Foot, Aircraft
4	Harbor Seal	1 small	Rocks	Yes	Aircraft
4	Steller	1 medium	Rocks	Yes	Aircraft
4	California	1 x-large	Rocks	Yes	Aircraft
5	Seabird	2 medium	Rocks/Cliff	Yes	Foot, Aircraft, Vessel
5	Seabird	1 large	Rocks	Yes	Aircraft
6	Seabird	1 small	Cliff	No	Aircraft
6	Seabird	2 large	Rocks	No	Aircraft, Vessel
6	Seabird	1 x-large	Rocks	No	Aircraft, Vessel

T & E species that occur in northern half of cell: Bald eagle, peregrine falcon., brown pelican, Steller sea lion.

Figure 3.7c. Rocky shore natural resources for the northern Cascade Head Cell.

Cascade Head Cell (south)



ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
7	Seabird	1 medium	Cliff	No	Aircraft, Vessel
8	Seabird	3 medium	Rocks	No	Aircraft, Vessel
9	Seabird	5 small	Rocks, Cliff	Yes	Foot

T & E species that occur in southern half of cell: Bald eagle, peregrine falcon, brown pelican.

Figure 3.7d. Rocky shore natural resources for the southern Cascade Head Cell.

CELL 8: LINCOLN CITY

The Lincoln City cell consists of a long sand beach interrupted by scattered sea stacks, large rocks, and sections of exposed bedrock platforms and low-lying bedrock intertidal areas. The cell stretches along the Lincoln City oceanfront from Wecoma Beach on the north to Siletz Bay on the south. There is one rocky shores site: 8.1 Ocean Lake Intertidal. Most of the property is privately owned and has been heavily developed into densely-packed residential areas with tourist accommodations clustered among them. Public access points include public thoroughways scattered throughout the residential areas, and several small waysides. D River Wayside has the largest parking capacity (over 100 parking spaces), and receives the most use by visitors in the area.

Rocky Shores Resources

The upland portion of the cell lies on a marine terrace and sand dune formation (Schlicker, et al. 1973). Cliffs vary in height from 10' to greater than 150' above a sandy beach. Most of the sea stacks and wave-cut platforms consist of basalt. Sandstone and siltstone of the Nestucca Formation underlies the marine terrace, basalt intertidal areas, and beaches of this cell (Lund 1974b).

The rocky intertidal habitat includes scattered washrocks, beach rocks, and intertidal bedrock platforms (Figure 3.8b). Site 8.1 (Oceanlake Intertidal) includes sea stacks and rocks and a smaller section of wave-cut bedrock platform just north of D River. Both intertidal areas are prone to sand scour and periodic burial in the lower bedrock sections. The rocks and wave-cut platform in site 8.1 support large colonies of aggregating anemones and mussel bed communities. Large, mature mussels greater than 15 cm in length are common. Almost all of these stacks and rocks are accessible at most low tides. Human trampling impacts are evident on the tops of the most accessible platform segments.

There are several rocky platforms south of D River (Figure 3.8b). These platforms appear to support the same types of organisms as found

within site 8.1. Many of the rock surfaces have younger mussels growing within disturbed patches. Commercial harvest of mussels occurs at some of these areas. Piddock clams are plentiful and easily dug from the relatively soft bedrock of the exposed sections of the underlying Nestucca Formation.

Human Use

Human uses in this area include beach combing, sight seeing, tide pooling, angling, surfing, and some intertidal invertebrate harvest. The Lincoln City shoreline has some of the most heavily used beaches in Oregon. State Parks recorded almost 1.4 million visitor-days at the D River Wayside in 1992 (PRD 1993). There is also heavy use from hotels at the south end of the cell. The rocky intertidal areas receive heavy use during low tide periods. Visitors to these areas often collect seastars and other organisms as souvenirs. There is currently no information on the amount of invertebrates collected from intertidal areas in this cell.

Management Authorities and Jurisdictions

- ODFW - Harvest regulations (marine invertebrates and finfish)
- PRD - Owner/manager of D River Wayside
- Co-manager of beaches with DSL
- DSL - Manager of submerged and submersible lands
- Co-manager of beaches with PRD
- Lincoln City - Planning and zoning regulations
- Private Property Owners

Human Use Concerns and Suggested Management Approaches

- 1) All rocky intertidal areas in cell - Possible overuse impacts, including trampling, collecting, and disturbance to substrate.

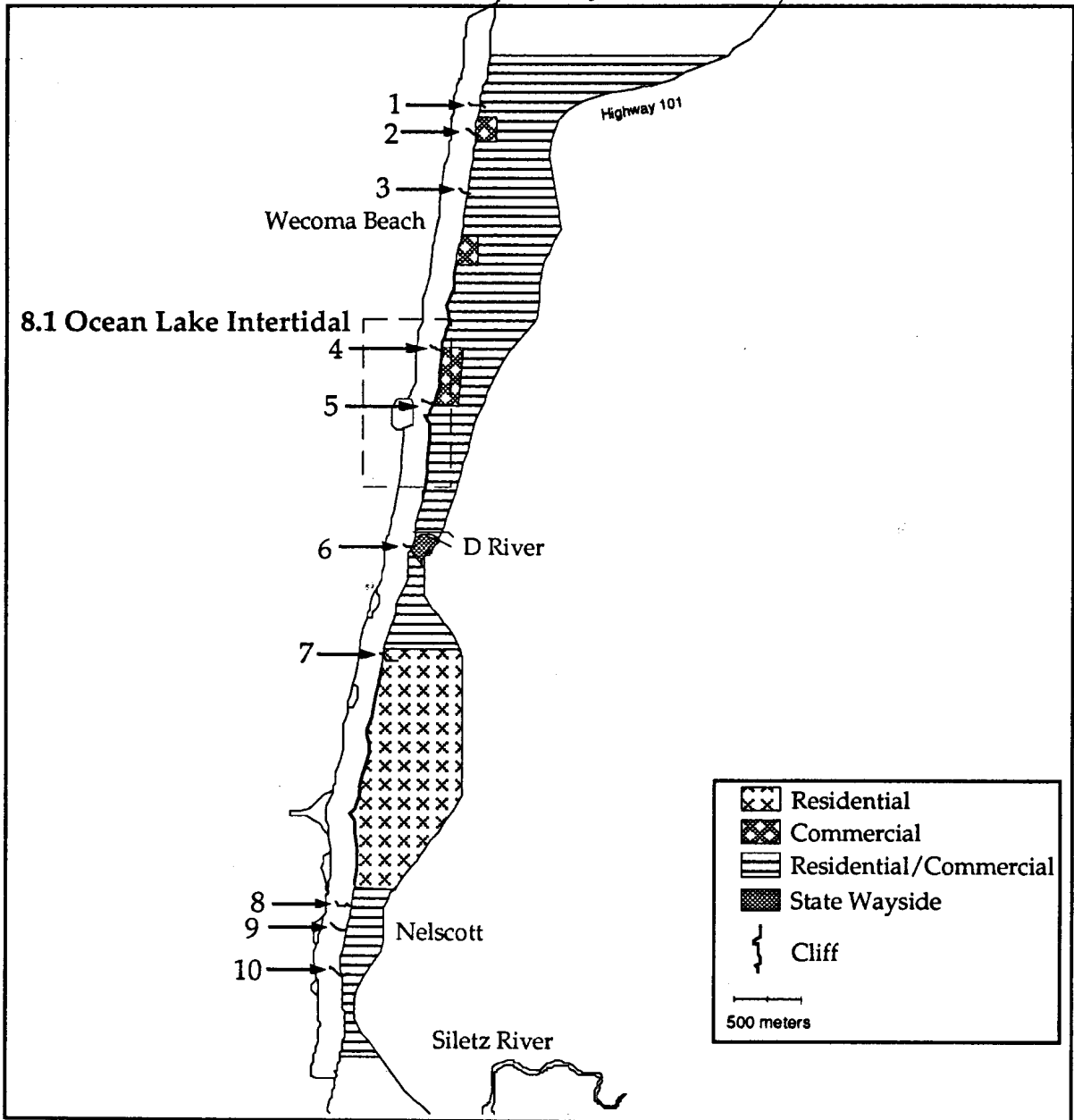
Suggested Approach: Use interpretive signs and volunteers to educate the public about appropriate intertidal etiquette. Hotels can distribute flyers that encourage exploring tidepools but discourage collecting souvenirs.

Additional Opportunities

Opportunities for interpretive efforts are good because of the population base and the popularity of the area as a tourist destination.

Interpretive signs and pamphlets informing the public of appropriate intertidal etiquette would be useful due to the large number of people that pass through this area.

Lincoln City Cell

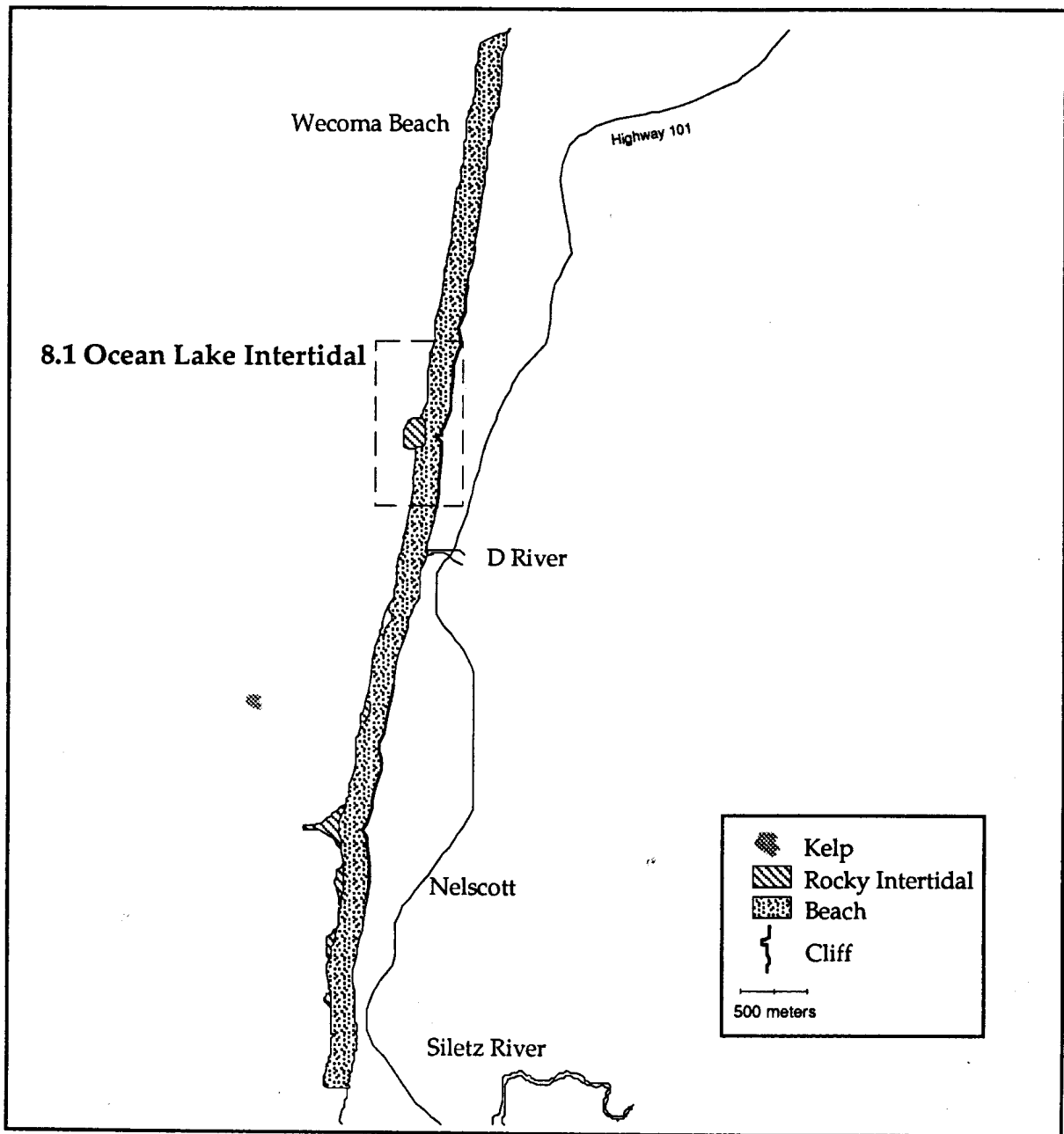


ID No.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/Trail Difficulty*	Length (ft)
1	adjacent to Shilo Inn		U	primitive/M	600
2	Wecoma Beach		U	beach/steps/E	600
3	Grace Hammond Beach		5	beach/E	800
4	Ocean Lake Intertidal north		5	beach/steps/M	1000
5	Ocean Lake Intertidal south		U	†paved/beach/E	400
6	D River State Wayside	1,398,000	U	beach/E	1000
7	SW 11 Rd.		U	primitive/E	U
8	SW 33 Rd.		U	paved/beach/E	U
9	SW 35 Rd.		U	paved/beach/E	U
10	Emergency Vehicle Access		U	gravel/beach/E	U

* (E = easy M = moderate D = difficult) U = unknown
 †vehicle access to beach

Figure 3.8a. Upland characteristics for the Lincoln City Cell.

Lincoln City Cell



No seabird colonies or pinniped groups occur in this cell.
No T & E species occur in this cell.

Figure 3.8b. Rocky shore natural resources for the Lincoln City Cell.

CELL 9: DEPOE BAY

The Depoe Bay cell is located about 14 miles north of Newport. The cell contains five rocky shores sites: 9.1 Fogarty Creek, 9.2 Boiler Bay, 9.3 Pirate Cove, 9.4 North Depoe Bay, and 9.5 Whale Cove (Figure 3.9a). The shoreline is made up primarily of cliffs and intertidal bedrock platforms, with a few small sandy beaches interspersed. Most of the landward portions of this cell consist of residential and commercial areas within and adjacent to the city of Depoe Bay. Restaurants, motels, and gift shops are numerous in the city of Depoe Bay and surrounding areas. There is one state wayside, one city park, and one state park. Depoe Bay City Park has restrooms and parking available; Boiler Bay State Wayside and Fogarty Creek State Park have restrooms, parking and picnicking. Access to the shore is limited in the private residential areas. Main access points are at Boiler Bay State Wayside and Fogarty Creek State Park.

Rocky Shores Resources

Most of the rocky shoreline in this cell consists of low basalt cliffs and headlands. In a few areas where erosion has breached the wall of basalt, coves have formed in the softer sandstone substrate (Lund 1974b). The erosion process formed Whale Cove, Depoe Bay, Pirate Cove, Boiler Bay, and the mouth of Fogarty Creek.

Rocky intertidal habitats consist of narrow, steep fringes of cliffs along much of the shoreline, and of larger platform and boulder areas in the coves. Mussel beds and sea palm kelp indicate the high energy of the surf in the exposed cliff areas. The north shore of Whale Cove (site 9.5) consists of a large basalt boulder area with tidepools containing numerous purple urchins. Mussel beds are found on the more exposed west tip of the cove. There is a large flat sandstone shelf dissected with numerous surge channels on the southeast corner of the cove. ODFW planted abalone in Whale Cove as an experiment in the late 1960's. These abalone are still present but no new recruits have been observed in Whale Cove. Juvenile abalone have been observed in Boiler Bay (Trowbridge, pers. com. 1994). It is not known if the planted abalone have successfully established a viable population. Boiler Bay and

Fogarty Creek (sites 9.1 and 9.2) consist of a mix of boulder fields, bedrock platforms with surge channels, and some sand beaches. Boiler Bay has an unusually diverse community of intertidal plants and animals due to the variety of substrate types and wave exposure regimes.

Subtidal kelp beds extend along much of the cell's shoreline. The beds, composed primarily of bull kelp (*Nereocystis*), indicate the existence of significant nearshore reefs along the coastline. In a 1990 survey, these kelp beds accounted for about 5% of the total subtidal kelp bed areas off Oregon and represent the largest subtidal kelp beds north of Cape Arago (Ecoscan 1991). The associated subtidal reefs support a significant commercial fishery for red sea urchins.

The shoreline cliffs support a number of smaller seabird nesting colonies (Figure 3.9b). Each nesting colony typically contains fewer than 30 birds and is spread along several hundred feet of shoreline. Pigeon guillemot and western gull are the most common species (USFWS 1988). The rock that forms the north side of Pirate Cove (site 9.3) supports the largest colony in the cell. The colony had just under 200 birds during a 1988 survey and was used primarily by western gulls and pelagic cormorants (USFWS 1988). A bald eagle pair is known to nest inland of Whale Cove (Brown, pers. com. 1993).

Harbor seals haul out at several locations in the cell, including rocks off Fogarty Creek, an intertidal platform to the south of the creek (site 9.1), rocky platforms in Boiler Bay (site 9.2), and a rocky platform in Whale Cove (site 9.5). On occasion, Pirate Cove (site 9.4) is also used as a haulout. The Whale Cove site is the largest of the haulouts. All haulout sites in the cell are also pupping sites (Brown 1993). The Fogarty Creek site receives the most public disturbance pressure, while the Whale cove site is relatively inaccessible and receives little disturbance pressure.

Human Use

Human uses include picnicking, camping, sight seeing, tide pooling, bird watching, whale watching, surfing, and angling. Whale Cove receives some recreational SCUBA diving activity. Commercial divers harvest sea urchins in the nearshore reef areas during summer. The

city of Depoe Bay is a major tourist area with gift shops, restaurants, motels, RV park, and a marina used by commercial, private, and charter fishing vessels. Visitor counts at Fogarty Creek State Park and Boiler Bay State Wayside for 1992 were over 258,000 and 842,000 visitor-days, respectively (PRD 1993). The intertidal area at Boiler Bay receives relatively high use from school groups even though the access is steep and unimproved. School group use of this intertidal area may increase as educational use spreads from the nearby Yaquina Head intertidal area. Oregon State University researchers have studied intertidal ecological processes at Boiler Bay for many years. Boiler Bay is also popular among aquarists for the collection of live invertebrate specimens. ODFW presently manages the intertidal zone from Government Point (Boiler Bay) to Fogarty Creek and within Shell Cove as scientific/educational permit areas. Whale Cove is presently closed to the collection or harvest of any shellfish or finfish species. Boiler Bay and Depoe Bay are Oregon State Parks whale watching sites.

Management Authorities and Jurisdictions

- ODFW - Harvest regulations (marine invertebrates and finfish)
- Education/Research collection permit (Boiler Bay, Shell Cove)
- Closed area (Whale Cove)
- PRD - Owner/manager of wayside and State Park property
- Co-manager of beaches with DSL
- DSL - Manager of submerged and submersible lands
- Co-manager of beaches with PRD
- Manager of kelp harvest leases
- ODOT - Owner of highway right-of-way (includes pull-offs from Highway 101)
- USFWS - Owner/manager of the offshore rocks (above ordinary high water) that are separated from the shore at high tide
- Lincoln County - Planning and zoning regulations
- City of Depoe Bay - Planning and zoning regulations
- Manager of Depoe Bay City Park
- Private Property Owners

Human Use Concerns and Suggested Management Approaches

1) Accessible rocks between Fogarty Creek and Fishing Rock (site 9.1) - Disturbance to harbor seals.

Suggested Approach: Use interpretive signs to educate the public about disturbance to harbor seals. Examine the disturbance in more detail to develop appropriate management actions.

2) Whale Cove (site 9.5) - Possible future disturbance to pinniped haulout. Presently, disturbance is low because private property restricts access.

Suggested Approach: Consider disturbance potential in design and placement of future development in the area.

3) Boiler Bay (site 9.2) - Possible overuse of the rocky intertidal area.

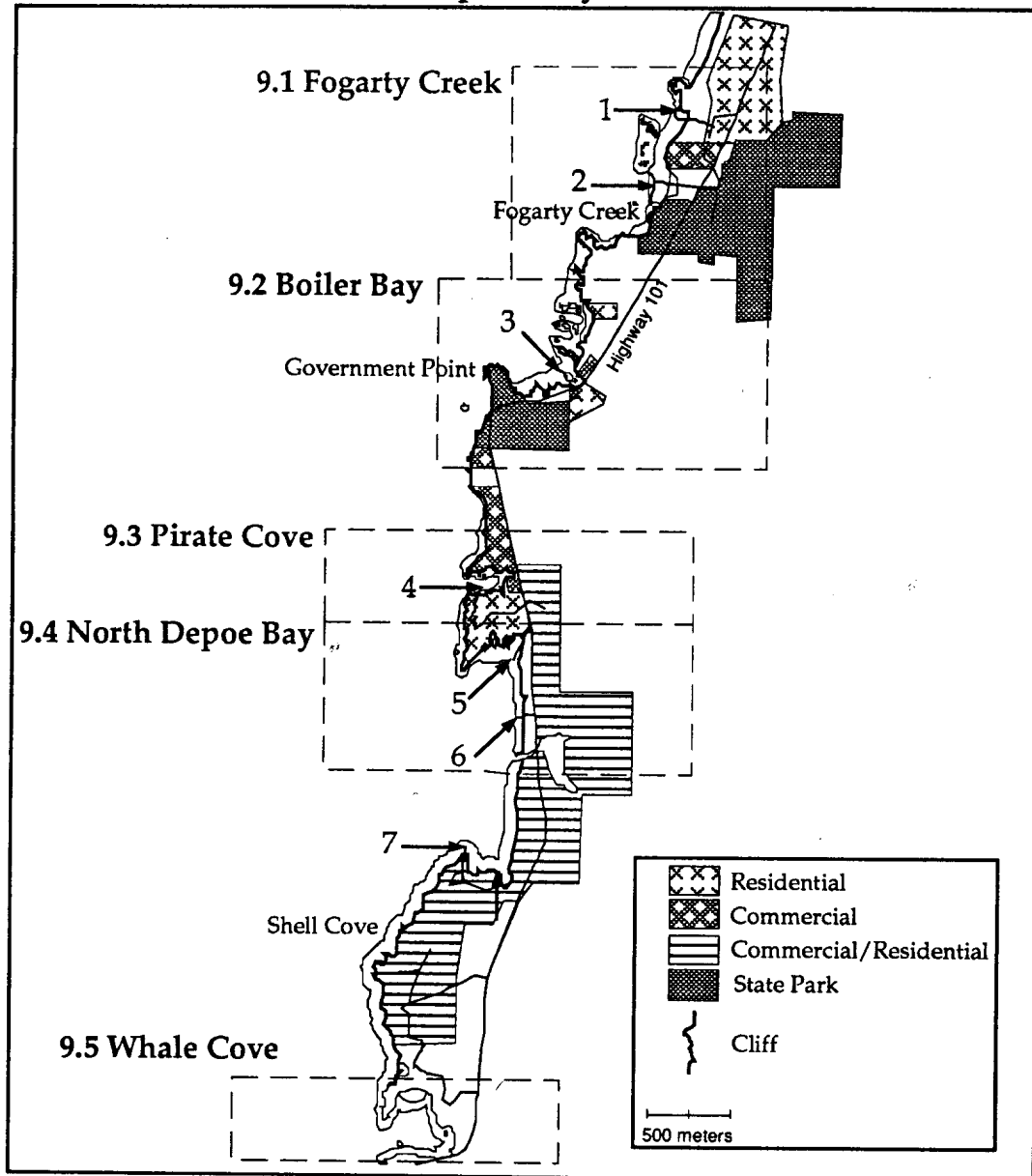
Suggested Approach: Use interpretive signs and volunteers to educate the public about appropriate intertidal etiquette. Boiler Bay may need more intensive management if use continues to increase.

Additional Opportunities

The Depoe Bay visitor center would provide an excellent site for interpretive efforts. Information on the geology of the basaltic walls with their "spouting horns", marine mammals, and local history are already present at the visitors center. Additional information on intertidal and subtidal communities could be included. The dangers of the cliff areas need to be emphasized. Hotels and RV parks provide an opportunity for distributing pamphlets and other information.

Several sites in the cell offer excellent research opportunities. Boiler Bay has been the site of on-going research and may need to be managed to ensure that research projects are not disturbed. Pirate Cove has been used to examine experimental urchin planting. Because of the restricted access into the cove, it would provide a good site for a research reserve. Whale cove is also an excellent site for both intertidal and subtidal research because the cove is closed to the taking of shellfish and finfish.

Depoe Bay Cell

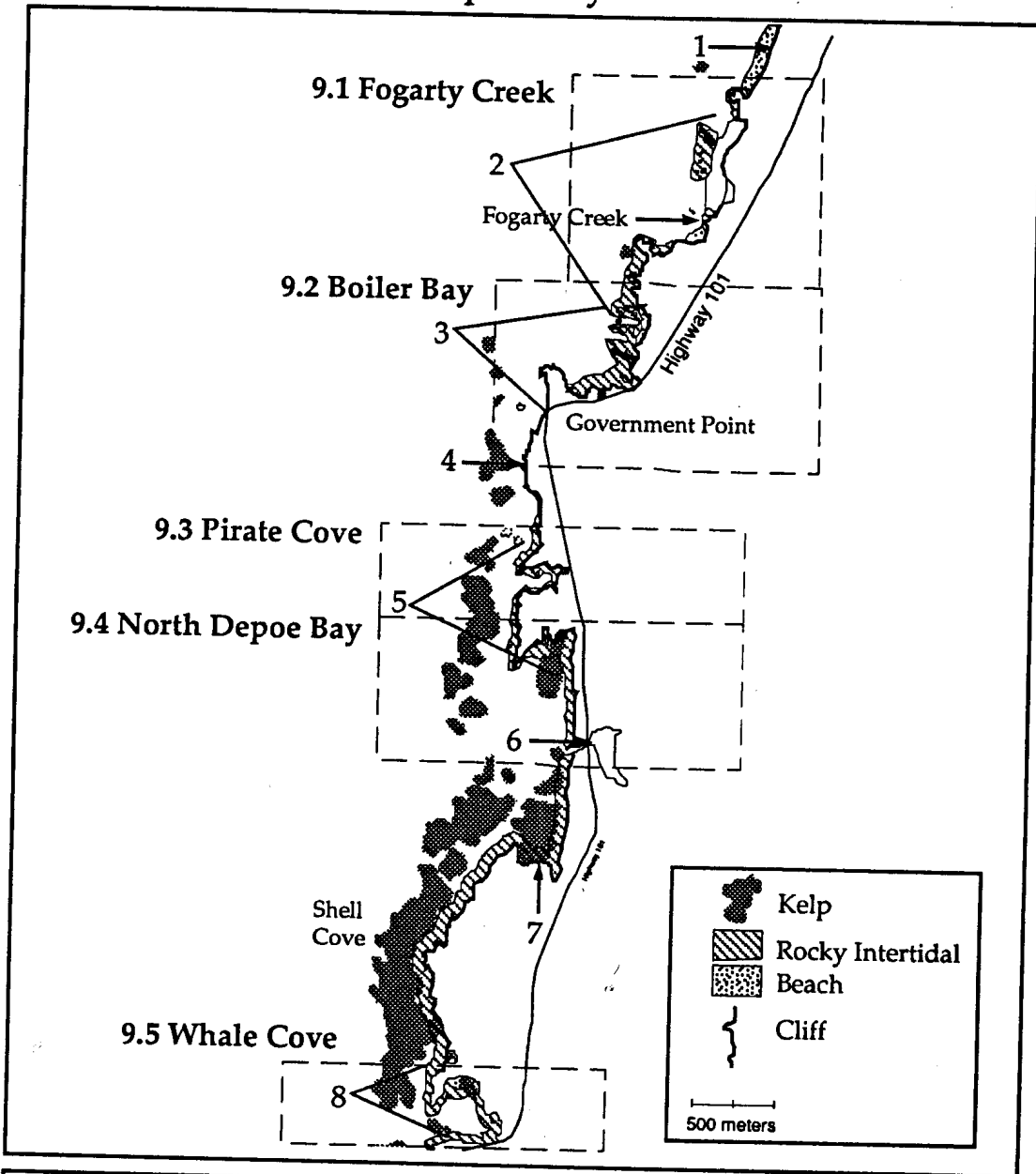


ID	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/ Difficulty*	Trail Length (ft)
1	Fishing Rock Trail			primitive/M	800
2	Fogarty Creek	259,000	250	paved/E	U
3	Boiler Bay	843,000	6	primitive/D	75
4	Pirate Cove		1	primitive/E	975
5	Arch Rock Hotel		U	primitive/M	148
6	Oregon Gift Shop		U	paved/prim./M	50
7	Cliff Street		U	primitive/E	400

* (E = easy M = moderate D = difficult) U = unknown

Figure 3.9a. Upland characteristics for the Depoe Bay Cell.

Depoe Bay Cell



ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
1	Seabird	1 small	Cliff	Yes	
2	Harbor Seal	2 small	Rocks, Platform	Yes	Foot
3	Seabird	1 small	Cliff	Yes	
3	Harbor Seal	1 small	Rocks, Platform	Yes	Foot
4	Seabird	1 small	Cliff	Yes	Foot, Vessel
5	Seabird	2 small	Cliff	Yes	Foot, Vessel
5	Seabird	1 medium	Cliff	Yes	Foot, Vessel
6	Seabird	1 small	Cliff	Yes	Foot
7	Seabird	1 small	Cliff	Yes	
8	Seabird	3 small	Cliff	Yes	
8	Harbor Seal	1 medium	Platform	Yes	

T & E species that occur in cell: bald eagle

Figure 3.9b. Rocky shore natural resources for the Depoe Bay Cell.

CELL 10: CAPE FOULWEATHER

The Cape Foulweather cell is located about 10 miles north of Newport. The cell contains three rocky shores sites: 10.1 Rocky Creek St. Wayside, 10.2 Otter Rock/Gull Rock, and 10.3 Otter Crest. Shoreline features include basalt and sandstone cliffs, sandy beaches, rocky intertidal areas, and a few large offshore rocks. The landward portion of the cell contains a small unincorporated residential community, other residential areas, two state waysides and two state parks, a commercial resort facility, and the historic and scenic route of old Highway 101. Rocky Creek St. Wayside and Devils Punchbowl St. Park have parking, restrooms, and picnicking facilities. Otter Crest St. Wayside has a small parking lot and a private gift shop. There are numerous scenic overlooks from the state waysides and off the highway. Trails lead to the intertidal area from one of the waysides, the state park, and from the resort (Figure 3.10a).

Rocky Shores Resources

Much of the shoreline consists of basalt rocky cliffs (Lund 1974). Cape Foulweather itself is a large basalt headland which rises about 500 ft above sea level, one of the highest along the Oregon coast (PRD 1988). At the south end of the cell, the geologic features change to sandstone. The southernmost headland of the cell has a circular hole that was formed when the roof over two sea caves collapsed (Lund 1974b). This is referred to as Devils Punch Bowl.

The rocky intertidal habitats along Cape Foulweather, north of the Otter Crest site (site 10.3), consist of the steep cliff bases with some sloping shelf areas. There are some small coves containing intertidal platform areas. Most of these coves and cliffs are either inaccessible or very dangerous and we have no information about the intertidal communities that exist there. At the Otter Crest site (site 10.3), the intertidal habitat changes to a large flat surf-cut sandstone shelf, with numerous shallow pools and surge channels. This area is presently classified as a Marine Garden by ODFW. The south end of the shelf is very flat with low relief. It has a lower invertebrate diversity and has some algal species adapted to periodic sand burial. The north end

of the shelf changes to a higher relief habitat with large pools. This area has extensive beds of purple sea urchin, mussels beds, and a diverse algal community.

Subtidal kelp bed patches extend along much of the cell's shoreline (Figure 3.10b). The beds, composed primarily of bull kelp (*Nereocystis*), indicate the existence of nearshore reefs along the coastline. These subtidal reefs support a commercial fishery for red sea urchins.

The offshore rocks and extensive cliffs in the Cape Foulweather cell support several seabird nesting colonies and pinniped haulouts. Gull Rock (site 10.2) contains the largest seabird colony in the cell. Principal nesting species include common murre and Brandt's cormorant, and the total bird count approached 15,000 in a 1988 survey (USFWS 1988). The endangered brown pelican uses the rock as a roosting site. The Oregon Ocean Plan lists Gull Rock as especially sensitive bird and mammal habitat (Oregon Ocean Resources Management Task Force 1991). A few western gulls and pigeon guillemots nest on some of the other offshore rocks in the cell. Seabirds also nest along many of the cliffs (Figure 3.10b). The most notable colony extends along the cliffs below Otter Crest State Wayside (Figure 3.10b). This is the largest pelagic cormorant colony in the state, with over 800 birds during a 1988 survey (USFWS 1988). Harbor seal haulouts in the cell include Gull Rock, rocks off Devil's Punch Bowl (site 10.2), and intertidal platforms at the marine garden site (Site 10.3). All of the haulouts are relatively small (Brown 1993).

Human Use

Uses of the Otter Crest cell include picnicking, sight seeing, beach combing, tide pooling, bird watching, whale watching, angling, and commercial urchin harvest. There are many spectacular scenic overlooks from the state waysides and along the route of old Highway 101. Shoreline use is concentrated at Devil's Punch Bowl and the otter crest marine gardens (site 10.3). Use of this site will continue to grow due to easy access and its proximity to the community of Otter Rock, the nearby resort, and major tourist towns on the central coast. In 1992, Devil's Punch Bowl State Park recorded approximately 533,000 visitor-days (PRD 1993).

The Marine Garden intertidal area receives high use from school groups as well as the general public. School group use of this intertidal area may increase as educational use spreads from the nearby Yaquina Head intertidal area. Rocky Creek State Park, Cape Foulweather, and Devil's Punch Bowl State Park are Oregon State Parks whale watching sites. Commercial divers harvest sea urchins in the nearshore reef areas during summer. Fishing on the reefs, as well as from shore, is also popular.

Management Authorities and Jurisdictions

- ODFW - Harvest regulations (marine invertebrates and finfish)
- Marine garden (Otter Crest)
- PRD - Owner/manager of property within two waysides one state park
- Co-manager of beaches with DSL
- DSL - Manager of submerged and submersible lands
- Co-manager of beaches with PRD
- Manager of kelp harvest leases
- ODOT - Owner of highway right-of-way (includes pull offs from Highway 101)
- USFWS - Owner/manager of the offshore rocks (above ordinary high water) that are separated from the shore at high tide
- Lincoln County - Planning and zoning regulations
- Inn at Otter Crest - Owner of one of the access points to the marine gardens
- Other Private Property Owners

Human Use Concerns and Suggested Management Approaches

1) Gull Rock (site 10.2) - Potential boat and aircraft disturbance to large seabird nesting colonies.

Suggested Approach: Provide information to

vessel and aircraft owners and operators concerning the need to minimize disturbance. The disturbances should be studied and management measures developed that are designed to address site specific concerns.

2) Otter Crest cliffs - Possible aircraft disturbance to seabird nesting colonies.

Suggested Approach: Provide information to aircraft owners and operators concerning the need to minimize disturbance. The disturbances should be studied concurrently with examination of impacts to Gull Rock.

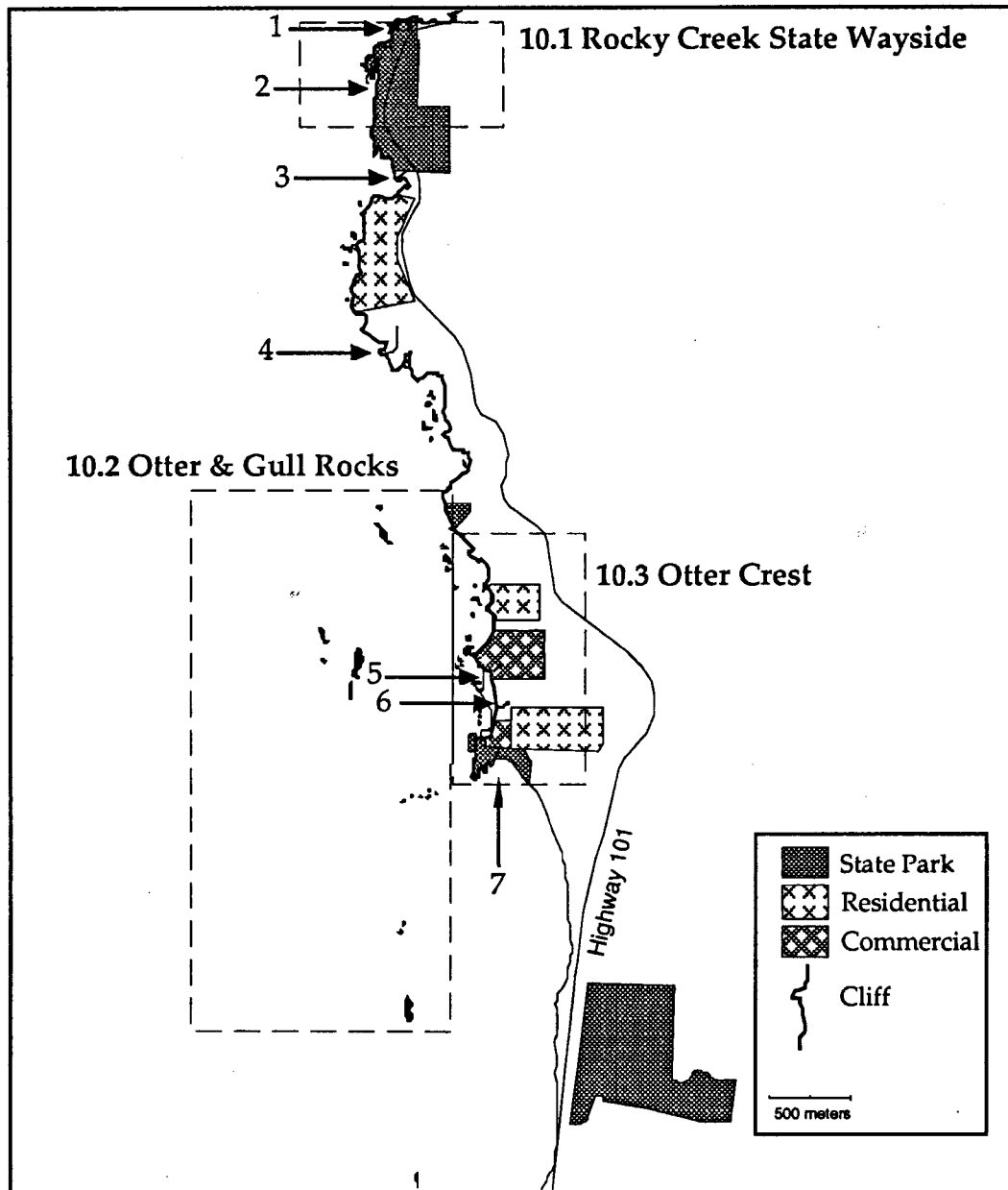
3) Marine Gardens at Otter Crest (site 10.3) - Possible overuse of rocky intertidal area .

Suggested Approach: Use interpretive signs and volunteers to educate the public about appropriate intertidal etiquette. This area should be considered a candidate for more intensive management.

Additional Opportunities

All sites within the Otter Crest cell are good candidates for interpretive programs due to their high use and the need to alleviate impacts. Information about the rocky intertidal, sea birds, marine mammals, and Native American use can be included in educational efforts at the two state waysides, the state park, the nearby resort, and the marine gardens (sites 10.1 and 10.3). Special attention should be paid to the marine gardens where most of the rocky shore use is focused. A recent survey of visitors to the Marine Garden showed that most of them accessed the site from the resort (Fox 1993). Many visitors suggested that informational pamphlets or tours staged out of the resort would be valuable.

Cape Foulweather Cell

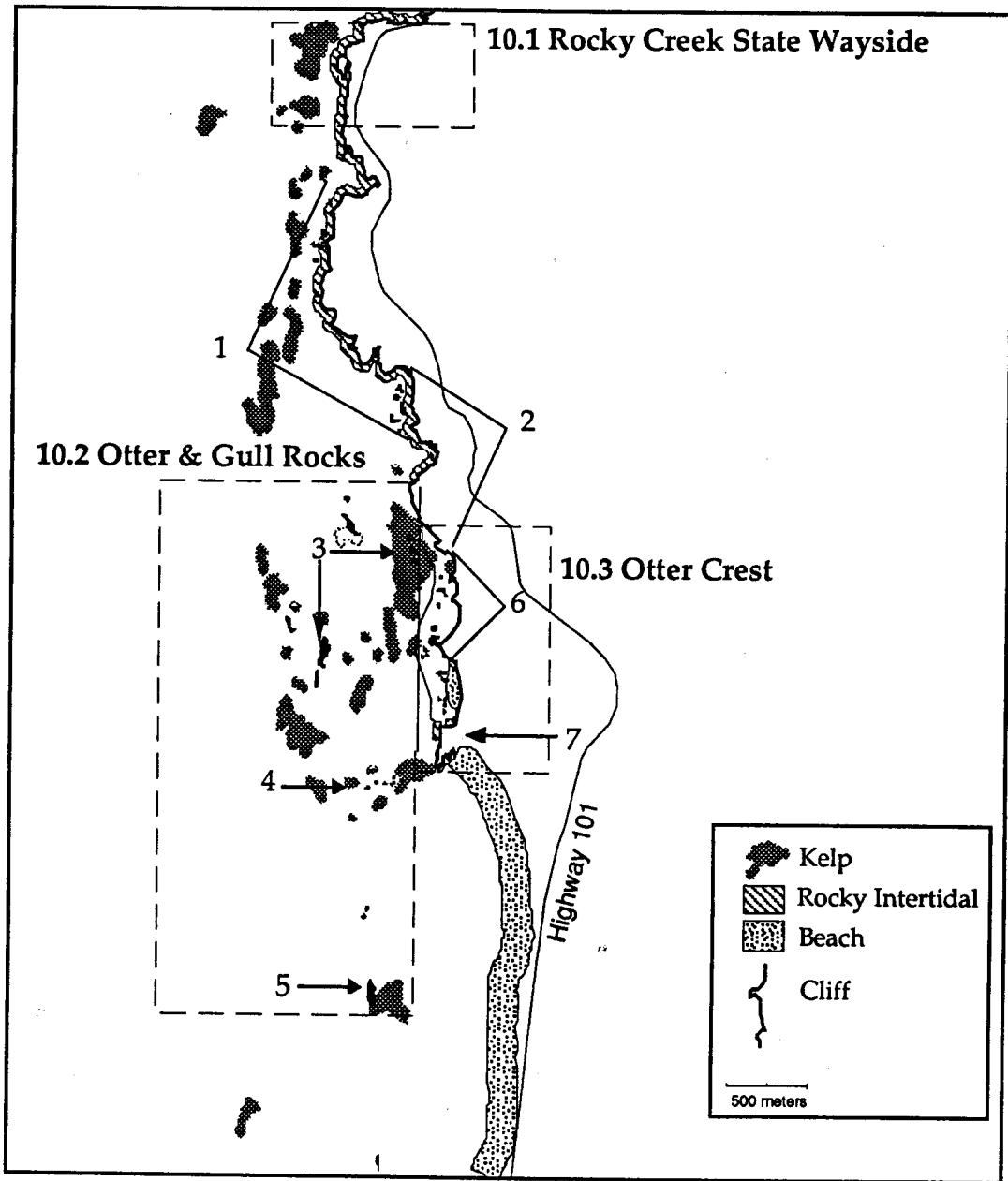


ID No.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/ Difficulty*	Trail Length (ft)
1	N-Rocky Ck. Wayside	244,000 [†]	20+	primitive/D	100
2	S-Rocky Ck. Wayside		U	primitive/D	U
3	Rocky Creek		25	primitive/D	100
4	Cape Trail South		25	primitive/M	700
5	Inn at Otter Crest		U	steps/M	300
6	Otter Crest Beach		20	paved/M	380
7	Devil's Punchbowl	533,000	45	steps/M	600

* (E = easy M = moderate D = difficult) U = unknown
[†]Combined count for Accesses 1 and 2

Figure 3.10a. Rocky shore upland characteristics for the Cape Foulweather

Cape Foulweather Cell



ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
1	Seabird	4 small	Cliff/Rocks	No	
2	Seabird	1 large	Cliff	No	
3	Seabird	1 x-large	Rocks	No	Aircraft, Vessel
3	Harbor Seal	2 small	Rocks	No	Aircraft, Vessel
4	Harbor Seal	1 small	Rocks	No	Aircraft, Vessel
5	Seabird	1 small	Rocks	No	
6	Seabird	2 small	Cliff/Rocks	Yes	
7	Seabird	1 small	Cliff	Yes	

T & E species that occur in cell: Brown Pelican

Figure 3.10b. Rocky shore natural resources for the Cape Foulweather Cell.

CELL 11: YAQUINA HEAD

Yaquina Head is located approximately five miles north of the city of Newport. The cell, including both the headland and a rocky outcropping several miles to the south, is divided into four sites: 11.1 Yaquina Head Marine Garden, 11.2 South Yaquina Head, 11.3 BLM Tidepool, and 11.4 Jumpoff Joe (Figure 3.11a). The landward section of sites 11.1, 11.2 and 11.3 is owned primarily by the Bureau of Land Management (BLM). Site 11.4, Jumpoff Joe, is bordered by the Nye Beach neighborhood of Newport. BLM manages the sites 11.1 - 11.3 as the Yaquina Head Outstanding Natural Area. The area is accessible from Highway 101 by N.W. Lighthouse Drive. There is a parking area, interpretive trails, and observation deck at the tip of the headland. The major access to Yaquina Head Marine Gardens (Site 11.1) is by a long stairway from the main parking area." BLM has created a large tidepool at site 11.3, formerly referred to as the lower quarry, and will be building an interpretive center overlooking the site. The tidepool creation in Site 11.3 involved excavating parts of the lower quarry to intertidal and shallow subtidal elevations, and allowing ocean water to flood the excavation. BLM will run an intensive interpretive effort at the site. Sites 11.2 (South Yaquina Head) and 11.3 (BLM Tidepool) can be accessed from the Lower Quarry parking area. There is little or no access to most of site 11.2 because of steep cliffs. Some of the rocky intertidal and cliff habitat on the north side of Yaquina Head is accessible by Moolack Beach. Access to Jumpoff Joe (Site 11.4) is either along the beach from the "Nye Beach Turnaround" (N.W. 3rd St.), or from other public street ends in Newport.

Rocky Shores Resources

The rocky shore features of the Yaquina Head cell are primarily made up of Miocene Columbia River Basalt which overlies the Astoria Sandstone and Nye Mudstone Formations (Mardock 1993). The basalt at Yaquina Head cooled under a variety of conditions resulting in grades and textures that contribute to a unique mixture of complex microhabitats. Glassy breccia (angular shapes) lines much of the beach area. Pillow lava has formed cobbles, pebbles,

and round holes in rock. A large fan of columnar basalt lines the back wall of the Lower Quarry (Mardock 1993). Jumpoff Joe consists of a series of rapidly eroding mudstone and sandstone outcroppings embedded in a long sand beach.

The Yaquina Head Marine Garden contains a wide range of rocky shore habitats. The major habitat types include rocky islands, basalt and sandstone cliff, intertidal cliff base, rocky intertidal platforms, intertidal boulder fields, pebble/cobble beach, wash rocks and submerged reefs supporting kelp beds (Figure 3.11b). The rocky intertidal habitat of Yaquina Head has a diverse plant and animal community. A recent study at the marine garden site revealed significant intertidal habitat impacts due to human trampling (Brosnan and Crumrine 1992). The intertidal zone at Jumpoff Joe contains representatives of many common north coast invertebrate species which can be easily observed by visitors during low tides.

At least nine species of marine birds breed at Yaquina Head, including the common murre, tufted puffin, black oystercatcher and rhinoceros auklet. The largest of the Yaquina Head breeding colonies is on Colony Rock, located about 100' off the tip of the headland. This rock supports about 15,000 breeding birds, including several thousand breeding pairs of common murre, hundreds of Brandt's cormorants, and several other seabirds species (USFWS 1988). The cliff habitat of the relatively isolated and inaccessible parts of site 11.2 and the north part of site 11.1 provide large nesting areas for pelagic and Brandt's cormorants (Figure 3.11b). Grassy banks provide habitat for burrow nesters such as tufted puffins and pigeon guillemots. The endangered brown pelican and peregrine falcon, as well as the threatened bald eagle, also use Yaquina Head. In addition, the harlequin duck, listed as a sensitive species by ODFW, occasionally uses the main Marine Garden area.

A small colony of harbor seals haul out on a cluster of low rocky islands and wash rocks near the main Marine Garden area. These haul-outs are also used occasionally by Steller and California sea lions. The rocks are accessible to humans at low tide.

Human Use

Historically, the Yaquina Head intertidal area has been subject to considerable harvest pressure. The area is now protected as a Marine Garden. Collecting is no longer permitted, however visits by school groups and others have increased and have resulted in significant trampling impacts. Based on foot counter data, BLM staff estimate that approximately 60,000 people visit the Marine Garden every year. This includes 9,000 to 10,000 school group participants. About 400,000 people visited the upland day use area in 1992 and there is a continued increase expected. Other uses of Yaquina Head include fishing, SCUBA diving, surfing, bird watching, whale watching, hang gliding and photography. Communication Hill has a Coast Guard radio relay station, an outer navigational marker for the Newport Airport, and an Oregon State University wave research camera.

Interpretive information is provided to day-use visitors by BLM rangers and volunteers during all seasons. Weather permitting, spotting scopes are set up to allow the public to get a better view of marine birds and mammals without disturbing them. Yaquina Head is also an Oregon State Parks whale watching site. BLM rangers and volunteers provide interpretive instruction and supervision to approximately 200 school groups per year. Current BLM policy at Yaquina Head Outstanding Natural Area includes efforts to minimize the impact of thousands of visitors per year on the upland habitats. In the last three years distinct improvements in the quality and appearance of the heavily-used upper headland areas have become apparent. By creating boundaries for humans, upland and marine birds have been allowed to return to nesting habitat that may have been abandoned since lighthouse construction and operation began. A handicap-accessible observation deck has been constructed to give visitors a relatively close-up look at the seabird colonies, where murre and cormorant chicks can be easily observed.

Management Authorities and Jurisdictions

- ODFW - Harvest regulations (marine invertebrates and finfish)
- Yaquina Head Marine Garden

- BLM - Ownership of 100 acres surrounding Yaquina Head Lighthouse, managed as Yaquina Head Outstanding Natural Area
- USCG - Ownership and specific maintenance of the lighthouse, communication tower and radio beacons.
- PRD - Co-manager of beaches with DSL
- DSL - Manager of submerged and submersible lands
- Co-manager of beaches with PRD
- USFWS - Owner/manager of the offshore rocks (above ordinary high water) that are separated from the shore at high tide
- Lincoln County - Planning and zoning regulations
- City of Newport - Planning and zoning regulations
- Private Property Owners

Human Use Concerns and Suggested Management Approaches

- 1) Yaquina Head Marine Garden (site 11.1) - Overuse of rocky intertidal area (primarily trampling impacts)

Suggested Approach: Continue and expand existing intertidal interpretive programs. BLM staff plan to implement a school group reservation system to spread the use over a longer time period and improve the ability of staff to supervise use. Completion of the tidepool project will shift much of the use away from the marine garden site.

- 2) Seabird nesting colonies at tip of headland (site 11.1) - Potential disturbance caused by people, boats, and aircraft approaching too close.

Suggested Approach: Current efforts by BLM have reduced direct human impact to the colonies. An intertidal area adjacent to tufted puffin nesting sites is closed during the nesting season. Staff constantly supervise activities at the site to ensure people do not climb on the rocks. Fences and paths on the upland areas keep people from disturbing nesting sites. These efforts will need to be continued and may need to be increased along with increased use of the area. Information should be provided to vessel and aircraft owners and operators concerning the need to minimize disturbance to seabirds.

3) Harbor seal haulout site (site 11.1) - Harbor seal disturbance by visitors of the Marine Garden

Suggested Approach: Current efforts by BLM have reduced direct human impact to this site. BLM staff place rope barrier in the intertidal area adjacent to the haulout during the high use season. Staff constantly supervise activities at the site to stop people from crossing the barrier.

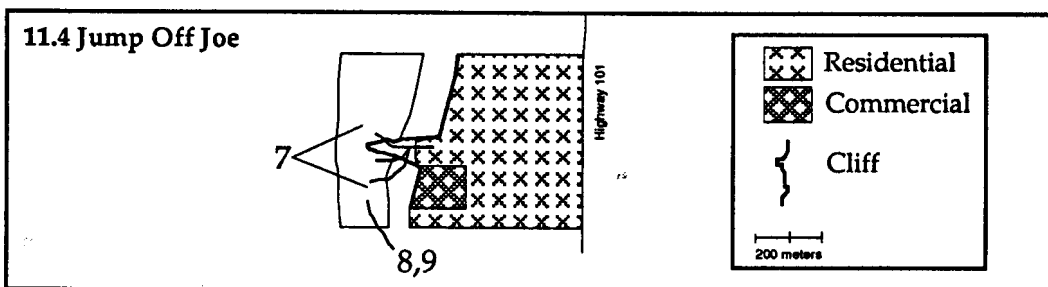
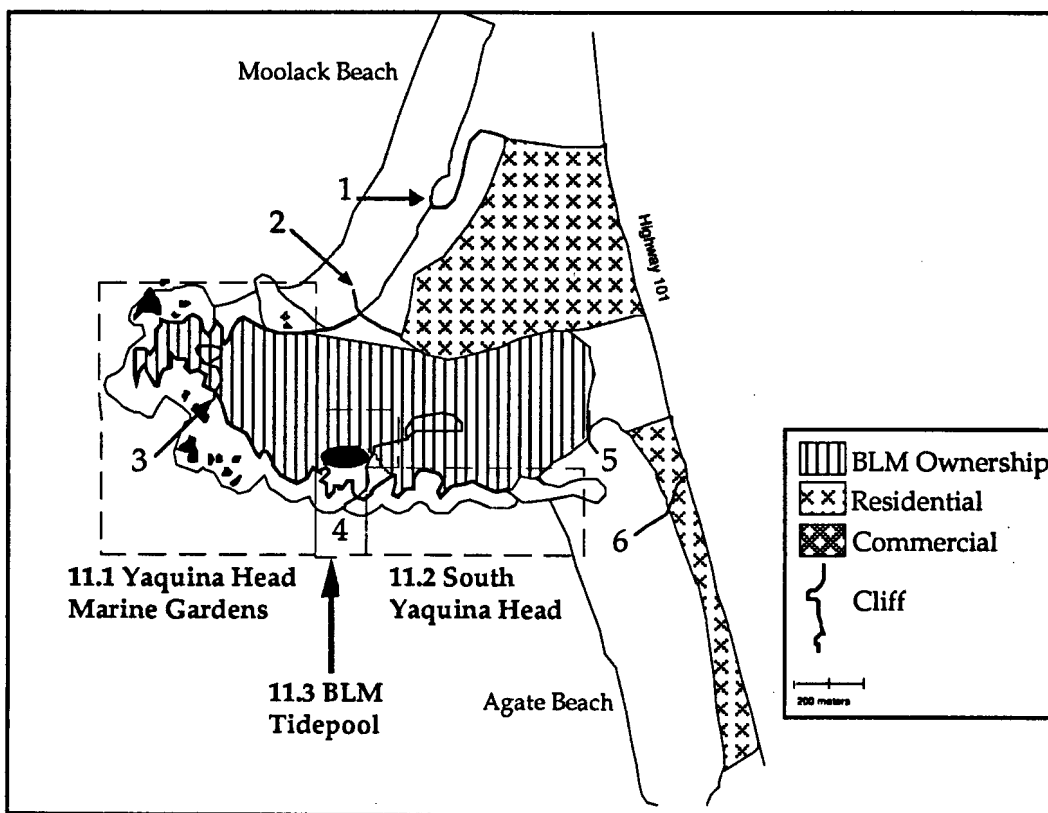
4) BLM does not have adequate legal authority to enforce intertidal resource protection regulations.

Suggested Approach: Examine options for increasing enforcement at the site. One option would be to initiate rule or legislative changes to transfer enforcement authority to BLM. Another option would be for BLM to provide funding to Oregon State Police to maintain an officer at the site during selected times.

Additional Opportunities

With the continued management of Yaquina Head Outstanding Natural Area by the BLM, and the future completion of the tidepool area and interpretive center, this area will experience dramatic increases in visitor use. In order to flourish, wildlife communities need protection from the increasing numbers of visitors. In general, care could be taken to continue to establish plenty of small refuges, away from all human access, where appropriate food, shelter and water can be reliably found by wildlife. Problems encountered by management authorities at Yaquina Head are an indication of what is in store for many other rocky shore sites in the near future. Some of the management strategies developed by BLM could be used at other sites to help solve problems related to large numbers of visitors.

Yaquina Head Cell

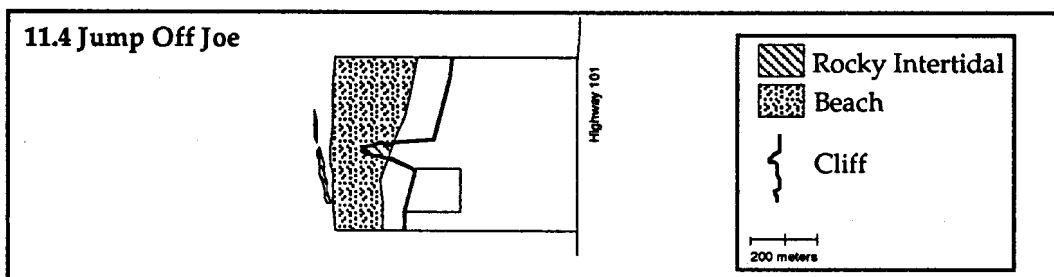
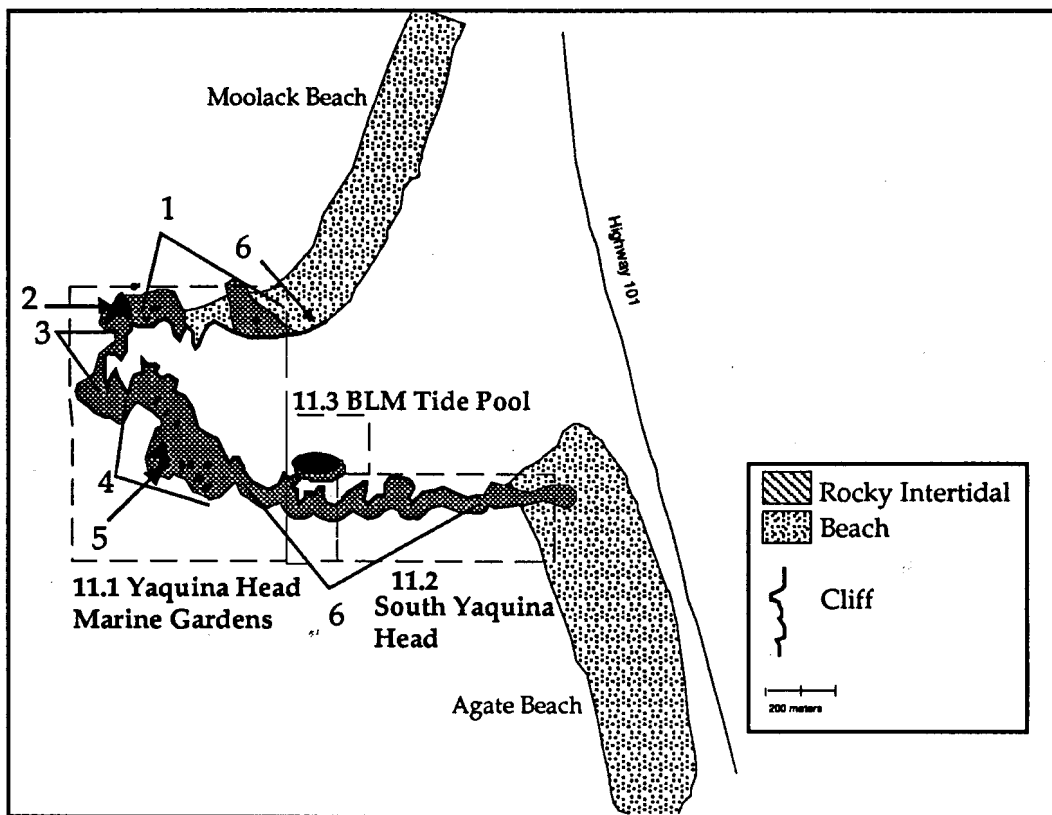


ID No.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/ Difficulty*	Trail Length (ft)
1	Traylor Park Trail		U	U	U
2	56th Street		2	no surface/M	600
3	Lighthouse Trail	433,000	42	paved/M	200
4	BLM Tidepool-N		50	paved/E	600
5	N-Trail Agate Beach		2	paved/M	1000
6	S-Trail Agate Beach		15	gravel/M	600
7	Jump Off Joe Access		U	no surface/M	800
8	Veteran's Walk		30	paved/E	800
9	Nye Beach Wayside		50	beach/E	800

* (E = easy M = moderate D = difficult) U = unknown

Figure 3.11a. Rocky shore upland characteristics for the Yaquina Head Cell.

Yaquina Head Cell



ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
1	Seabird	3 small	Cliff/Rocks	Yes	Aircraft, Vessel
2	Seabird	1 x-large	Rock	No	Aircraft, Vessel
3	Seabird	1 small	Cliff	Yes	Aircraft, Foot, Vessel
3	Seabird	3 med	Cliff	Yes	Aircraft, Foot, Vessel
4	Seabird	3 small	Rocks	Yes	Aircraft, Foot, Vessel
5	Harbor Seal	1 small	Rock	Yes	Foot, Vessel
6	Seabird	1 medium	Cliff	Yes	Aircraft, Foot

T & E species that occur in cell: Brown Pelican, Peregrine Falcon, bald eagle

Figure 3.11b. Rocky shore natural resources for the Yaquina Head Cell.

CELL 12: SEAL ROCK

The Seal Rock cell is located 12 miles south of Newport just off Highway 101. Shoreline features include basalt and sandstone cliffs, sandy beaches, rocky intertidal areas, and numerous offshore rocks. The landward portions of the site include residential areas, a state park, and Highway 101. The state park has parking, restrooms, and picnicking facilities. A series of small loop trails in the park lead to scenic overlooks. The shore can be accessed from a paved trail in the state park, and steep, unimproved trails from each of 3 turnouts off Highway 101 (Figure 3.12a).

Rocky Shores Resources

Rocky shore habitats at Seal Rock include cliffs, rocky intertidal areas, and offshore rocks. The cliffs include both erosion-resistant basalt structures that form three small headlands and eroded sandstone cliffs that demark the seaward edges of marine terrace deposits (Lund 1972b). A row of basaltic sea stacks and rocks extends in a north-south direction just off the beach.

Rocky intertidal habitats consist of a north-south trending shelf of low-lying sandstone bedrock and a series of basalt outcroppings. There are boulder patches at the base of Elephant Rock and landward of some of the basalt outcroppings. Some of the sandstone shelf is flat while some has numerous pools, overhangs, and caves. Part of the sandstone area is seasonally covered with sand and some becomes exposed to freshwater runoff during low tides. Large basalt outcroppings seaward of the sandstone intertidal habitat protects these areas from the full force of waves. The seaward faces of the basalt outcroppings are very exposed to wave action, while the landward faces and adjacent boulder areas are somewhat protected. The variety of habitats, including exposed and protected boulders and bedrock, makes the Seal Rock intertidal area very diverse. Outer rock faces have the mussel bed and sea palm communities typical of exposed environments. Protected basalt rock faces have a more diverse intertidal community. Seagrass beds can be found landward of these areas. The sandstone areas are less diverse but have algal and invertebrate

species that are adapted to periodic sand burial. Some of the sandstone and boulder areas are quite devoid of intertidal life. This is most likely due to a combination of factors including periodic sand burial, human trampling impacts, and turning over rocks during clam harvest. Further research would be required to determine the relative contribution of each of these factors.

Offshore rocks and shoreline cliffs support some seabird nesting and pinniped use. The rocks nearest to shore are accessible at low tide. Harbor seals haul out on several of these rocks throughout the site (Brown 1993). Steller sea lions periodically haul out on the outermost large offshore rock (Figure 3.12b). Seabirds that nest on some of the offshore rocks include western gull and black oystercatcher (USFWS 1988). In addition, the endangered Brown Pelican use the offshore rocks as roost sites. Pigeon guillemots nest on some of the sandstone cliffs. Fewer than 50 seabirds nest in the cell, according to a 1988 survey (USFWS 1988).

Human Use

Uses of the site include sight seeing, beach combing, sunbathing, tide pooling, bird watching, clamming, seaweed harvest and angling. The site is very popular and receives high use due to its visibility from the highway, protection from summer northerly winds, availability of clamming and angling opportunities, and opportunity to view seals and sea birds. Harvest of the alga *Alaria* has recently become popular at the site. Seal Rock is one of the best areas on the open coast for digging littleneck clams and provides good angling opportunities for perch and other marine fish. The intertidal area receives moderate use from school groups and relatively high use by the general public. School group use of this intertidal area may increase as educational use spreads from the nearby Yaquina Head intertidal area.

Management Authorities and Jurisdictions

- ODFW - Harvest regulations (marine invertebrates and finfish)
- PRD - Owner/manager of Seal Rock State Park property
- Co-manager of beaches with DSL
- DSL - Manager of submerged and submersible lands

- Co-manager of beaches with PRD
- ODOT - Owner of highway right-of-way (includes pull offs from Highway 101)
- USFWS - Owner/manager of the offshore rocks (above ordinary high water) that are separated from the shore at high tide
- Lincoln County - Planning and zoning regulations
- Private Property Owners

Human Use Concerns and Suggested Management Approaches

1) Elephant Rock - Potential disturbance to bird nesting colonies from foot access.

Suggested Approach: The disturbances should be studied and management measures developed that are designed to address site specific concerns. Current signs warning that the area is off limits due to dangerous trails have limited effectiveness. It may become necessary to fence off access to Elephant Rock.

2) Sandstone cliffs - Digging and foot access has disturbed nest burrows of Pigeon Guillemots and caused considerable erosion.

Suggested Approach: Fence off sand cliff areas where burrowing nesters occur. Use interpretive signs to educate the public about possible human impacts to seabirds.

3) Nearshore rocks - Disturbance to harbor seals on haulout rocks

Suggested Approach: Use interpretive signs to educate the public about disturbance to

pinnipeds. The use of the beaches is very high and the importance of the haulouts is relatively low; therefore, closure of the beaches or there access would most likely be unjustified.

4) Intertidal habitats - Possible overuse of rocky intertidal area.

Suggested Approach: Use interpretive signs and volunteers to educate the public about appropriate intertidal etiquette. This area should be considered a candidate for more intensive management.

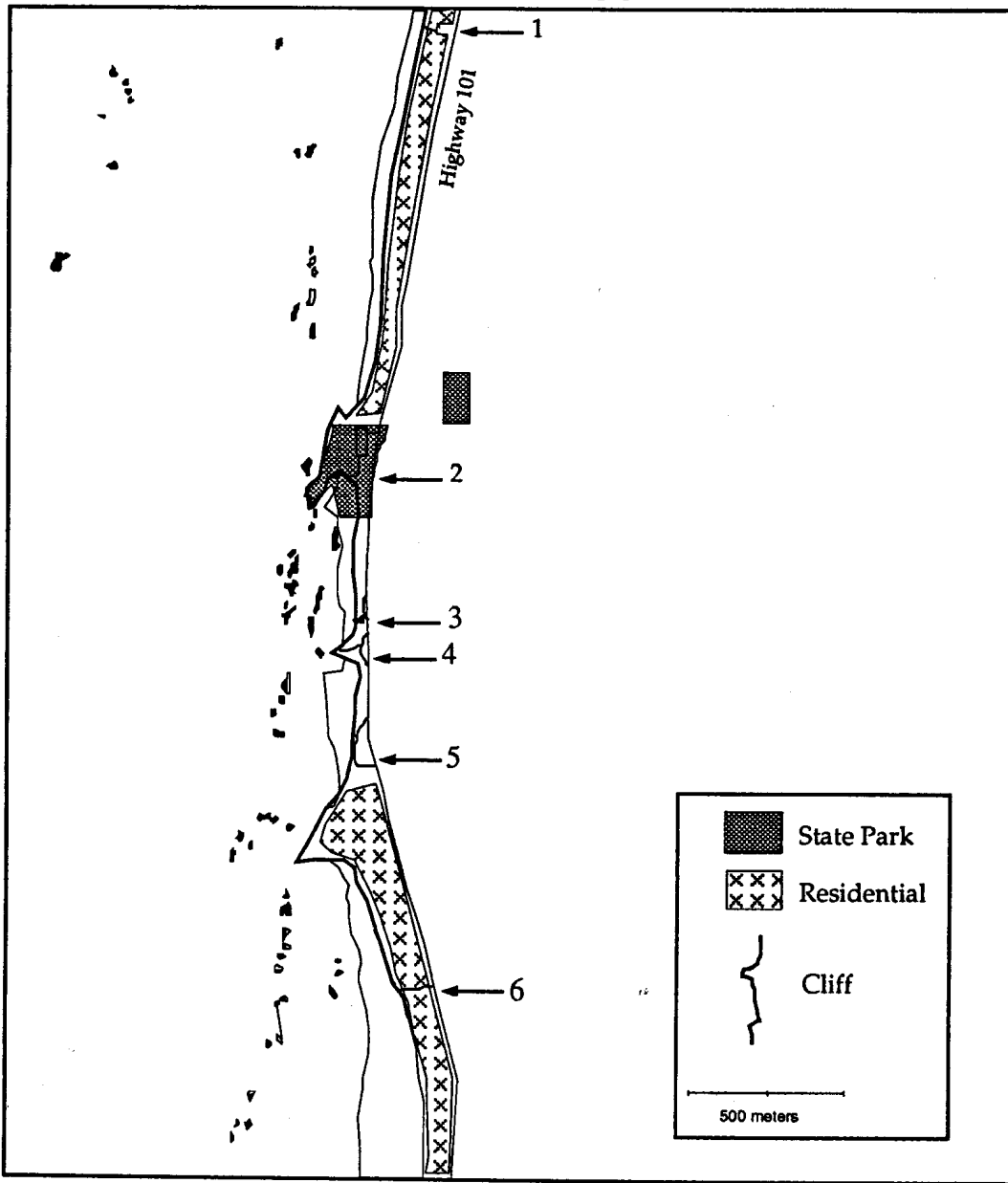
5) Intertidal habitats - The effects of *Alaria* harvest are unknown.

Suggested Approach: If the harvest expands, the impacts to *Alaria* and the effects on the intertidal ecosystem need to be studied.

Additional Opportunities

Seal Rock is a good candidate for interpretive programs due its high use and visibility, and the need to alleviate impacts. Information about the rocky intertidal, sea birds, marine mammals, and Native American use can be included in an education effort. Seal Rock is also a good area for use of local volunteer docents due to its proximity of a community with concerned citizens that can provide a pool of volunteers. The primary constraint for developing interpretive opportunities is the limited availability of parking that would be needed to accommodate large numbers of people.

Seal Rock Cell

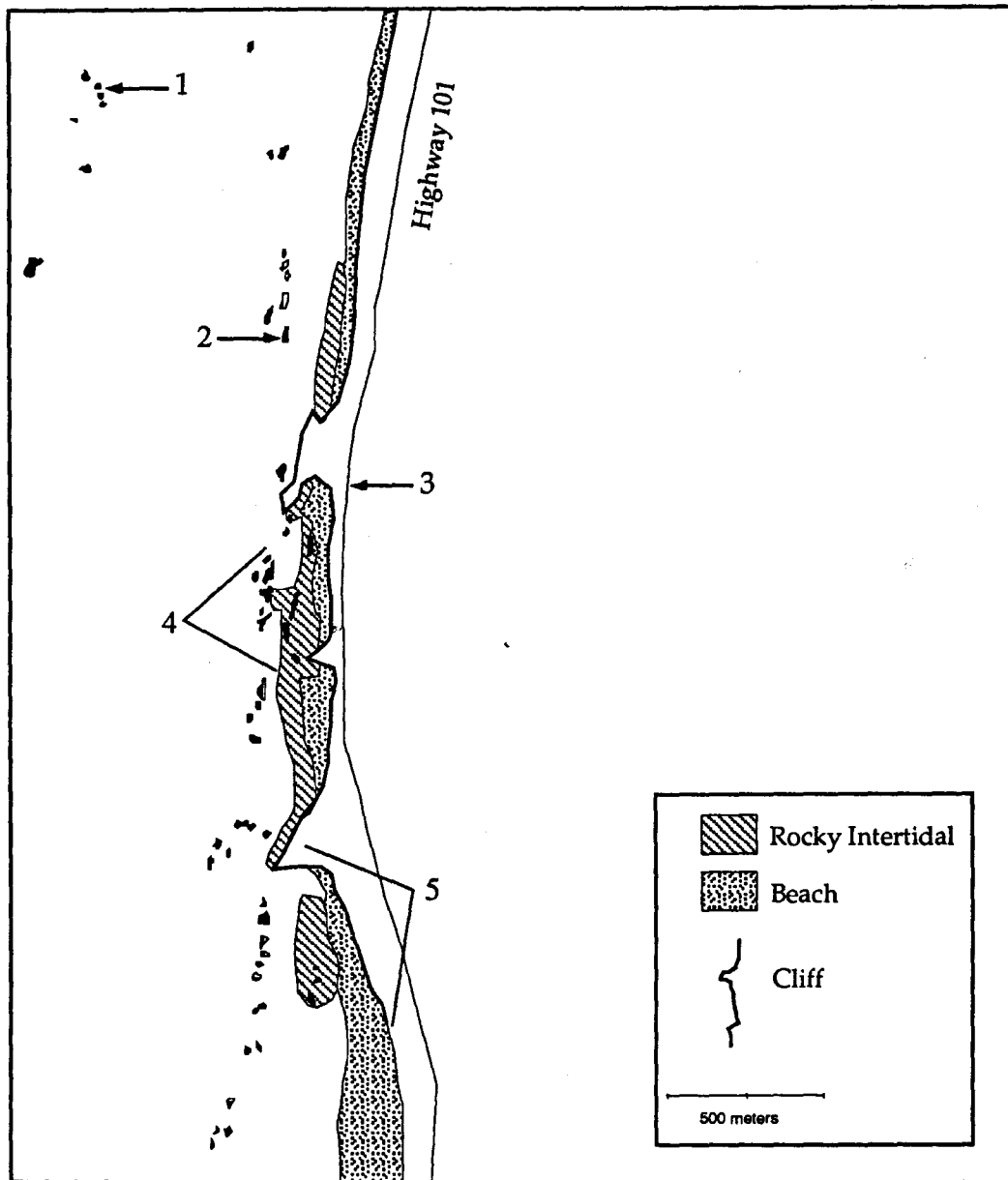


ID No.	Location	1992 Visitor Count	Parking Spaces	Trail Type/ Difficulty*	Trail Length (ft)
1	Seal Rock Wayside		8	primitive/E	2475
2	Seal Rock St. Park	203,000	28	paved/M	550
3	highway pull off		5	primitive/D	50
4	highway pull off		8	primitive/D	100
5	highway pull off		15	primitive/D	100
6	Quail Street		0	gravel/E	125

* E = easy M = moderate D = difficult

Figure 3.12a. Rocky shore upland characteristics for the Seal Rock Cell.

Seal Rock Cell



ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
1	Steller sea lion	1 small	Rocks	No	
2	Seabird	1 small	Rocks	Yes	Foot, Aircraft
3	Seabird	1 small	Cliff	Yes	Foot, Aircraft
4	Seabird	3 small	Rocks	Yes	Foot, Aircraft
4	Harbor Seal	1 small	Rocks	Yes	Foot, Aircraft
5	Seabird	2 small	Cliff	Yes	Foot, Aircraft

T & E species that occur in cell: Steller sea lion, brown pelican

Figure 3.12b. Rocky shore natural resources for the Seal Rock Cell.

CELL 13: YACHATS

The Yachats cell extends along the City of Yachats ocean frontage south to Cape Perpetua. The cell has three rocky shores sites: 13.1 Smelt Sands, 13.2 Yachats State Park, and 13.3 Yachats Ocean Road Wayside (Figure 3.13a). The primary shoreline features include large rocky platforms and low cliffs. Landward features include state parks, residential areas, and hotels mostly within the city limits of Yachats. The state parks have parking, restroom, and picnicking facilities. Most of the access to the rocky shores is over very short trails leading from the state park parking areas and from city street ends (Figure 3.13a). The "804 Trail" parallels the rocky shoreline for about two-thirds of a mile extending from Smelt Sands State Wayside (site 13.1) to a beach on the north end of Yachats (Figure 3.13a).

Rocky Shores Resources

The shoreline of the Yachats cell consists of low cliffs fronted by a fractured rocky bench. Most of the cliffs range in height from a few feet to 30 feet and are composed of sedimentary marine terrace deposits (Lund 1971, 1972b). At the southern end of the cell, the sandstone structures give way to higher basaltic cliffs of Cape Perpetua (Lund 1971).

The rocky bench along the shoreline forms a long, narrow strip of intertidal habitat (Figure 3.13b). The bench is broken into individual rocky structures separated by large fissures and small steep coarse-grained sandy beaches. The Yachats River forms a major break in the bench. The dominant rock type extending from the southern end of the cell to approximately Smelt Sands State Wayside is basalt (sites 13.2 and 13.3). North of Smelt Sands, the rock composition shifts to a conglomerate and then to sandstone (Lund 1972). The rocky intertidal area is highly fractured and eroded, resulting in a variety of deep fissures, surge channels, overhangs, and caves. High intertidal habitat containing barnacles and algae, such as *Pelvetiopsis*, covers the top of the rocky bench. Tide pools in the upper intertidal habitat contain anemones and coralline algae. The seaward faces of the rocky benches support highly exposed mid-intertidal

habitats containing mature mussel bed communities. Much of the base of the bench is subject to sand scour and is comparatively bare except for a few species of algae and invertebrates that are resistant to scour. Tube worms are abundant in some of the more protected lower intertidal areas.

The only area in the cell used by seabirds and harbor seals is a nearshore rock in site 13.3 (Figure 3.13b). The western gull is the primary bird species that nests on the rock (USFWS 1988). This rock is part of the Oregon Islands National Wildlife refuge.

Human Use

Uses of the Yachats cell include hiking, site seeing, tide pooling, commercial mussel harvest, and angling. This cell is unusual in that the entire rocky shoreline is exposed to human use. This is due to easy access from the nearly continuous strip of residential development, hotels, and state parks adjacent to the shore. The three state parks had a total combined visitor use of over 700,000 visitor-days in 1992 (PRD 1993). The 804 trail parallels the shore north from Smelt Sands (site 13.1) and provides excellent hiking and sight seeing opportunities for visitors of the state wayside and adjacent hotels. The large mature mussel beds in the cell support a small commercial mussel fishery. Recreational mussel harvest is also popular. The rocky shoreline has many popular angling spots for surf perch and other marine fish. Smelt Sands and other pocket beaches provide opportunities for catching smelt with a dip net. The sewage outflow for the city of Yachats opens onto the outer edge of one of the rocky platforms.

Management Authorities and Jurisdictions

- ODFW - Harvest regulations (marine invertebrates and finfish)
- PRD - Owner/manager of the state park properties
 - Co-manager of beaches with DSL
- DSL - Manager of submerged and submersible lands
 - Co-manager of beaches with PRD
- USFWS - Owner/manager of the offshore rocks (above ordinary high water) that are separated from the shore at high tide

City of Yachats - Planning and zoning regulations
Lincoln County - Planning and zoning regulations
Private Property Owners

Human Use Concerns and Suggested Management Approaches

1) Intertidal habitats (all sites) - Possible overuse of rocky intertidal area .

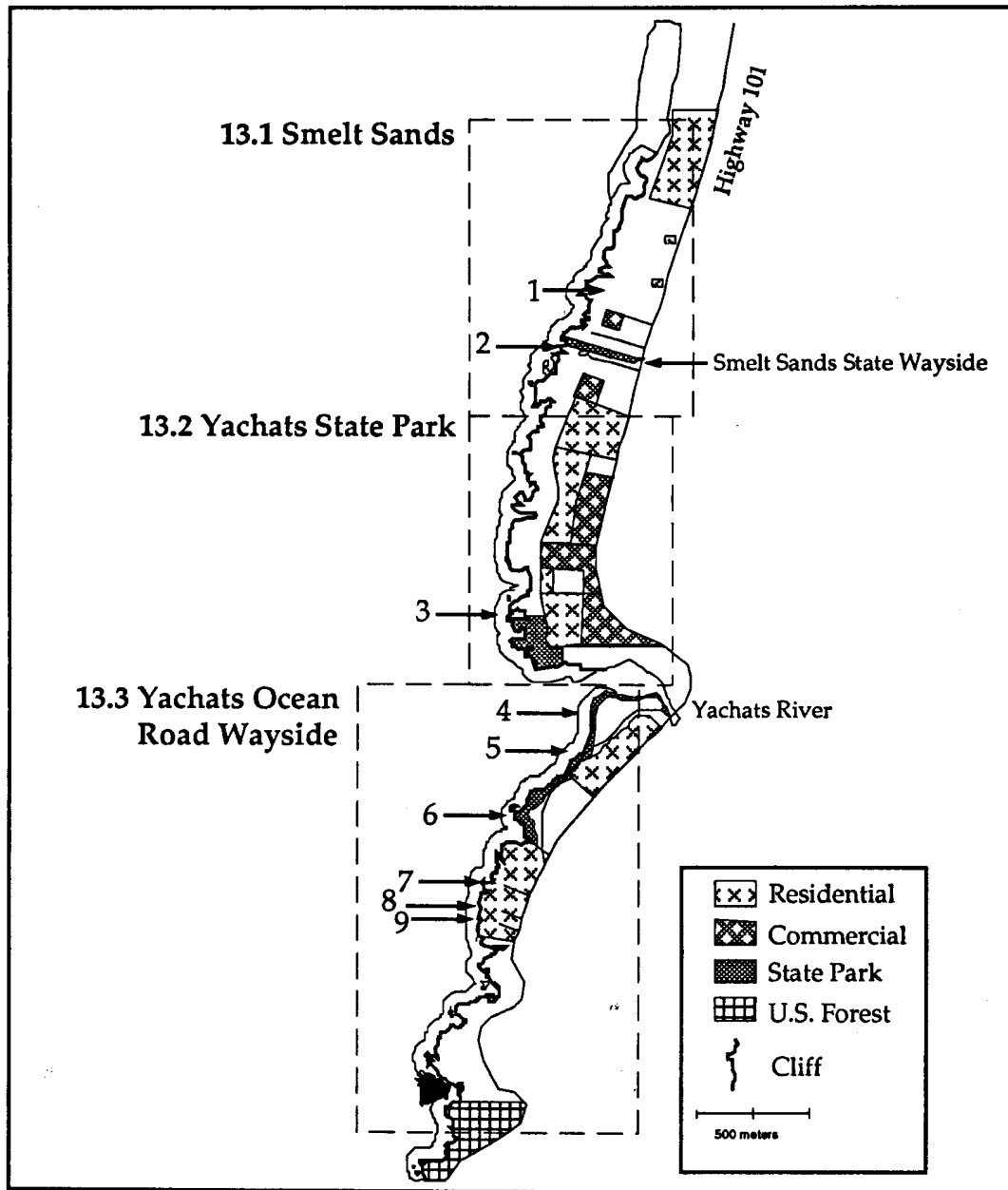
Suggested Approach: Use interpretive signs and volunteers to educate the public about appropriate intertidal etiquette. There are rising conflicts among commercial mussel harvesters, recreational harvesters, and people interested in intertidal observation.

This area should be considered a candidate for more intensive management and it may be desirable to designate part of the cell as a marine garden.

Additional Opportunities

All sites within the Yachats cell are good candidates for interpretive programs due to their high use and visibility. The interpretive efforts should focus on rocky intertidal habitats and the interesting local geology. Concerns for public safety need to be considered in these efforts because the rocky bench has many steep drop-offs and deep crevices, and is exposed to high surf.

Yachats Cell

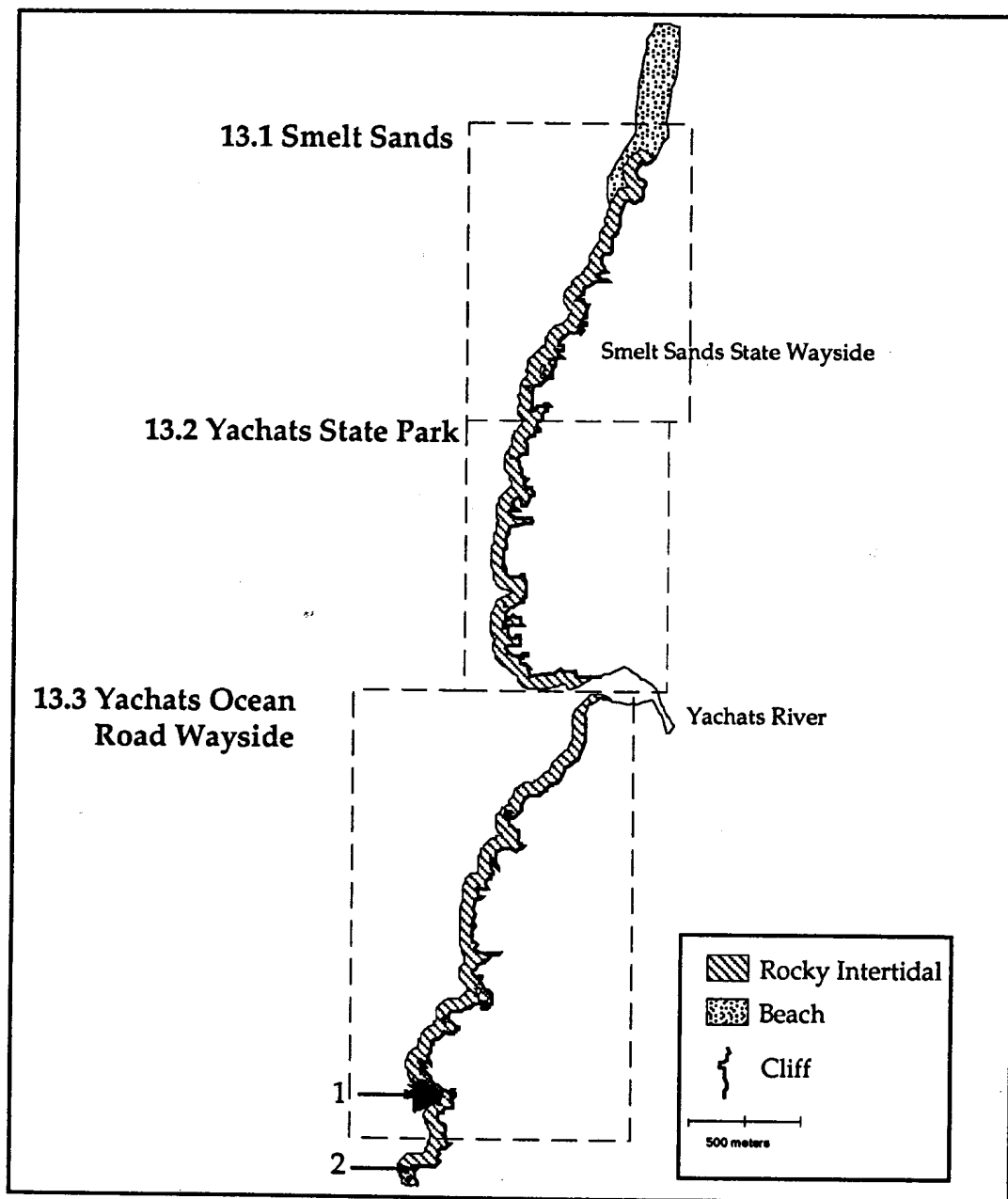


ID No.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/ Difficulty*	Trail Length (ft)
1	804 Trail		U	gravel/chips/E	varies
2	Smelt Sands	52,000	18	gravel/chips/E	varies
3	Yachats State Park	494,000	15	paved/steps/E	178
4	Yachats Wayside	156,000 [†]	30	paved/beach/E	100
5	Yachats Wayside		4	paved/E	63
6	Yachats Wayside		10	primitive/E	25
7	Surfside Drive		U	primitive/M	63
8	Gender Drive		U	primitive/E	25
9	Windy Way		U	primitive/M	75

* (E = easy M = moderate D = difficult) U = unknown
[†] Combined count for access points 4,5 and 6.

Figure 3.13a. Upland characteristics for the Yachats Cell.

Yachats Cell



ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
1	Seabird	1 medium	Rocks	Yes	
2	Harbor Seal	1 small	Rocks	Yes	

T & E species that occur in cell: None

Figure 3.13b. Rocky shore natural resources for the Yachats Cell.

CELL 14: CAPE PERPETUA

The Cape Perpetua cell extends from the main promontory of Cape Perpetua south to Roosevelt beach. The cell has five rocky shores sites: 14.1 Cape Perpetua Parks, 14.2 Neptune State Park, 14.3 Strawberry Hill, 14.4 Bob Creek, and 14.5 Stonefield Beach State Wayside (Figures 3.14a and 3.14b). The primary shoreline features include a large rocky promontory at Cape Perpetua, low cliffs south of the cape, and a series of rocky intertidal platforms separated by sandy beaches. Landward features include state parks, federal Forest Service parks, and some residential areas. The cell has relatively little residential development compared to other central coast areas. The U.S. Forest Service's Cape Perpetua Recreation Area has a well staffed interpretive center and a network of scenic trails along the shore and inland through forested areas. Most of the access to the rocky shores is over trails leading from the state or federal park parking areas (Figures 3.14a and 3.14b).

Rocky Shores Resources

The shoreline of the Cape Perpetua cell consists of two distinct cliff types fronted by either fractured rocky benches or sandy beaches. Massive basaltic cliffs hundreds of feet high form Cape Perpetua at the north end of the cell. Most of the cliffs to the south of the cape range in height from a few feet to 50 feet and are composed of sedimentary marine terrace deposits (Lund 1971). The sedimentary cliffs are interspersed with small basalt promontories, such as Gwynn Knoll and Bray Point.

Rocky intertidal habitat in the cell is extensive. A basaltic bench forms an almost continuous intertidal area from Cape Perpetua to just south of Bob Creek. Only a few relatively narrow sandy beaches and creeks form breaks in the bench. South of Bob Creek the intertidal habitat consists of low, more eroded basalt outcroppings among large sandy beaches. Much of the basalt is high relief, with numerous fractures, crevices, caves, and overhangs. There is an apparent trend in decreasing elevation of the basalt benches and outcroppings running from north to south throughout the cell. At the same time, the relative amount of sandy beach

increases from north to south. In the Cape Perpetua area (site 14.1) the rocky benches are relatively high, and the tops of the benches are mostly in the high intertidal and splash zones. Typical organisms include barnacles and seaweeds such as *Pelvetiopsis*. Tide pools in the upper intertidal habitat contain anemones, coralline algae, and some purple urchins. Highly exposed mid-intertidal habitat containing a rich, mature mussel bed community exists where the bench drops off abruptly at its seaward face and in the numerous fissures. As you proceed south to Neptune State Park (site 14.2) and Strawberry Hill (site 14.3), the benches are lower, within mid-intertidal elevations, and contain rich mussel bed communities. These are the most diverse intertidal habitats in the cell. Much of the intertidal habitat in the southern part of the cell is so low that it is periodically covered with sand. Notable exceptions occur at Stonefield Beach and Ocean Park (site 14.5) where the large, low rocky outcroppings have well developed intertidal communities.

The cliffs and rocky platforms of the cell provide habitat for marine bird and mammal use. There are three seabird nesting colonies on the cliffs (Figures 3.14c and 3.14d). Bird colonies on the basaltic cliffs of Cape Perpetua (site 14.1) and Gwynn Knoll (site 14.4) support primarily pelagic cormorants with some pigeon guillemots (USFWS 1988). The sandstone cliffs of Strawberry Hill (site 14.3) and Tenmile Creek (site 14.5) support primarily pigeon guillemots (USFWS 1988). The endangered peregrine falcon and brown pelican also use Cape Perpetua. Rocky intertidal habitats at Stonefield Beach and Ocean Park (site 14.5) are important wintering areas for Harlequin Ducks. This species is currently listed by ODFW as a sensitive species and is a candidate for federal listing as a threatened species. There is a small harbor seal haulout near Stonefield Beach Wayside (Figure 3.14d). Two additional groups of harbor seals haul out on rocks at Strawberry Hill (site 14.3) and an intertidal platform south of Strawberry Hill (Figure 3.14c).

Human Use

Uses of the Cape Perpetua cell include hiking, sight seeing, tide pooling, education, interpretation, research, commercial mussel harvest, and angling. The state parks and federal

forest in the cell have a combined visitor use of almost 750,000 visitor-days per year (PRD 1993; Cape Perpetua Visitor Center 1993). Staff from the Cape Perpetua Visitor Center lead intertidal interpretive walks during spring and summer. Approximately 2,000 people per month, including the general public, schools, and organized groups, participate in the walks (McCraken, pers. com. 1993). School groups also use Strawberry Hill and Bob Creek for educational purposes. Researchers from Oregon State University are conducting on-going studies of intertidal community ecology at Strawberry Hill. Devil's Churn, Cape Perpetua overlook, Cape Perpetua Visitor's Center, and Cook's Chasm are Oregon State Parks whale watching sites. Commercial and recreational mussel harvesters use Bob Creek. The rocky shoreline throughout the cell has many popular angling spots for surf perch and other marine fish. The rocky intertidal area in site 14.1, Cape Perpetua Parks, is designated as a marine garden. Sites 14.2 and 14.3, Neptune and Strawberry Hill, are educational/scientific permit collection areas.

Management Authorities and Jurisdictions

- ODFW - Harvest regulations (marine invertebrates and finfish)
- Educational/scientific collection permit (Neptune State Park and Strawberry Hill)
- Marine Garden (Cape Perpetua Recreation Area)
- PRD - Owner/manager of the state park properties
- Co-manager of beaches with DSL
- DSL - Manager of submerged and submersible lands
- Co-manager of beaches with PRD
- USFWS - Owner/manager of the offshore rocks (above ordinary high water) that are separated from the shore at high tide
- USFS - Owner/manager of Cape Perpetua Recreation Area and other properties within Siuslaw National Forest
- Lincoln County - Planning and zoning regulations
- Lane County - Planning and zoning regulations
- Private Property Owners

Human Use Concerns and Suggested Management Approaches

- 1) Cape Perpetua Recreational Area (site 14.1) - Possible overuse of the rocky intertidal areas.
Suggested Approach: Use interpretive signs and the existing interpretive staff to educate the public about appropriate intertidal etiquette. This area may need more intensive management if use continues to increase.
- 2) Strawberry Hill (site 14.3) - Disturbance to harbor seal haulout (the haulout is not easily accessed, but people can approach very close to it).
Suggested Approach: Use interpretive signs to educate the public about disturbance to harbor seals. Examine the disturbance in more detail to develop appropriate management actions.
- 3) Strawberry Hill (site 14.3) - Use of trails to the site has caused cliff erosion.
Suggested Approach: Direct access to one trail only and close off the numerous branching trails.
- 4) Stonefield Beach (site 14.5) - Possible disturbance to bird nesting colonies.
Suggested Approach: Use interpretive signs to educate the public about possible human impacts to seabirds.
- 5) Stonefield Beach and Squaw Creek (site 14.5) - Potential disturbance to harlequin duck wintering areas. The duck may be listed as a threatened species.
Suggested Approach: Use interpretive signs to educate the public about potential impacts. The potential disturbances should be studied and management measures developed that are designed to address site specific concerns.

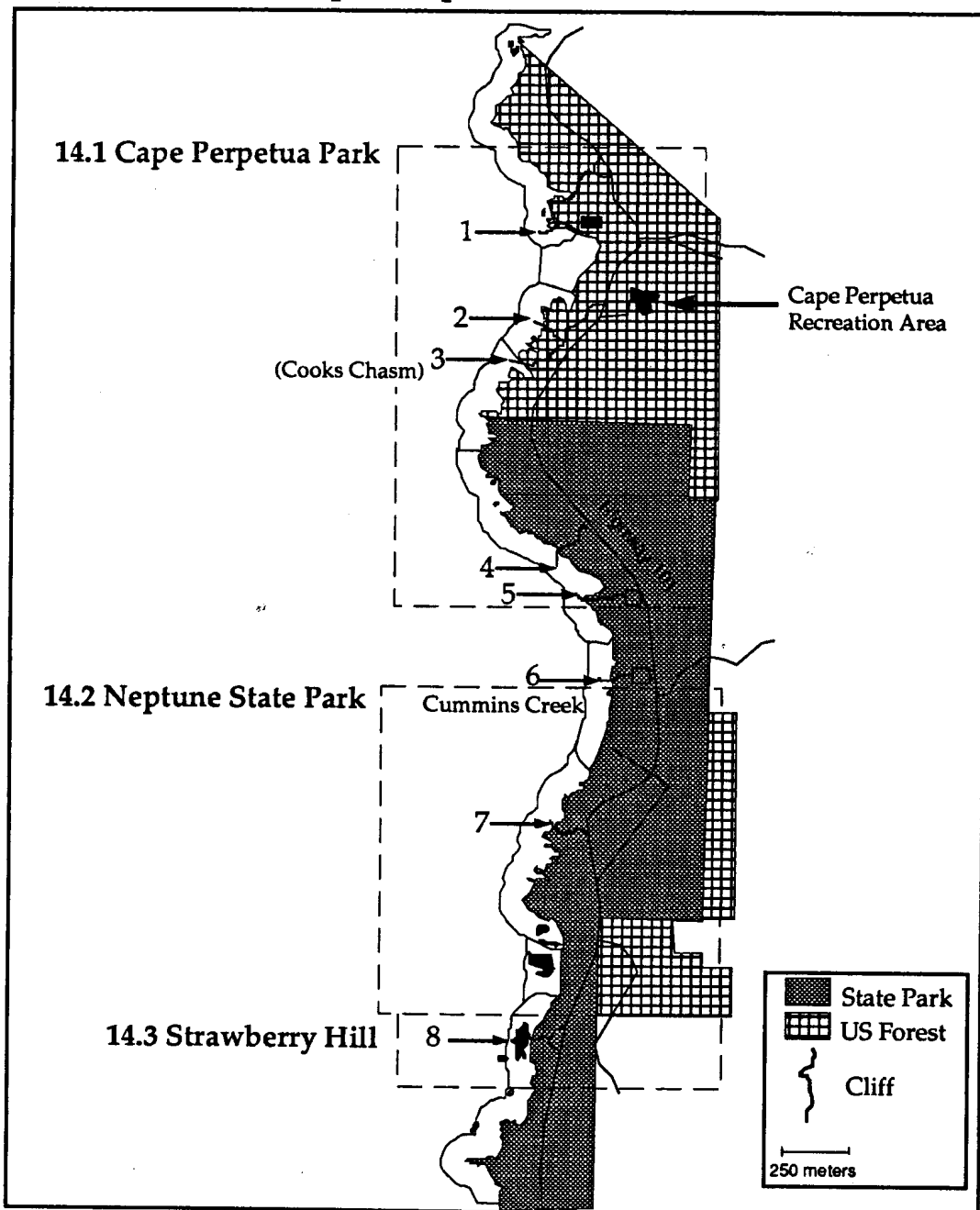
Additional Opportunities

Current interpretive efforts at Cape Perpetua Recreation Area are excellent. These should be maintained and, if possible, increased. This site may receive some of the overflow school use from Yaquina Head. Signs identifying the Cape Perpetua Visitor center and interpretive programs should be placed at Devil's Churn and Neptune State Park and associated waysides.

This would significantly increase awareness of the visitor center's existence. Strawberry Hill offers one of the best spots on the coast for

viewing harbor seals and is an excellent location for interpretive signs on marine mammals.

Cape Perpetua Cell (north)

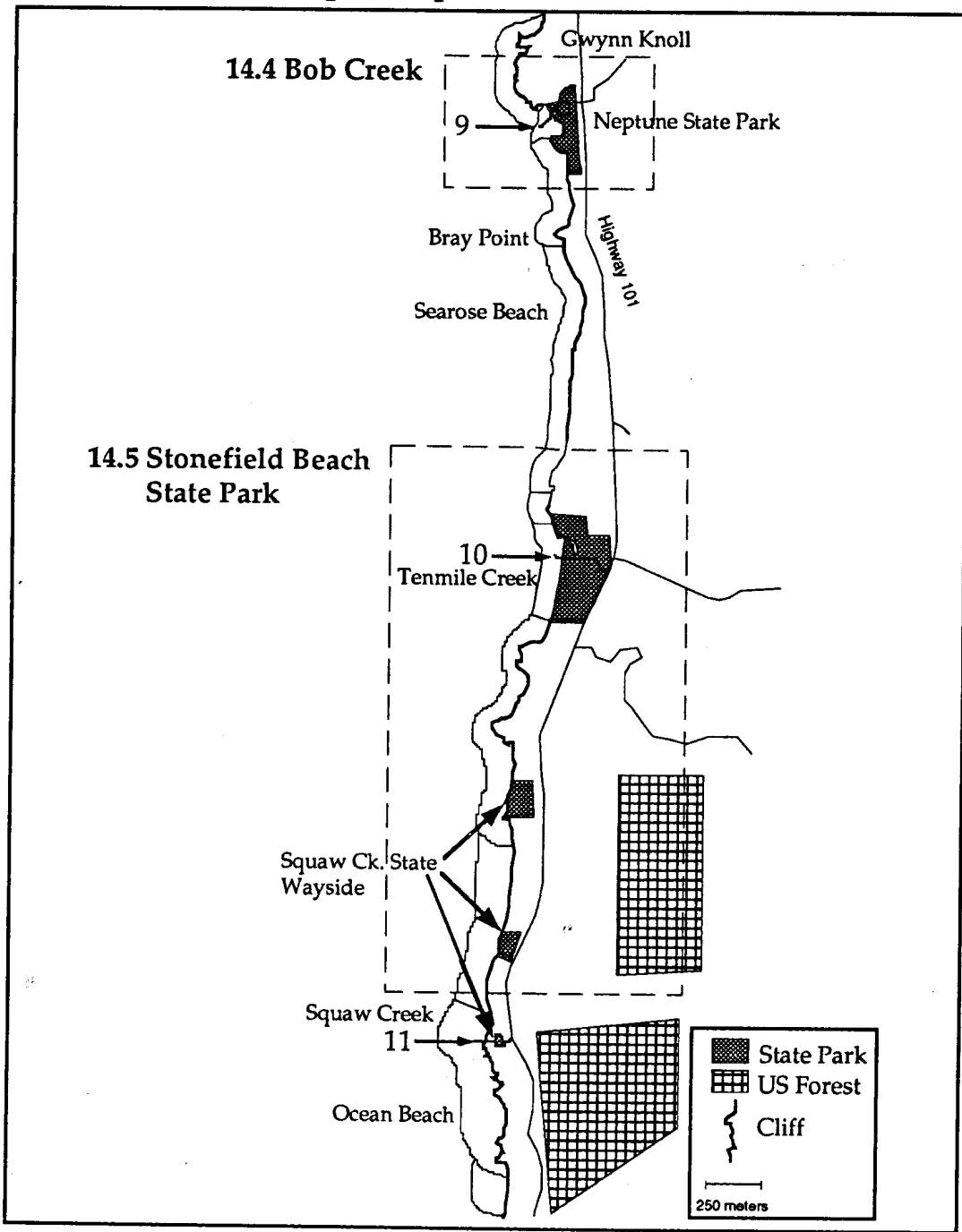


ID No.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/ Difficulty*	Trail Length (ft)
1	Devils Churn		30	paved/steps/E	765
2	Cape Perpetua Scenic Area	150,000+	7	paved/E	500
3	Cooks Chasm view trail		10	paved/M	438
4	Captain Cook turnout		5	primitive/M	125
5	Gwynn Creek		10	paved/E	150
6	Neptune State Park	452,000+	15	paved/E	200
7	Highway turnout		U	primitive/D	100
8	Strawberry Hill Wayside		10	primitive/M	150

* (E = easy M = moderate D = difficult) U = unknown
 † Combined count for Access points 2 and 3 and Access points 6 and 9 (Fig. 3.14.b).

Figure 3.14a. Upland characteristics for the northern Cape Perpetua Cell.

Cape Perpetua Cell (south)

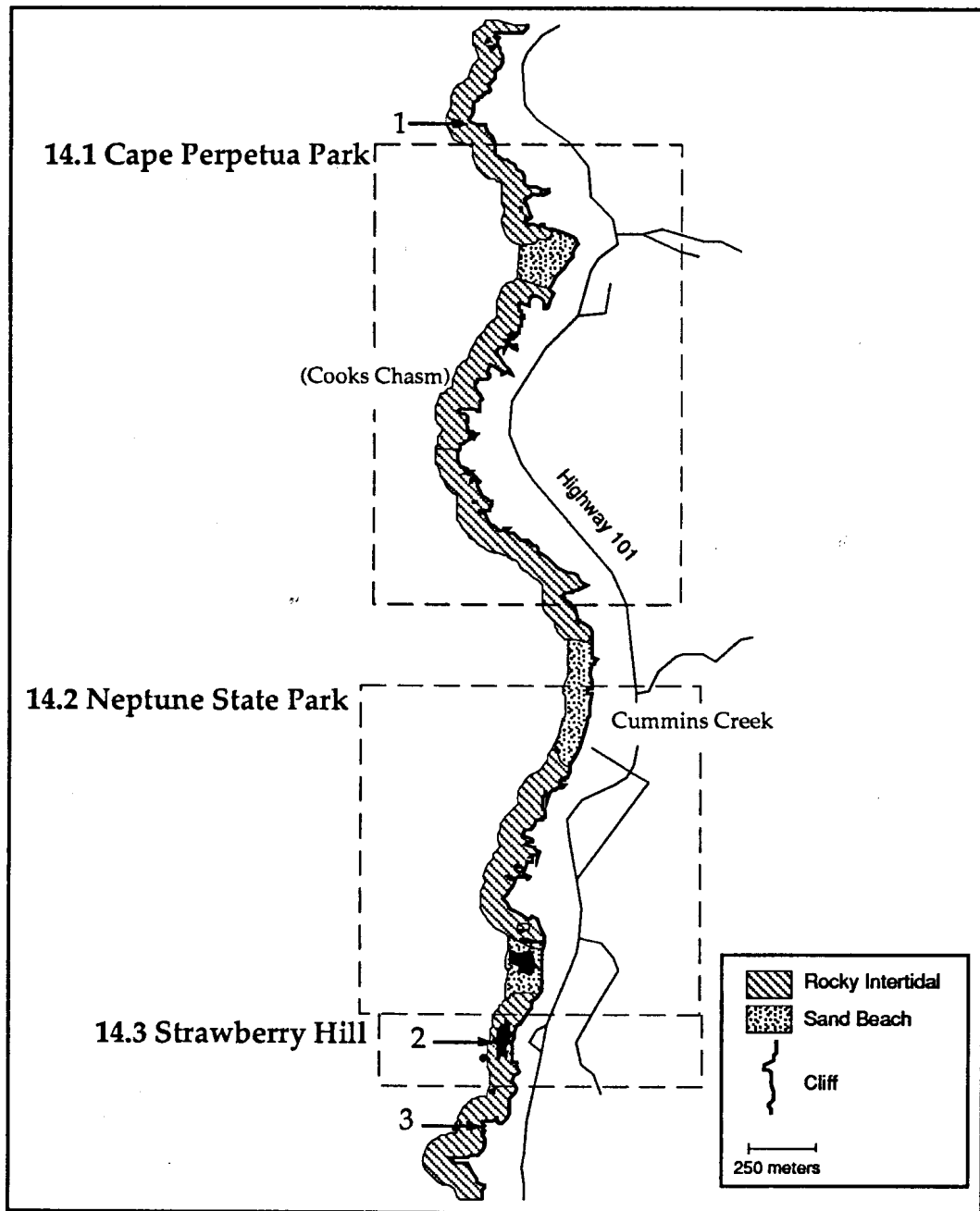


ID No.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/ Difficulty*	Trail Length (ft)
9	Bob Creek		7	primitive/E	400
10	Stonefield Beach Park	145,000	30	beach/E	925
11	Squaw Creek		5	primitive/M	200

* (E = easy M = moderate D = difficult) U = unknown

Figure 3.14b. Upland characteristics for the southern Cape Perpetua Cell.

Cape Perpetua Cell (north)

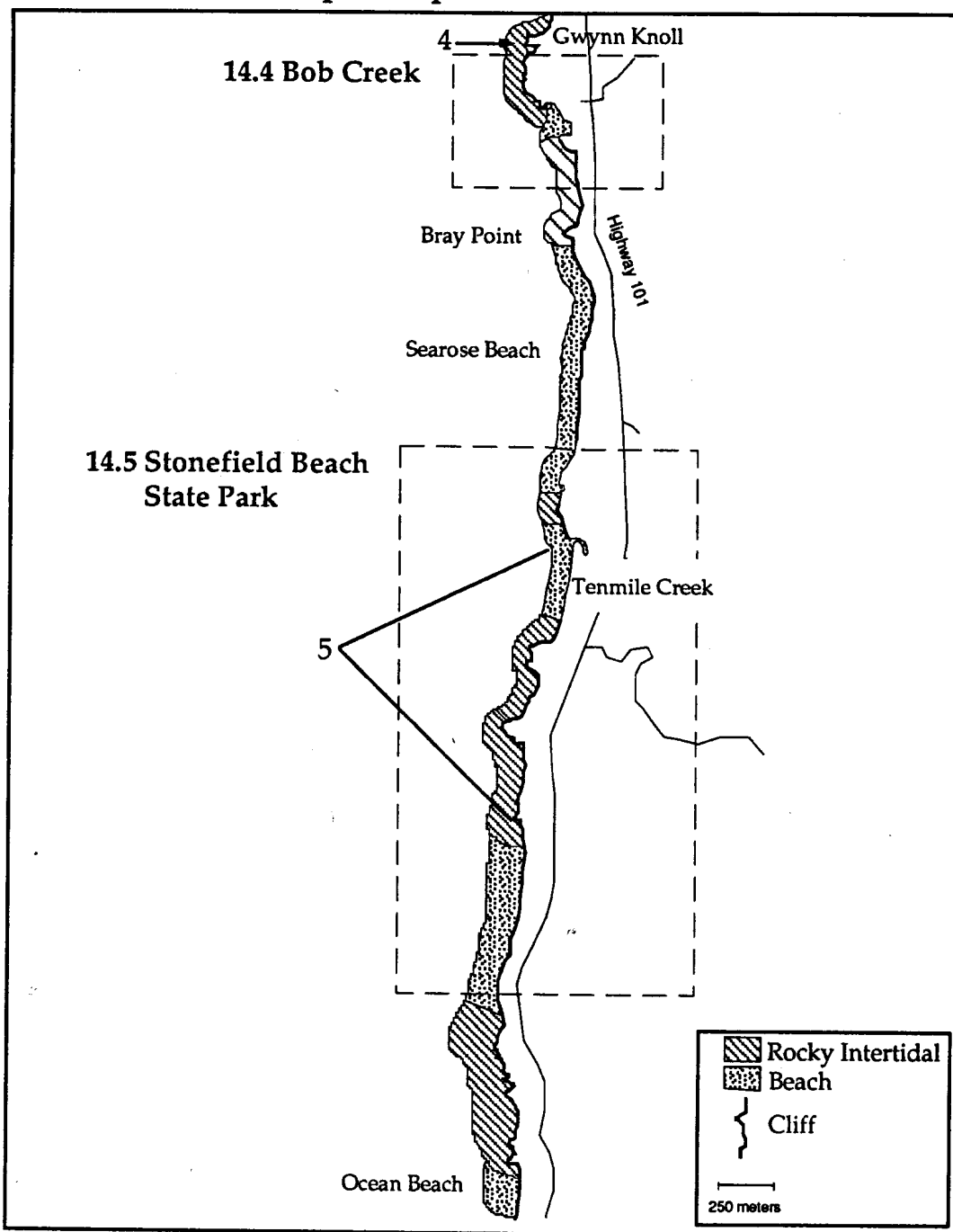


ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
1	Seabird	1 medium	Cliff	Yes	
2	Harbor Seal	1 small	Rocks	Yes	Foot
3	Harbor Seal	1 small	Rocks, Platform	Yes	Foot

T & E species that occur in the northern half of the cell: Peregrine Falcon, pelican

Figure 3.14c. Rocky shore natural resources for the northern Cape Perpetua Cell.

Cape Perpetua Cell (south)



ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
4	Seabird	1 small	Cliff	Yes	
5	Harbor Seal	1 small	Beach	Yes	
5	Seabird	1 small	Cliff	Yes	Foot

T & E species that occur in the southern half of the cell: None

Figure 3.14d. Rocky shore natural resources for the southern Cape Perpetua Cell.

CELL 15: HECETA HEAD

The Heceta Head cell encompasses an area of two major basalt headlands, Heceta Head and Sea Lion Point. It consists of high forested coastal cliffs, upland meadows, small narrow embayments, nearshore stacks and islands, and numerous caves of various sizes. There are two sites within this cell: 15.1 Devil's Elbow and 15.2 Sea Lion Point (Figure 3.15a). Most of the access to the shoreline is at Devil's Elbow State Park. The park has picnicking and restroom facilities, and provides access to the scenic Heceta Head Lighthouse. A very steep, rough trail near the Highway 101 tunnel provides access to Cape Cove. The popular tourist attraction at Sea Lion Caves provides parking, a gift shop, and access to both scenic overlooks and to viewing areas within a large sea cave.

Rocky Shores Resources

The cliffs and associated rocks of the cell consist of very resistant basalt flows of the Eocene age (Lund 1971). A layer of terrace conglomerate and sandstone overlies the basalt and is well exposed along the edges of sea cliffs. Various caves have formed along fracture zones at the bases of cliffs. The largest cave, Sea Lion Cave, resulted from erosion of two intersecting fracture zones in the rock (Lund 1971).

Most of the intertidal area is in the form of vertical bedrock habitat at the bases of cliffs. Some narrow, undercut intertidal ledges, and steeply sloping benches exist around the cliffs and associated rocks and stacks. The rocky intertidal habitat is typical of other highly exposed cliff faces, supporting the characteristic mussel/*Pisaster* community. Numerous green and aggregating anemones exist in the areas that appear to be subject to sand scour.

The cliffs and nearshore rocks support numerous seabird nesting colonies and a large sea lion haulout (Figure 3.15b). The largest colonies are on Conical Rock and adjacent cliffs, Parrot Rock, Sea Lion Point, and Cox Rock. Brandt's cormorant is the dominant nesting seabird at all of these colonies. This series of colonies includes the largest mainland breeding colony of Brandt's cormorant in the world

(USFWS 1988). Other nesting seabirds utilizing colony sites in the cell include pelagic cormorant, black oystercatcher, western gull, pigeon guillemot, tufted puffin, double crested cormorant, and rhinoceros auklet. The threatened brown pelican also uses the cell. Prior to 1986, a rock ledge connected Parrot Rock to the mainland. USFWS blasted this ledge away, resulting in a decrease in human disturbance from climbing and an increase in use by some birds, especially tufted puffins. The threatened Steller sea lion and California sea lions haul out on rocky ledges and large boulders at Sea Lion Point (Brown 1992). The Sea Lion Caves tourist facility provides one of the best areas on the coast to view Steller sea lions.

Human Use

Recreational human use within the Heceta Head cell includes: picnicking, sight seeing, beach combing, bird watching, hiking, angling, whale watching. This area is popular for its scenery at highway overlooks, and for the attraction of Sea Lion Caves (site 15.2). Devil's Elbow State Park (site 15.1) is a popular picnic area, and Heceta Head Lighthouse is one of Oregon's most popular and most photographed lighthouses. Access to the water's edge is limited to Devil's Elbow State Park. There are picnic tables, restrooms, and trails leading to the lighthouse and also through the woods along Cape Creek. Visitor day use within this area has increased steadily over past years. In 1992, State Parks recorded nearly 350,000 visitor-days at Devil's Elbow State Park (PRD 1993). The Coast Guard leases facilities at the Heceta Head lighthouse to various groups for retreats, meetings, and classes. Some of these classes focus on coastal natural history. Sea Lion Caves provides a private interpretive program that emphasizes Steller sea lions and local geology. About 250,000 people used the Sea Lion Caves facility in 1992 (Johnson, pers. com. 1993). Sea Lion Caves is also an Oregon State Parks whale watching site. Most other human use in the cell is limited to the upland areas above the cliffs. Highway 101 provides many turnouts for viewing and whale watching.

Management Authorities and Jurisdictions

ODFW - Harvest regulations (marine invertebrates and finfish)

- PRD - Owner/manager of Devil's Elbow State Park
- Co-manager of beaches with DSL
- DSL - Manager of submerged and submersible lands
- Co-manager of beaches with PRD
- ODOT - Owner of highway right-of-way (includes pull-offs from Highway 101)
- USFWS - Owner/manager of the offshore rocks (above ordinary high water) that are separated from the shore at high tide
- USCG - Manager of Heceta Head Lighthouse (US Coast Guard Reserve)
- Lane County - Planning and zoning regulations
- Sea Lion Caves - Owner of the Sea Lion Caves tourist facility
- Other Private Property Owners

Human Use Concerns and Suggested Management Approaches

- 1) Headlands and rocks at Devil's Elbow State Park and Sea Lion Point (site 15.1) - Possible disturbance to nesting birds from aircraft .
Suggested Approach: Provide information to aircraft owners and operators concerning the need to minimize disturbance. The disturbances should be studied and

management measures developed that are designed to address site specific concerns.

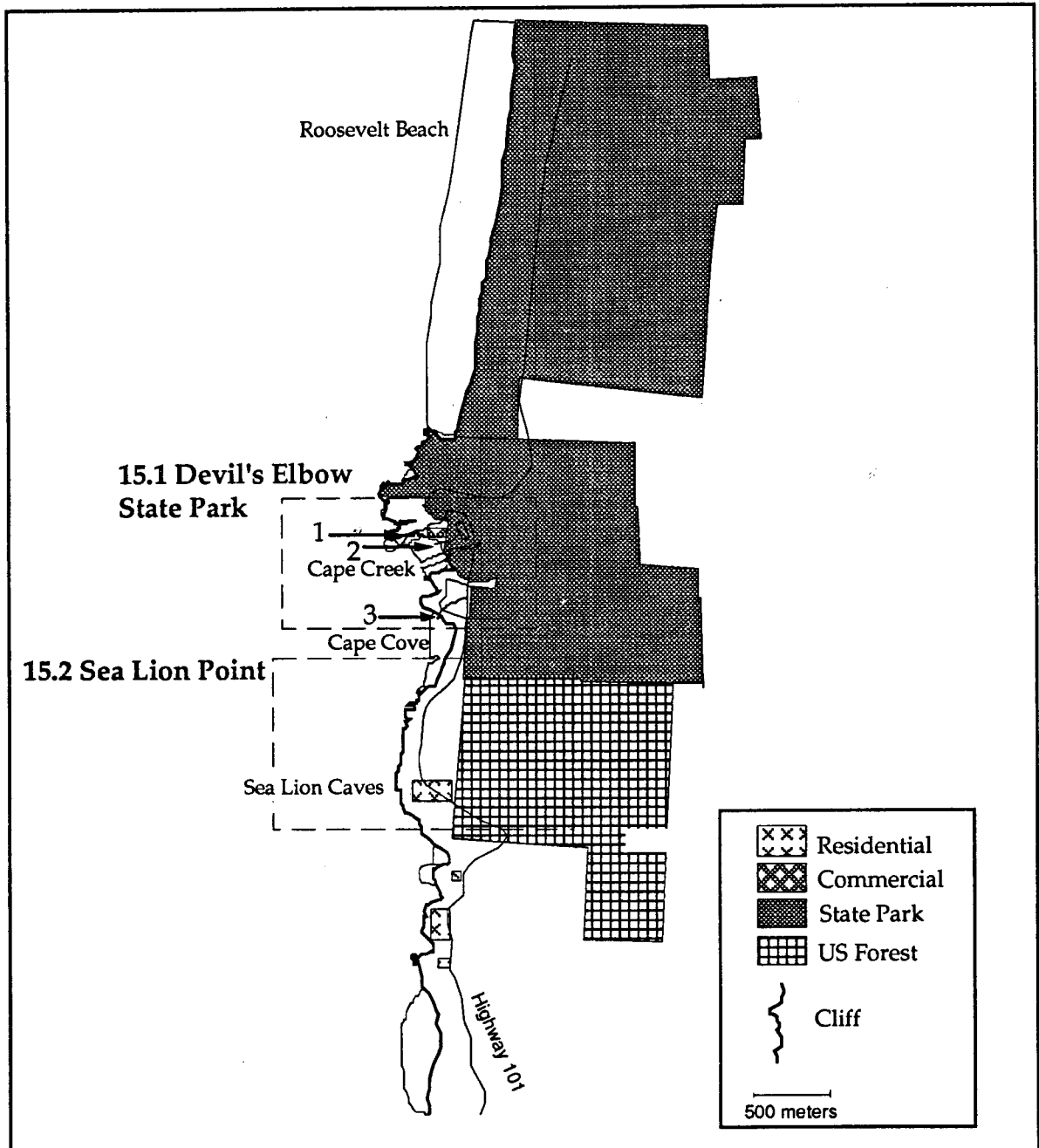
- 2) Devil's Elbow State Park and Heceta Head Lighthouse (site 15.1) - Possible disturbance to nesting birds from foot traffic around and above the cliffs.

Suggested Approach: Post signs at key points to discourage access and warn people of potential impacts to sea birds. Close the informal trails leading to the seabird colony sites. The disturbances should be studied and additional management measures developed that are designed to address site specific concerns.

Additional Opportunities

The number of people visiting the areas within this cell creates an opportunity for interpretive programs informing people about the natural resources of the area. The existing commercial facility at Sea Lion Caves provides interpretive information about the geology and marine life. Volunteer staffing at Devil's Elbow State Park would provide the opportunity for controlled tours and education on the marine and upland ecosystems and history of this area.

Heceta Head Cell



ID No.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/Trail Difficulty*	Length (ft)
1	Heceta Head lighthouse			gravel/E	1760
2	Devil's Elbow State Park	346,000†	25†	beach/E	300
3	Cape Cove		2	primitive/D	1320

* (E = easy M = moderate D = difficult) U = unknown
 †Combined count for Access points 1 and 2.

Figure 3.15a. Upland characteristics for the Heceta Head Cell.

Heceta Head Cell

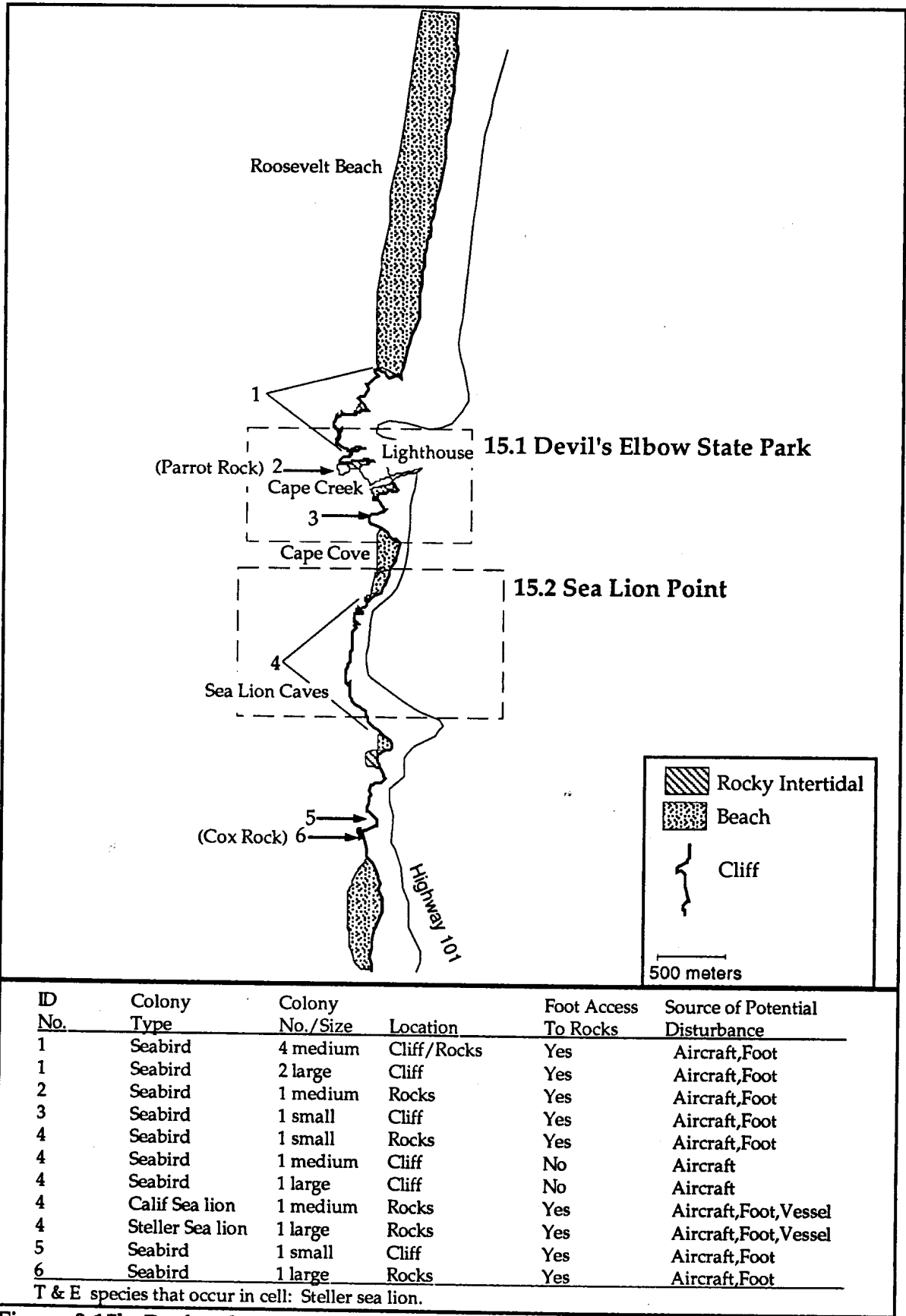


Figure 3.15b. Rocky shore natural resources for the Heceta Head Cell.

CELL 16: CAPE ARAGO

Cape Arago is located just south of the mouth of Coos Bay and forms the only major rocky shoreline between Heceta Head, 55 miles to the north, and Cape Blanco, 32 miles to the south. The cell includes five rocky shore sites: 16.1 Gregory Point/Squaw Island, 16.2 Sunset Bay, 16.3 Shore Acres, 16.4 North Cove, and 16.5 Middle and South Coves. Shore features in this area include steep cliffs, numerous offshore rocks, extensive rocky intertidal and subtidal reefs, and small sand beaches. Oregon State Parks manages most shore and landward portions of the cape, with several day-use areas, a public botanical garden, a portion of the Pacific Coast Trail, and seasonal camping facilities at Sunset Bay State Park. Rocky shore areas in the northern half of the cell are accessible from several parking lots and maintained foot trails (Figure 3.16a). North of Sunset Bay State Park, Gregory Point is managed by US BLM and is the site of housing facilities for USCG personnel. Private residential development with limited public beach access extends north from Gregory Point to Yoakum Point. With the exception of Sacchi Beach, the rocky shoreline in the southern half of the cell is inaccessible (Figure 3.16b).

Rocky Shores Resources

Cape Arago is comprised primarily of Eocene tuffaceous sandstone and siltstone of the Coaledo Formation, with minor strata of pebble conglomerates, shale, and coal (Baldwin 1976). The combination of strata orientation and differential erosion have resulted in a variety of habitat types. Low slope platforms with numerous cracks and small surge channels are common features of Sunset Bay (site 16.2), South Cove (site 16.5), and portions of North Cove (site 16.4). Moderate to steeply sloped platforms with deep surge channels predominate at Middle Cove (site 16.5), Simpson Reef (site 16.4), North Cove, Squaw Island (site 16.1), and Yoakum Point. Near vertical cliffs form the major habitat of Lighthouse Island, Shore Acres, and much of the shoreline south of South Cove. The sandstone is relatively soft and detached fragments survive as boulders and cobbles only in areas with some protection from wave action. These areas include the northwest corner of

South Cove, North Cove inshore of Shell Island, inside small coves along Shore Acres, the south side of Sunset Bay, and the channel between Lighthouse Island and Gregory Point. Shell Island in North Cove, composed primarily of shell fragments, is a unique intertidal landform in Oregon.

The wide variety of habitat types has resulted in a very diverse intertidal community. The outer, exposed rock faces have California mussel, gooseneck barnacle, sea palm (*Postelsia*), and Laminaria algal communities typical of high-energy environments. More protected areas with a variety of platform, surge channel, boulder and cobble habitats have rich communities of intertidal organisms. Of particular note are the high densities of intertidal and subtidal purple sea urchins. Cape Arago is the southernmost site in Oregon where this species can be found in such concentrations. Also of note is the high diversity and abundance of algal species in North Cove where the variety of habitat types and protection provided by Simpson Reef has allowed this community to flourish. Moving sand is a major environmental factor in some habitats, particularly inside Sunset Bay and parts of South and North coves where periodic sand burial creates communities of low diversity. Another factor which may influence diversity in South Cove is the high number of human visitors, resulting in trampling and overturning of rocks while visiting the site (Brosnan and Crumrine 1992).

Subtidal kelp beds are extensive off of much of the shoreline. Simpson Reef is the only site in Oregon where significant beds of giant kelp, *Macrocystis integrifolia*, can be found. In most years, bull kelp (*Nereocystis luetkeana*) beds are found in most inshore areas. Kelp Beds off Cape Arago accounted for about 4% of Oregon's total subtidal kelp bed area in a 1990 survey (Ecoscan 1991). The subtidal reefs associated with the kelp beds support a significant commercial fishery for red and purple sea urchins.

The cliffs and offshore rocks and islands provide habitat for numerous seabird colonies and pinniped haulouts (Figures 3.16c and 3.16d). The largest seabird colony in the cell occurs on Lighthouse Island (site 16.2a). Seabird numbers on the island exceeded 1,200 in a 1988 survey (USFWS 1991). The principal nesting species

include western gull, pigeon guillemot, and Brandt's, pelagic, and double-crested cormorants. The endangered brown pelican also use this island as a roosting site. Smaller colonies of seabirds use Squaw Island and inaccessible cliffs and small islands south of Sunset Bay. Principal nesting species in these colonies include pelagic cormorant, western gull, and pigeon guillemot (USFWS 1988). The endangered peregrine falcon has also been noted in the cell (Lowe, pers. com. 1993).

Four species of pinnipeds use the rocky shores of Cape Arago (Brown 1993). Shell Island and the rocks of Simpson Reef are important haulout sites for harbor seals, California sea lions, and Steller sea lions use (Figure 3.16c). These sites represent the largest outer coast haulouts for harbor seals and California sea lions in the state. Harbor seals also use rocks near Squaw Island and South Cove as haulouts. A small population of elephant seals uses Shell Island as a haulout and for the first time in 1993, as a pupping site. The Oregon Ocean Plan lists Shell Island and Simpson Reef as especially sensitive bird and mammal habitat (Oregon Ocean Resources Management Task Force 1991). A single sea otter was documented at Cape Arago in 1992 (Puchy and Marshall 1993) and sightings have been reported in 1993. This animal is believed to be a transient from the Washington population and not a survivor of a 1970-71 reintroduction attempt in Oregon waters. Inshore rocky intertidal areas are occasionally used by raccoons, mink, and scavenging black bears (Peter Perrin, ODFW, pers. com.).

Human Use

The varied scenic attractions and recreation opportunities at Cape Arago draw large numbers of visitors, both locally and from out of town. Total visitor counts for the three state parks combined exceeded 1.5 million visitor-days in 1992 (PRD 1993). The most frequent uses of the rocky shores include sight seeing, marine mammal and bird watching, tide pooling by small and large organized groups, beach combing, angling, scuba diving, surfing, and swimming (in Sunset Bay). Less common activities include sea kayaking, small-scale personal harvest of edible seaweeds and invertebrates, and various research projects by students and faculty of the Oregon Institute of

Marine Biology. The entire shoreline from Gregory Point to South Cove is an ODFW scientific/educational collection permit area. A commercial fishery for red and purple sea urchins occurs in most nearshore areas of Cape Arago, primarily during summer months. All nearshore areas are regularly fished by both private and charter vessels out of Coos Bay and by small craft launched in Sunset Bay. There are full-hookup camping facilities at Sunset Bay and nearby Bastendorff Beach County Park. Cape Arago receives year-round use from the nearby communities of Coos Bay and North Bend, which have a combined population of about 35,000.

Several interpretive and educational programs are currently in place at Cape Arago. Shoreline Education for Awareness is a non-profit education organization based in Bandon, Oregon, that provides interpretive programs on intertidal biology, marine mammals and seabirds at Simpson Reef/North Cove overlook each Sunday from June through August. During summer, graduate students from the University of Oregon's Institute of Marine Biology (OIMB), in Charleston, provides similar interpretive services each Saturday at Simpson Reef overlook. This program is coordinated through the Coos Bay Chamber of Commerce and the local chapter of the Audubon Society. OIMB offers year-round course work in invertebrate zoology, marine ecology and algae, and uses intertidal areas at Cape Arago for instruction. Shore Acres State Park is an Oregon State Parks whale watching site.

Management Authorities and Jurisdictions

- ODFW - Harvest regulations (marine invertebrates and finfish)
- Education/Research collection permit (Gregory Point to South Cove)
- PRD - Owner/manager of State Park property, including Cape Arago State Park, Shore Acres State Park, Sunset Bay State Park, Yoakum Point State Wayside
- Co-manager of beaches with DSL
- DSL - Manager of submerged and submersible lands
- Co-manager of beaches with PRD
- Manager of kelp harvest leases
- ODOT - Owner of highway right-of-way (includes pull-offs from Highway 101)

- USFWS - Owner/manager of the offshore rocks (above ordinary high water) that are separated from the shore at high tide
- BLM - Owner of Gregory Point and co-manager of housing facilities with USCG.
- USCG - Manager of Cape Arago Lighthouse on Lighthouse Island and co-manager (with US BLM) of housing facilities on Gregory Point
- Coos County - Planning and zoning regulations
- Private Property Owners

Human Use Concerns and Suggested Management Approaches

- 1) Sunset Bay (site 16.2) and South Cove (site 16.5) - Possible overuse of rocky intertidal areas.
Suggested Approach: Use interpretive signs and volunteers to educate the public about appropriate intertidal etiquette. These areas may need more intensive management such as interpretive guides for groups, use restrictions, and rotational closures.
- 2) North Cove and Simpson Reef (site 16.4) - Disturbance of pinnipeds on haulout rocks (both foot and vessel access).
Suggested Approach: Continue the current strategy of closing the beach access trail at North Cove during the March through June pupping season. Continue interpretive program at Simpson Reef overlook during summer months. Use interpretive signs at beach access trails, boat launch ramps and sea kayak launch sites to educate the public about disturbance to pinnipeds. The disturbances should be studied and additional management measures developed. It may be necessary to establish

marine vessel exclusion zones at sensitive haulout sites during pupping season.

- 3) Lighthouse Island (site 16.1) - Potential future disturbance to bird nesting colonies that may result from future development plans.

Suggested Approach: Proposed development plans for Gregory Point include a natural history and Native American cultural interpretive center and public access to the lighthouse on Lighthouse Island. Development of this site should not include improved public access to intertidal or bird nesting areas. Proposed interpretive programs should emphasize the biologically sensitive nature of this site.

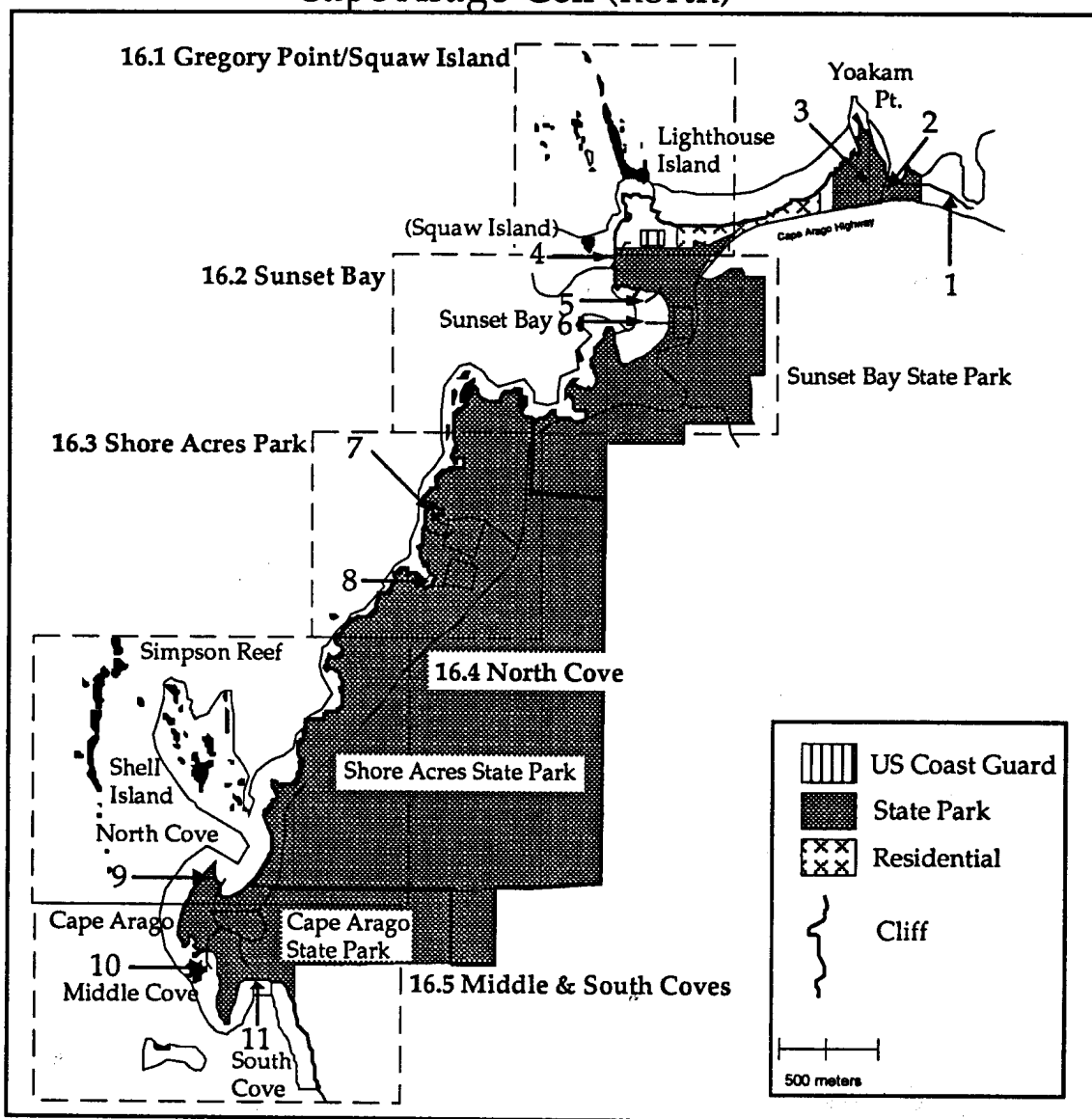
- 4) Squaw Island (site 16.1) - Possible disturbance to bird nesting sites.

Suggested Approach: Use interpretive signs at access trails to discourage human disturbance during nesting season.

Additional Opportunities

Current educational and interpretive programs provide a valuable service and should be encouraged to continue in marine garden areas. Additional opportunities exist for placement of interpretive signs at sites where visitor use of intertidal areas is high, particularly South Cove, North Cove, and Sunset Bay. State Park managers have noted high use of some intertidal sites by large, organized groups such as school groups. Instructors of these groups should be encouraged to attend interpretive workshops for school instructors. The high level of public use and potential for shoreline impacts at Cape Arago provides sufficient justification for seeking funds to staff a park naturalist at Cape Arago's state parks.

Cape Arago Cell (north)

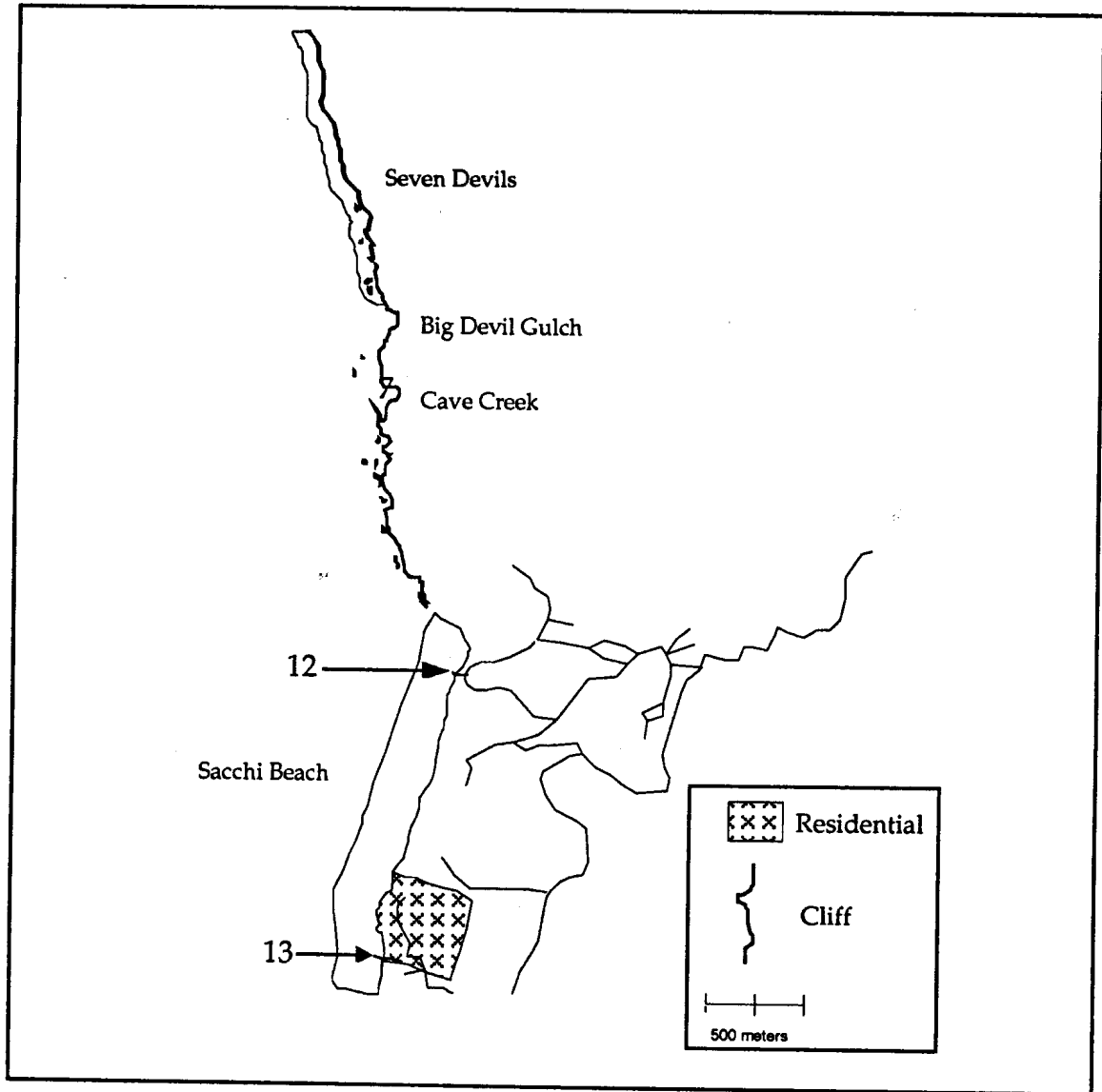


ID No.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/ Difficulty*	Trail Length (ft)
1	Bastendorff Beach			beach/E	U
2	N. Yoakum Point		6	primitive/D	U
3	S. Yoakum Point		4	primitive/D	750
4	Squaw Island		10	primitive/M	U
5	Boat Ramp	839,000 [†]	100 [†]	beach/E	250
6	Sunset Bay			beach/E	250
7	Shore Acres Park	410,000 [†]	100 [†]	paved/E	500
8	Botanical Gardens			paved/E	1000
9	North Cove	329,000 [†]	100 [†]	paved/M	800
10	Middle Cove			U	500
11	South Cove			paved/M	360

* (E = easy M = moderate D = difficult) U = unknown
[†] Combined count for Accesses 5 and 6; 7 and 8; 9, 10 and 11

Figure 3.16a. Rocky shore upland characteristics for the northern Cape Arago Cell.

Cape Arago Cell (south)

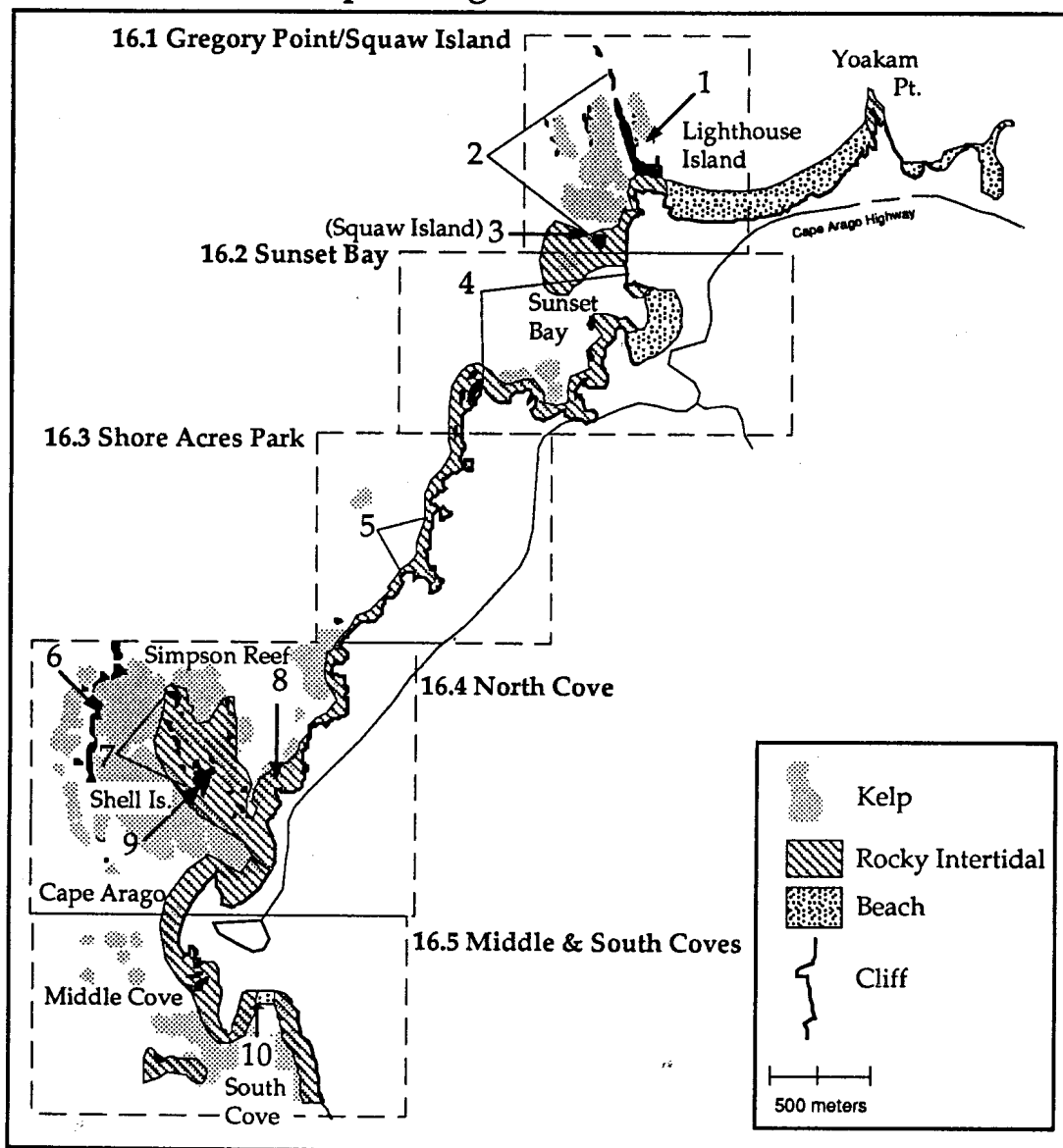


ID No.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/ Difficulty*	Trail Length (ft)
12	N. Sacchi Beach		U	beach/E	100
13	S. Sacchi Beach		6	gravel/E	1300

* (E = easy M = moderate D = difficult) U = unknown

Figure 3.16b. Rocky shore upland characteristics for the southern Cape Arago Cell.

Cape Arago Cell (north)

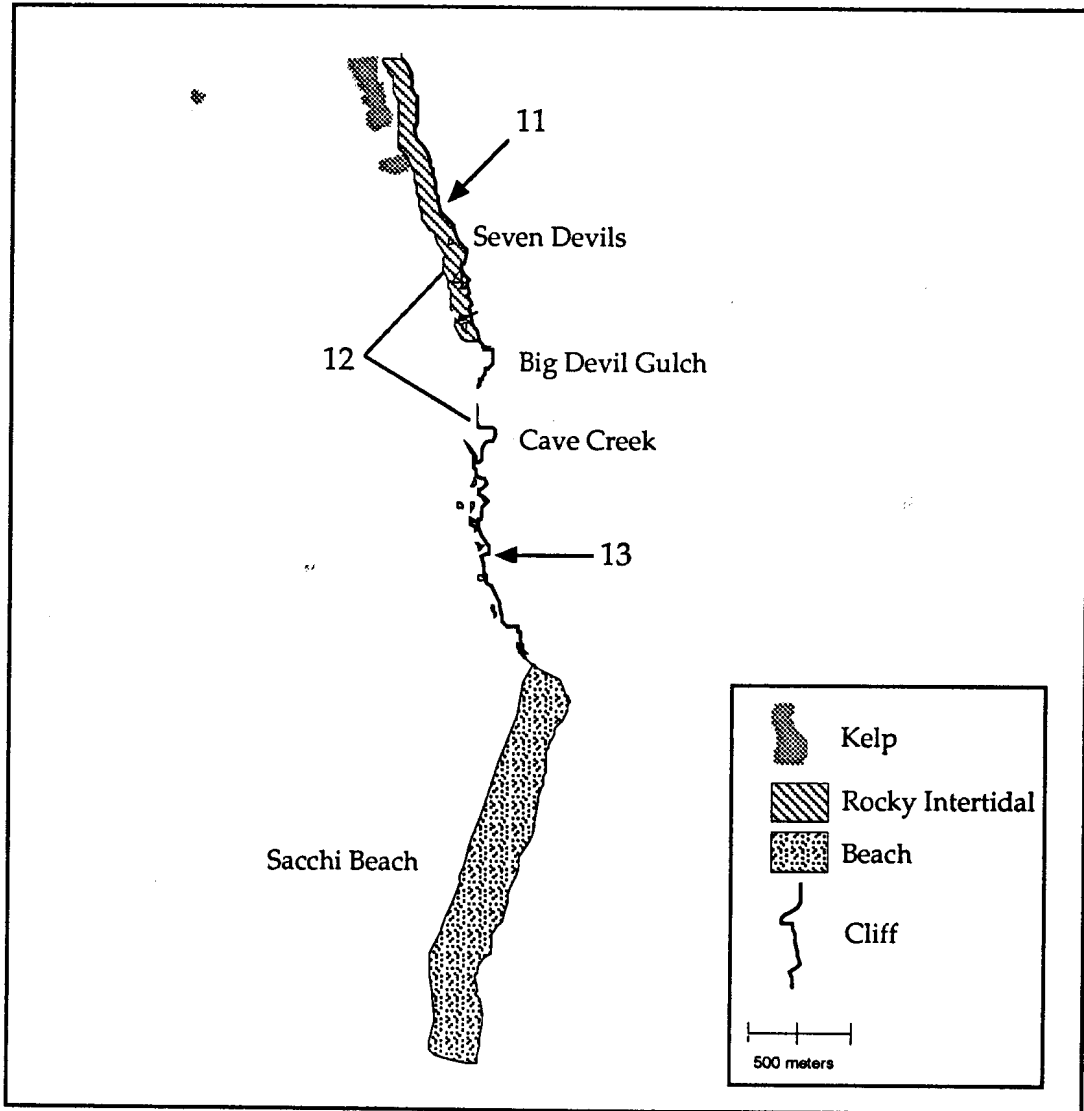


ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
1	Seabird	1 large	Rocks	Yes	Foot,Vessel,Aircraft
2	Seabird	3 small	Rocks/Cliff	Yes	
3	Harbor Seal	1 small	Rocks	Yes	
4	Seabird	4 small	Rocks	Yes	Foot,Vessel
5	Seabird	2 small	Cliff	Yes	
6	Calif.& Steller Sea Lions	2 small	Reef	No	Vessel,Aircraft
6	Harbor Seal	1 large	Reef	No	Vessel,Aircraft
7	Seabird	2 small	Rocks	Yes	
8	Seabird	1 small	Cliff	Yes	
9	Harbor Seal	1 large	Rocks	Yes	Foot,Vessel,Aircraft
9	Elephant Seal	1 small	Rocks	Yes	Foot,Vessel,Aircraft
9	Calif. Sea Lion	1 x-large	Rocks	Yes	Foot,Vessel,Aircraft
9	Steller Sea Lion	1 medium	Rocks	Yes	Foot,Vessel,Aircraft
10	Seabird	1 small	Rocks	Yes	

T & E species that occur in the northern half of the cell: Brown pelican, Aleutian Canada goose, Steller sea lion.

Figure 3.16c. Rocky shore natural resources for the northern Cape Arago Cell.

Cape Arago Cell (south)



ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
11	Seabird	1 medium	Cliff		
12	Seabird	2 small	Cliff		
13	Seabird	1 medium	Cliff		

T & E species that occur in the southern half of the cell: brown pelican, peregrine falcon, Steller sea lion

Figure 3.16d. Rocky shore natural resources for the southern Cape Arago Cell.

CELL 17: FIVE MILE POINT

The Five Mile Point cell consists of a rocky point south of Cape Arago (Figure 3.17a). The site has the only rocky intertidal habitat between Cape Arago and Bandon. Shoreline features include small rocky intertidal areas composed of low to high-relief platform, several low-elevation nearshore rocks, and sand beach. Five Mile Point is one half mile north of a public access road at Whiskey Run Beach. Shoreland development includes a wind-power generating facility.

Rocky Shores Resources

Five Mile Point is formed of the same Eocene sandstone found to the north at Cape Arago (Allen and Baldwin 1944). Folded strata dipping to the east characterize this formation. Erosion of these strata has formed low to moderately sloping platforms interspersed with numerous cracks and deep surge channels.

Rocky intertidal habitat consists of boulders or small platforms adjacent to sand beach. Moving sand scours the low areas and fills most surge channels and tidepools. Sand scoured areas display a relatively low diversity of invertebrate and algal species. Some portions of Five Mile Point less subject to scour include semi-protected surge channels and rocky habitat in the lee of offshore rocks. These areas have moderate to high diversity of both invertebrates and algae. This site is notable for the very dense aggregations of green anemones, aggregating anemones, tube worms and California mussels.

Several nearshore, inaccessible rocks at Five Mile Point provide roosting sites for seabirds. Osprey also use the area. Seabirds are not

known to nest on the rocks. A small group of harbor seals haul out on rocky platforms at the point (Brown 1993).

Human Use

Five Mile Point receives light use, primarily by people using vehicles to gain beach access. Activities include beach combing, tide pooling, bird watching and small-scale mussel harvest. Whiskey Run Beach, south of the point, is a popular site for digging razor clams. The brush-covered terrace east of Five Mile Point is the site of a private wind-power generating facility with 18 wind turbines in operation.

Management Authorities and Jurisdictions

- ODFW - Harvest regulations (marine invertebrates and finfish)
- PRD - Co-manager of beaches with DSL
- DSL - Manager of submerged and submersible lands
- Co-manager of beaches with PRD
- USFWS - Owner/manager of the offshore rocks (above ordinary high water) that are separated from the shore at high tide
- Coos County - Planning and zoning regulations
- Private Property Owners

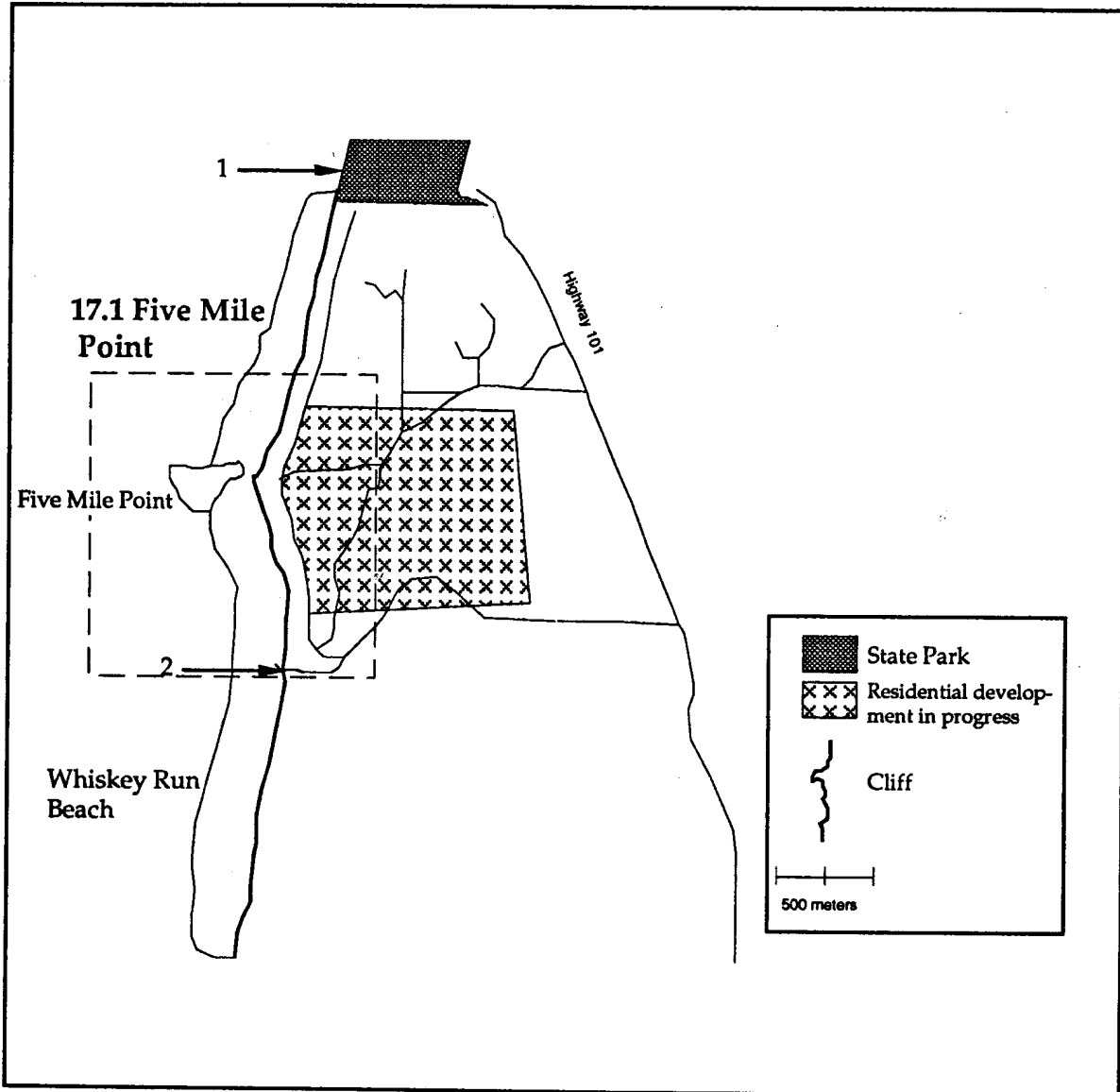
Human Use Concerns and Possible Solutions

There are currently no human use concerns identified for this cell.

Additional Opportunities

Human use and impacts on rocky shore areas are low and, at this time, there is little need for interpretive signs or programs.

Five Mile Point Cell

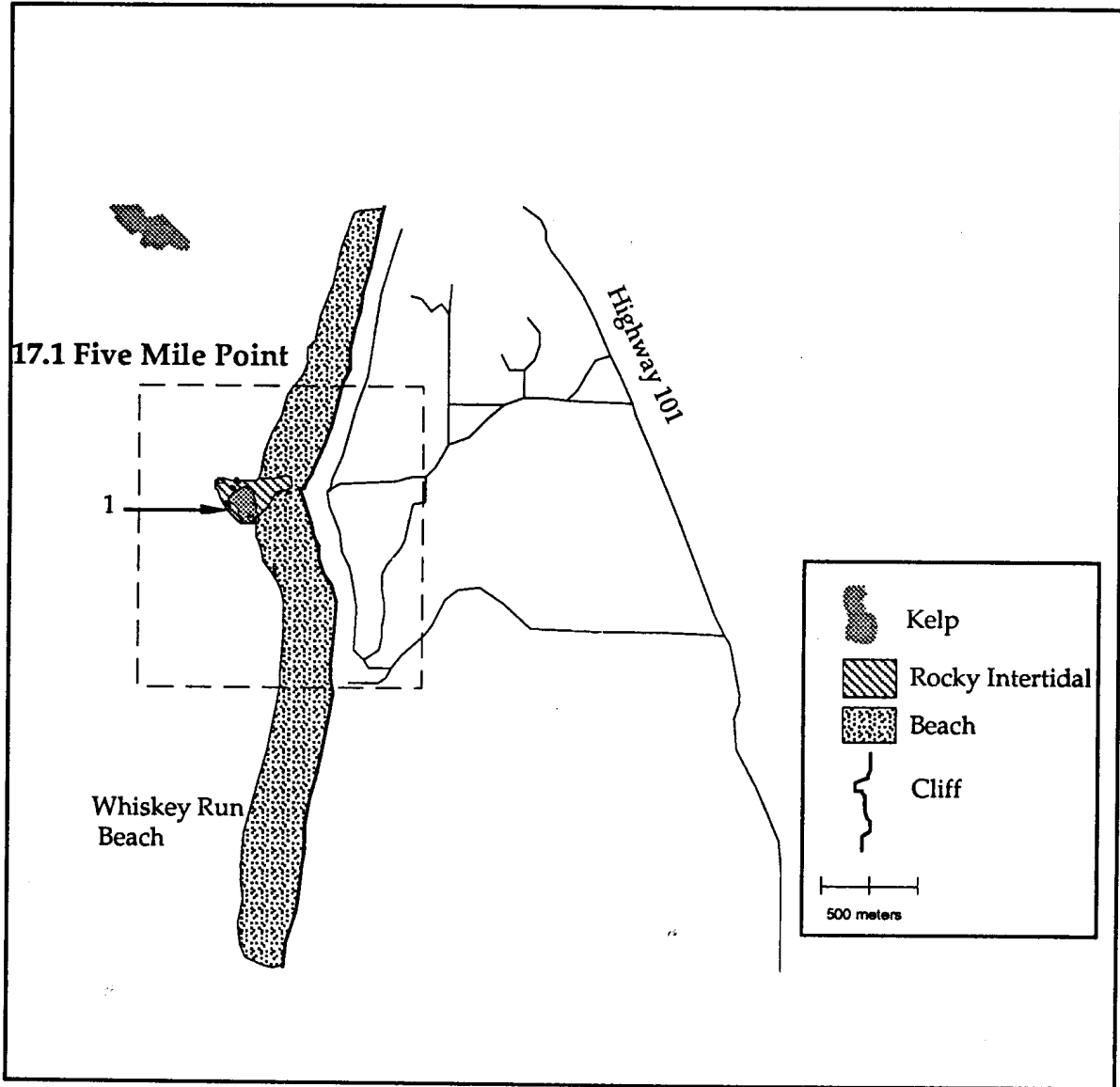


ID No.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/Trail Difficulty*	Length (ft)
1	Seven Devil's Wayside	79,000	100	beach/E	1320
2	Whiskey Run Beach		20	beach/E	1320

* (E = easy M = moderate D = difficult) U = unknown

Figure 3.17a. Upland characteristics for the Five Mile Point Cell.

Five Mile Point Cell



ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
1	Harbor Seal	1 small	Rocks	No	none

T & E species that occur in cell: none.

Figure 3.17b. Rocky shore natural resources for the Five Mile Point Cell.

CELL 18: COQUILLE POINT

The Coquille Point cell is adjacent to the city of Bandon and contains two rocky shore sites: 18.1 Coquille Point and Rocks and 18.2 Haystack Rock. Shoreline features include several small rocky intertidal areas, numerous low-elevation offshore rocks, several nearshore high-elevation rocks, sand beach, and the Coquille River estuary and ocean jetty. All the rocky intertidal areas are easily accessed by short trails from several state-owned waysides (Figure 3.18a). Land ownership adjacent to state waysides is mostly private, with both single-family residential and tourist-oriented commercial development. The offshore islands and Masonic Viewpoint at Coquille Point are managed by USFWS as part of the Oregon Islands National Wildlife Refuge.

Rocky Shores Resources

The rocky points and numerous offshore rocks at these sites are resistant rock types of the Otter Point Formation (Baldwin 1976). These include hard sandstone, siltstone, conglomerate, and various metamorphic rock types.

The predominant intertidal habitat type is low to high-slope platform with sand and cobble-filled surge channels. The exposed nature and presence of moving sand at these sites has formed an intertidal community of moderate diversity and high abundance for species adapted to periodic sand burial. High-slope rock faces are covered with thick beds of California mussels and gooseneck barnacles, while rocks with high exposure to sand are dominated by aggregating anemones, other barnacles, piddock clams, and a lush growth of several algal species. In most years, patches of bull kelp (*Nereocystis leutkeana*) are found around many of the rocks off Coquille Point.

The offshore rocks support several seabird colonies. The most notable in site 18.1 are Table Rock and other rocks off Coquille Point, and Cat and Kittens Rock and Face Rock off Grave Point (Figure 3.18b). In total, these rocks support over 30,000 birds (USFWS 1988). The principal nesting species include common murre, western gull, and Brandt's and pelagic cormorant. Haystack Rock in site 18.2 supports almost 800

birds, primarily western gull and pelagic cormorant (USFWS 1988). The endangered Aleutian Canada goose uses Table, Face, and Haystack Rocks. For many of these birds, these rocks are the last landfall before continuing their migration to Alaska (Lowe, pers. com. 1993). The endangered peregrine falcon uses Face Rock (Lowe, pers. com. 1993). The Oregon Ocean Plan lists North Coquille Point Rock, Cat and Kittens Rocks, and Face Rock as especially sensitive bird and mammal habitats (Oregon Ocean Resources Management Task Force 1991). Other rocks throughout the cell support numerous small seabird colonies that are used primarily by western gull, pigeon guillemot, black oystercatcher, and pelagic cormorant. Many of the rocks used for nesting are accessible during very low tides.

Harbor seals haulout on Cat and Kittens Rock and on Coquille Point. Cat and Kittens Rock is also a pupping site for harbor seals (Brown 1993).

Human Use

Rocky shores areas at Coquille Point and Haystack Rock receive relatively high use during summer by both local residents and tourists. Bandon Ocean State Wayside and Bandon State Park (Haystack Rock) have paved parking areas, day-use facilities and short beach access trails. Visitor use at Bandon Ocean State Wayside in 1992 approached 300,000 visitor-days and exceeded 360,000 visitor-days at Bandon State Park (PRD 1993). The nearshore rocks off Coquille Point are accessed by a gravel parking lot and short stairway adjacent to the most developed portion of Bandon's shorefront. Activities include sight seeing, beach combing, jogging, bird watching, angling, and small-scale personal and commercial harvest of California mussels. There is a boat basin in the Coquille River at Bandon, but the shallow, dangerous bar at the river mouth prevents small-craft from entering the ocean on all but the calmest days. Bandon has a population of about 3,000 and has focused development in recent years along oceanfront lands adjacent to rocky shore sites. Shoreline Education for Awareness, a volunteer organization based in Bandon, offers coastal interpretive and education programs at Coquille Point, Bandon Ocean Wayside, and Cape Arago. These programs are offered each weekend

during summer and upon request at other times of the year. This organization provides a valuable education service and should be supported and encouraged to continue. Bandon Ocean State Wayside is also an Oregon State Parks whale watching site.

Management Authorities and Jurisdictions

- ODFW - Harvest regulations (marine invertebrates and finfish)
- PRD - Owner/manager of state park property
 - Co-manager of beaches with DSL
- DSL - Manager of submerged and submersible lands
 - Co-manager of beaches with PRD
- USFWS - Owner/manager of Masonic Viewpoint at Coquille Point and of the offshore rocks (above ordinary high water) that are separated from the shore at high tide
- Coos County - Planning and zoning regulations
- City of Bandon - Planning and zoning regulations
- Private Property Owners

Human Use Concerns and Suggested Management Approaches

- 1) Coquille Point (site 18.1) and Haystack Rock (site 18.2) - Possible overuse of rocky intertidal areas.

Suggested Approach: Continue intertidal interpretive programs offered by Shoreline Education for Awareness. Use interpretive signs at beach access trails to educate the public about appropriate intertidal etiquette. Much of the use of these sites is by individuals walking on the sandy beach while viewing the rocky intertidal habitat on the sides of rocks. The rocky intertidal

trampling impact is most likely lower than other high-use sites.

- 2) Haystack Rock (site 18.2) and inshore rocks at Coquille Point (site 18.1) - Possible human disturbance to nesting seabirds from foot traffic.

Suggested Approach: Continue interpretive programs offered by Shoreline Education for Awareness. Signs should be posted at beach access trails that inform and remind beach users of the sensitive nature of these sites to disturbance. The disturbances should be studied and other management measures developed that are designed to address site specific concerns.

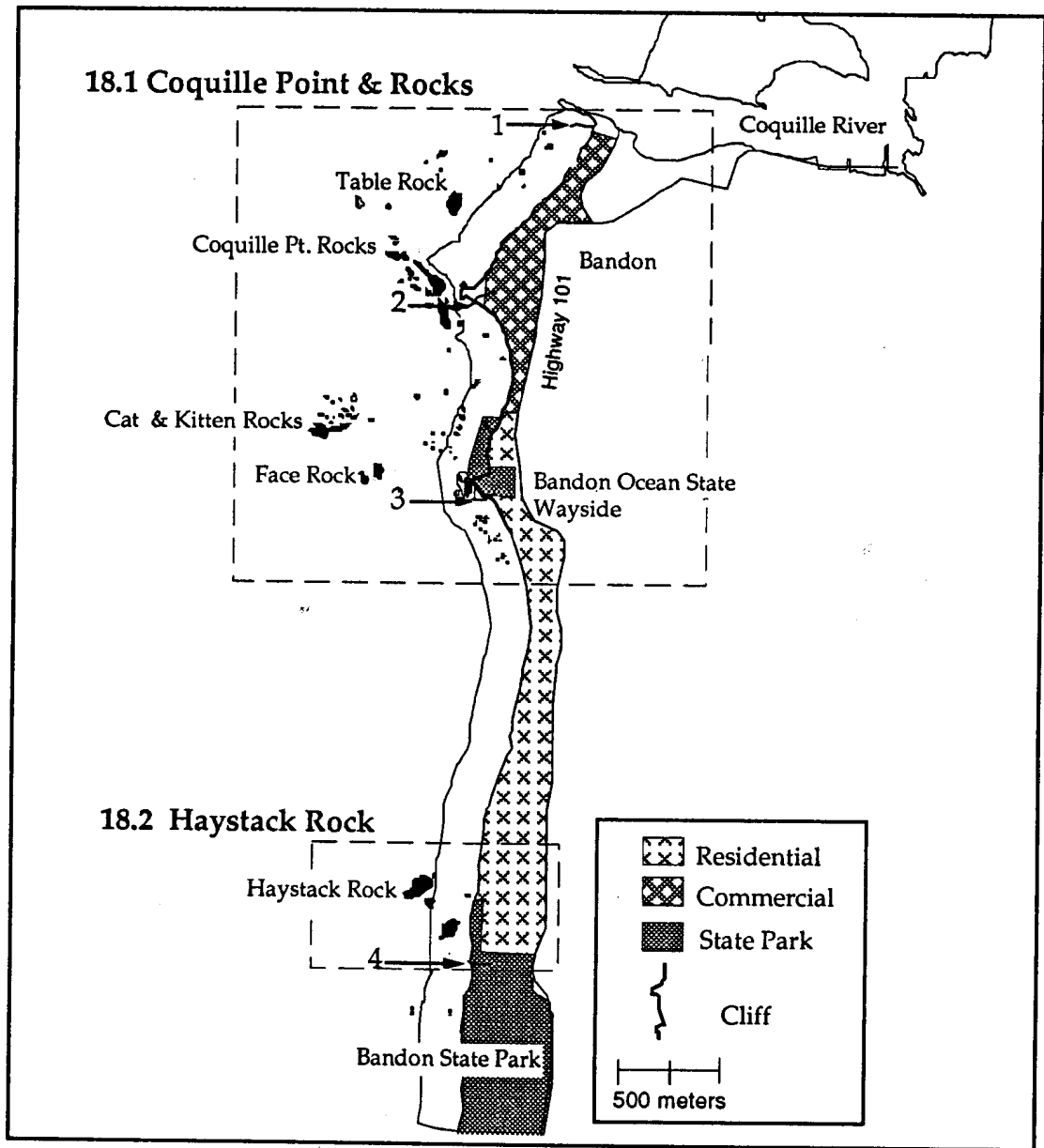
- 3) Table Rock, Face Rock, Cat and Kittens Rock, and the rocks listed in 2, above (sites 18.1 and 18.2) - Potential boat and aircraft disturbance to large seabird nesting colonies.

Suggested Approach: Provide information to vessel and aircraft owners and operators concerning the need to minimize disturbance. The disturbances should be studied and management measures developed that are designed to address site specific concerns.

Additional Opportunities

The USFWS owns lands at Masonic Viewpoint overlooking the offshore rocks and intertidal area at Coquille Point. Management plans for this site include landscaping to replant native vegetation and provide trails, scenic overlooks, and interpretive signs for marine birds and mammals and rocky intertidal areas. This work is scheduled to begin in 1993, with signs in place by 1994. Additional opportunities exist for interpretive sign placement at beach access trails at Coquille Point, Bandon Ocean State Wayside and Bandon State Park.

Coquille Point Cell

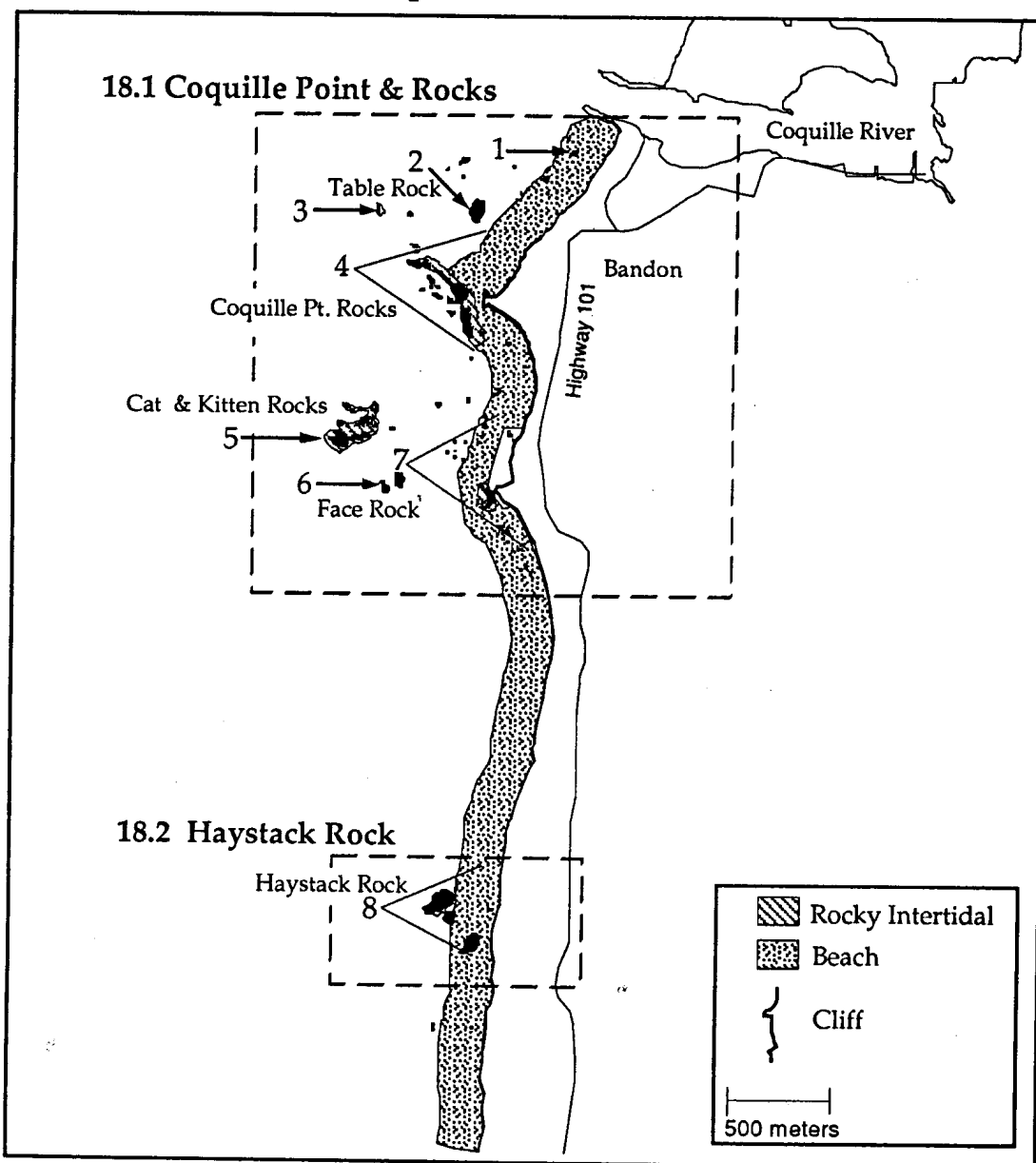


ID No.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/ Difficulty*	Trail Length (ft)
1	South Jetty access		100	beach/E	1320
2	Coquille Point		30	steps/beach/E	500
3	Face Rock Wayside	289,000	30	steps/beach/E	500
4	Devil's Kitchen Wayside	364,000	30	paved/1	300

* (E = easy M = moderate D = difficult)

Figure 3.18a. Rocky shore natural resources for the Coquille Point Cell.

Coquille Point Cell



ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
1	Seabird	1 small	Rocks	Yes	Aircraft, Foot, Vessel
2	Seabird	1 medium	Rocks	Yes	Aircraft, Foot, Vessel
3	Seabird	1 small	Rocks	Yes	Aircraft, Foot, Vessel
4	Seabird	2 small	Rocks	Yes	Aircraft, Foot, Vessel
4	Seabird	2 medium	Rocks	Yes	Aircraft, Foot, Vessel
4	Seabird	1 large	Rocks	Yes	Aircraft, Foot, Vessel
4	Harbor Seal	1 small	Rocks	Yes	Aircraft, Foot, Vessel
5	Seabird	1 x-large	Rocks	No	Aircraft, Vessel
5	Harbor Seal	1 medium	Rocks	No	Aircraft, Vessel
6	Seabird	1 large	Rocks	No	Aircraft, Vessel
7	Seabird	3 small	Rocks	Yes	Aircraft, Foot, Vessel
8	Seabird	2 small	Rocks	Yes	Aircraft, Foot, Vessel
8	Seabird	1 medium	Rocks	Yes	Aircraft, Foot, Vessel

T & E species that occur in cell: peregrine falcon, Aleutian Canada goose, brown pelican

Figure 3.18.b Rocky shore natural resources for the Coquille Point Cell.

CELL 19: CAPE BLANCO

Cape Blanco is a prominent rocky headland about 9 miles north of the town of Port Orford and forms the westernmost point in Oregon. This cell extends four miles north from the cape to Blacklock Point and includes four rocky shore sites: 19.1 Blacklock Point and Tower Rock, 19.2 Castle Rock and Gull Rocks, 19.3 Cape Blanco, and 19.4 Blanco Reef (Figure 3.19a). Shore features include extensive rocky intertidal areas, offshore rocks, sand beach, subtidal reefs, and the estuary of Sixes River. Rocky intertidal areas at Cape Blanco are accessed by a short foot trail from the top of the cape, and at Blacklock Point by a 1.5 mile maintained trail starting at the Port Orford Airport. Ownership of the western portion of Cape Blanco is currently being transferred to BLM by the USCG. The site will be managed cooperatively by PRD, BLM, USCG, and the Coquille and Siletz Tribes. The south side of the cape and the north side to Sixes River is part of Cape Blanco State Park, which provides seasonal camping and limited day-use facilities. Two miles north of Sixes River, Blacklock Point is managed by PRD as part of Floras Lake State Park. Privately owned ranch land abuts the half mile stretch of sand beach between Sixes River and Floras Lake State Park.

Rocky Shores Resources

The rocky shores of Cape Blanco and Blacklock Point are a complex mix of rock types from three different geologic formations. Resistant rock types of the Otter Point Formation form the western and northern base of Cape Blanco, Gull Rock, Castle Rock, Tower Rock, and the south side of Blacklock Point (Dott 1971; Baldwin 1976). Sedimentary rock types, including sandstone, siltstone and conglomerate comprise most of the bedrock platform and detached boulders at these sites. There are also boulders of harder volcanic and metamorphic rock types including basalt, blueschist and peridotites. Overlying Cape Blanco and extending intertidally on the south side of the cape are fossiliferous Mio-Pliocene sandstones and pebble conglomerates of the Empire Formation (Dott 1971; Baldwin 1976). Intertidal sandstone boulders and cobble eroded from the top of the cape are mixed with Otter Point rocks

on the western and northern part of the cape. Exposed for one half mile north of Blacklock Point is a thick sandstone strata of the upper Cretaceous Hunter Cove Formation. This stratum extends subtidally and has contributed sandstone boulders and cobble along the northern side of Blacklock Point.

Scattered boulders and cobble overlying low-slope bedrock platform form the predominant intertidal habitat type on the western face of Cape Blanco. Most tidepools in this area are filled with sand and gravel. The southwest and northwest portions are formed of high-relief broken bedrock and large boulders with numerous surge channels and large tidepools. A low-slope platform with numerous small pools and well-rounded cobble forms the north side of the cape. Intertidal areas at Blacklock Point consist primarily of high-relief broken bedrock and very large boulders on the exposed portions of the point, interspersed with cobble and small sand beaches in more protected areas. The extent and variety of habitat types and relatively pristine nature of these sites make this one of the biologically richest areas on the Oregon coast. Exposed portions are characterized by California mussels, gooseneck barnacles, sea palm (*Postelsia*), Laminaria algae, surf grass (*Phyllospadix* sp.) and other organisms adapted to a high-energy environment. Areas of high relief and large pools provide a variety of overhang, crack and vertical-face habitats that support a very diverse assemblage of invertebrate and algal species. The north side of Cape Blanco has a small area with a high concentration of purple sea urchins, which are uncommon south of Cape Arago in Oregon waters.

Blanco Reef (site 19.4) lies about one-half mile southwest of Cape Blanco. The reef consists of 10 large rocks and sea stacks, numerous low wash rocks, and extensive subtidal rocky habitat. The reef supports a large subtidal kelp bed (Figure 3.19b). The kelp beds of Blanco Reef, combined with some smaller nearshore beds adjacent to Cape Blanco, account for about 12% of the state's kelp resource (Ecoscan 1991). Commercial divers harvest red urchins from the reef primarily in winter and spring.

The cells rocks and cliffs provide habitat for pinnipeds and nesting seabirds. Pelagic cormorant, Brandt's cormorant, and western gull

form numerous small nesting colonies on the cliffs and nearshore rocks of Blacklock Point (site 19.1) and Cape Blanco (site 19.3) (USFWS 1988). The largest seabird colonies are on Tower Rock (site 19.1) and Castle and Gull Rocks (site 19.2). Tower Rock has over 1,100 birds, primarily common murre and pelagic cormorant (USFWS 1988). Castle Rock has a similar number of birds, but is used principally by double crested and pelagic cormorants (USFWS 1988). Gull Rock has the largest colony in the cell with over 25,000 birds, primarily common murre (USFWS 1988). The endangered brown pelican also uses many of the rocks in the cell as roosting sites. The Oregon Ocean Plan lists Castle and Gull Rocks as especially sensitive bird and mammal habitats (Oregon Ocean Resources Management Task Force 1991). Seabirds, particularly double-crested cormorants, frequently use Sixes River estuary as a feeding area. Cape Blanco is a historic habitat site for the endangered peregrine falcon and adult falcons are periodically observed. In 1990, a reintroduction attempt at Cape Blanco successfully fledged four peregrine falcon chicks (The Peregrine Fund 1991).

Harbor seals, California sea lions, and the threatened Steller sea lion haul out on Blanco Reef (Figure 3.19b). Harbor seals also use the rocks at Cape Blanco, Gull Rock, and Castle Rock as haulout sites (Brown 1993). All of the harbor seal haulouts are pupping sites. River otters, presumably from nearby Sixes or Elk Rivers, occasionally use intertidal areas at Cape Blanco.

Human Use

Activities in the cell include sight seeing, beach combing, tide pooling, bird watching, whale watching, clamming, angling, small-scale personal harvest of edible seaweeds, and commercial urchin harvest. Cape Blanco is an official gray whale counting station and an Oregon State Parks whale watching site. A commercial fishery for red sea urchins uses most areas of Blanco Reef, primarily during winter and early spring. State Parks management has noted moderate use of intertidal areas at Cape Blanco, primarily on the north side, by small and large organized groups. Southern and western faces of the cape are accessible only during very low tides and receive little use. Cape Blanco State Park recorded about 177,000 visitor-days and about 22,000 camper nights in 1992 (PRD 1993).

Blacklock Point receives little use because of its relative isolation, although recent extension of the Coast Trail past Blacklock Point may increase visitation. There are several interpretive and educational efforts at Cape Blanco. State Park staff offer intertidal and other natural history interpretive programs to local school groups. Volunteers that count gray whales during the spring migration provide marine mammal information to the public. The local chapter of the Audubon Society provides infrequent interpretive programs for seabirds. The University of Oregon occasionally uses intertidal areas at Cape Blanco for instruction in marine biology.

Management Authorities and Jurisdictions

- ODFW - Harvest regulations (marine invertebrates and finfish)
- PRD - Owner/manager of state park property
- Co-manager of western portion of Cape Blanco with BLM, USCG, and Siletz and Coquille Tribes.
- Co-manager of beaches with DSL
- DSL - Manager of submerged and submersible lands
- Co-manager of beaches with PRD
- Manager of kelp harvest leases
- USFWS - Owner/manager of the offshore rocks (above ordinary high water) that are separated from the shore at high tide
- BLM - Owner of western portion of Cape Blanco and co-manager with PRD, USCG, and Siletz and Coquille Tribes (Cape Blanco Lighthouse)
- USCG - Co-manager of Cape Blanco Lighthouse with PRD, BLM, and Siletz and Coquille Tribes
- Curry County - Planning and zoning regulations
- Private Property Owners

Human Use Concerns and Suggested Management Approaches

1) Castle (site 19.2) and Needle Rocks - Possible human disturbance to nesting seabirds from foot traffic. These rocks are accessible at low tide.

Suggested Approach: Signs should be posted at beach access trails that inform and remind beach users of the sensitive nature of these sites to disturbance. The disturbances

should be studied and other management measures developed that are designed to address site specific concerns.

2) Gull Rocks and other offshore rocks in the cell (site 19.2) - Possible boat and aircraft disturbance to seabird nesting colonies.

Suggested Approach: Provide information to vessel and aircraft owners and operators concerning the need to minimize disturbance. The disturbances should be studied and management measures developed that are designed to address site specific concerns.

3) Cape Blanco (site 19.3) - Possible future overuse problems in the rocky intertidal areas resulting from proposed US BLM and PRD plans to develop public access to Cape Blanco Lighthouse and a natural history interpretive site

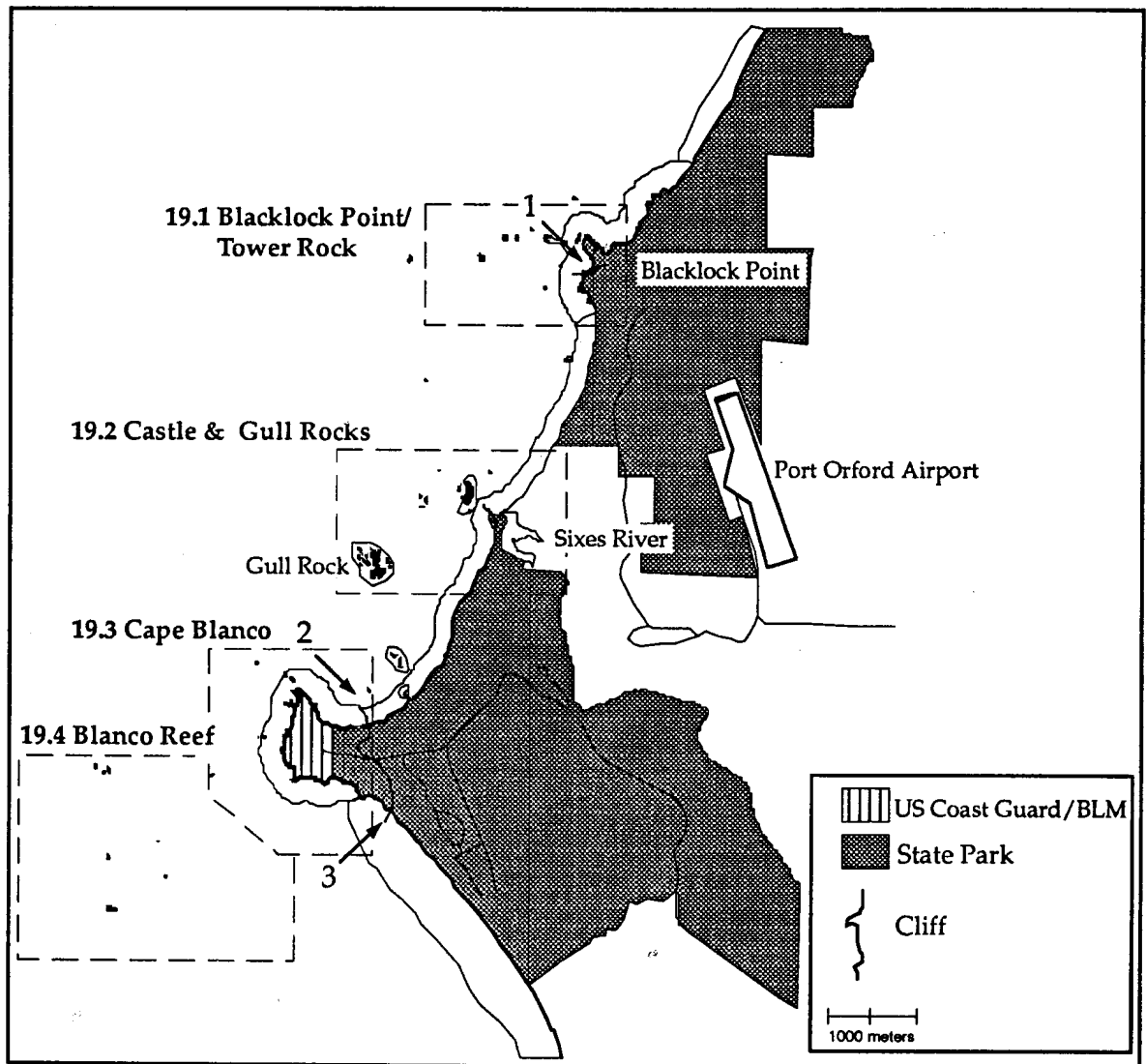
near the lighthouse.

Suggested Approach: The Cape Blanco intertidal area is relatively pristine and should be maintained as a low use site. Development plans should not include improved public access to intertidal areas and interpretive programs should emphasize the biologically sensitive nature of this site.

Additional Opportunities

Existing interpretive programs at Cape Blanco provide a valuable education service and should be encouraged to continue. Additional opportunities for interpretive programs or signs exist at Cape Blanco, particularly if the lighthouse is opened to the public and visitation increases. The programs should be designed to minimize impact to rocky intertidal areas.

Cape Blanco Cell

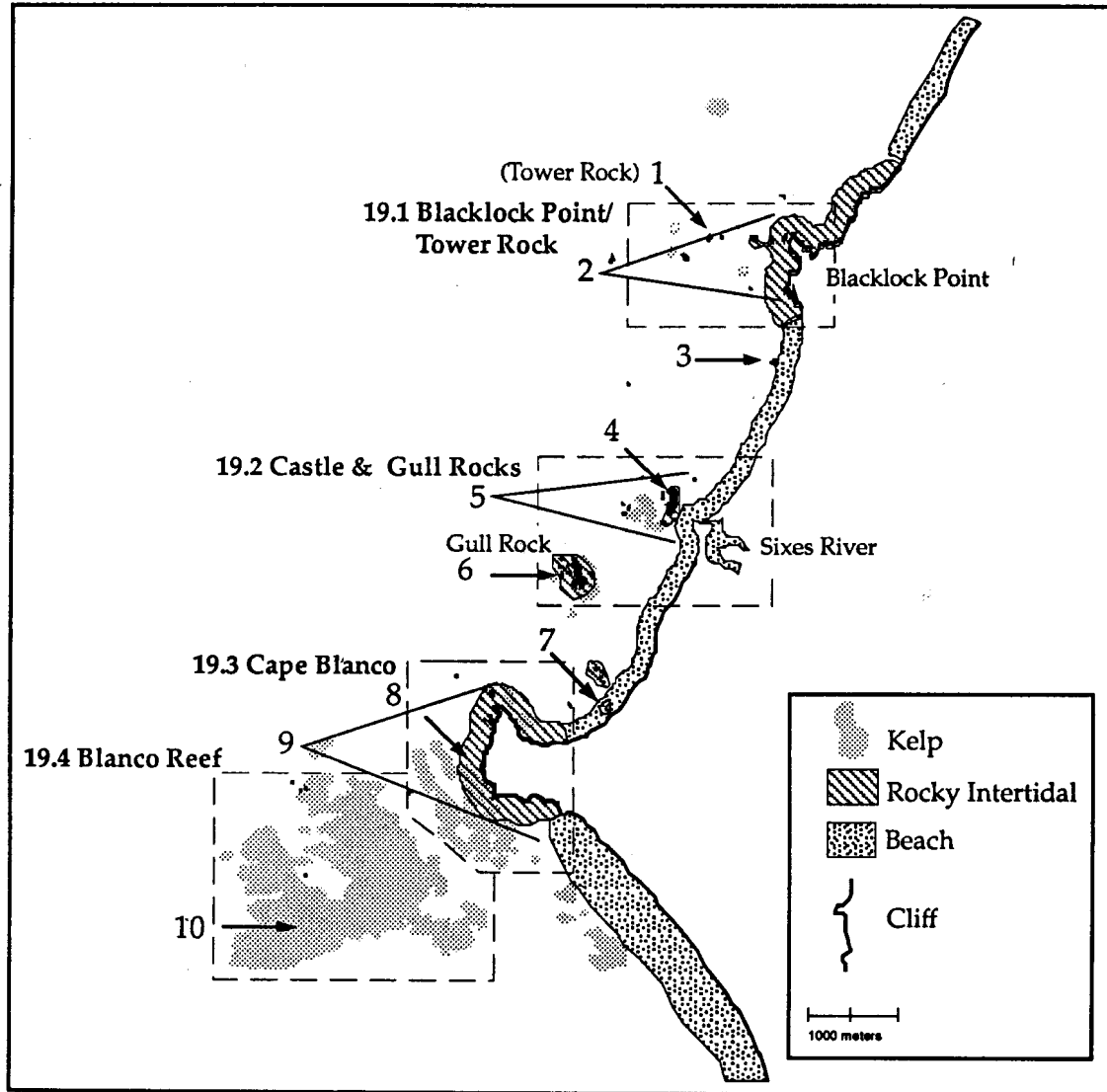


ID No.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/ Difficulty*	Trail Length (ft)
1	Rocky Point Trail			primitive/M	7900
2	Cape Blanco North	177,000+	10+	primitive/M	1300
3	Cape Blanco South			paved/M	400

* (E = easy M = moderate D = difficult)
 † Combined counts for Accesses 2 and 3
 U = unknown

Figure 3.19a. Rocky shore upland characteristics for the Cape Blanco Cell.

Cape Blanco Cell



ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
1	Seabird	1 large	Rocks	No	
2	Seabird	2 small	Rocks	Yes	
3	Seabird	1 small	Rocks	No	
4	Harbor Seal	1 small	Rocks	Yes	Aircraft, Foot, Vessel
5	Seabird	1 small	Rocks	Yes	Aircraft, Foot, Vessel
5	Seabird	1 medium	Rocks	Yes	Aircraft, Foot, Vessel
5	Seabird	1 large	Rocks	Yes	Aircraft, Foot, Vessel
6	Seabird	1 x-large	Rocks	No	Aircraft, Vessel
6	Harbor Seal	1 medium	Rocks	No	
7	Seabird	1 small	Rocks	Yes	Aircraft, Foot, Vessel
8	Harbor Seal	1 medium	Rocks	Yes	
9	Seabird	4 small	Rocks/Cliff	Yes	
9	Seabird	1 medium	Rocks	Yes	Foot
10	Harbor Seal	1 small	Reef	No	Aircraft, Vessel
10	Steller Sea Lion	1 medium	Reef	No	Aircraft, Vessel
10	Calif. Sea Lion	1 medium	Reef	No	Aircraft, Vessel

T & E species that occur in cell: brown pelican, peregrine falcon, Steller seal lion

Figure 3.19b. Rocky shore natural resources for the Cape Blanco Cell

CELL 20: ORFORD REEF

Orford Reef is an extensive system of subtidal and emergent rocks four miles southwest of Cape Blanco that forms a major geographic feature along Oregon's nearshore continental shelf. Nine large rocks and numerous low-elevation rocks, all located about four miles offshore, delineate the portion of the reef visible above the water. The remainder of the reef is subtidal, extending from a 60 foot depth about two miles offshore to a 450 foot depth approximately seven miles to the southwest. The reef covers at least 25 square miles, of which only about 3.5 square miles is visible on the surface as clusters of rocks or subtidal kelp beds.

Rocky Shores Resources

The emergent and subtidal rocks of Orford Reef are resistant relics of a Pleistocene headland of the Otter Point Formation, including sedimentary, volcanic and metamorphic rock types, late Jurassic in age (Don Stensland, Southwest Oregon Community College, pers. com.). The most common rock types are very hard sandstones and basalt. High-elevation rocks are typically dome-shaped with steep cliff faces, while low-elevation rocks are primarily high-slope bedrock platform. Most of the subtidal portions of the reef consist of boulder and cobble habitat, with intermittent patches of sand and bedrock (Graves and Richmond 1991; ODFW 1994).

Intertidal rocks support a California mussel/gooseneck barnacle assemblage typical of high-energy environments. This community covers almost all intertidal space available. The sea palm (*Postelsia palmaeformis*) exists on some rocks.

Extensive areas of reef support dense beds of bull kelp (*Nereocystis leutkeana*). In a 1990 survey, the reef's subtidal kelp beds accounted for about 37% of Oregon's bull kelp resources (Ecoscan 1991). Kelp growth was particularly dense on the reef in 1990. In years when heavy seas occur during early to mid-summer, kelp that is in its emergent stage may be torn free, limiting growth of the reef's kelp bed.

ODFW and Oregon State University conducted SCUBA and manned submersible surveys at Orford Reef between 1990 and 1993. These surveys have documented very diverse and abundant invertebrate and fish communities throughout Orford Reef. Little research has been conducted to determine biological productivity in this area, but the associated seabird, pinniped and subtidal communities are evidence of very productive ocean waters at Orford Reef. Nearby Cape Blanco and its associated reef form a major western extension of the mainland, affecting ocean currents around Orford Reef. Cape Blanco is a recognized region of localized upwelling (Ebert and Russell 1988). This upwelling could be a major factor influencing recruitment of invertebrate and fish populations to nearshore waters.

The rocks of Orford Reef support large seabird nesting colonies and pinniped haulouts. A total of almost 24,000 birds in a 1988 survey utilized seven colony sites on the rocks (USFWS 1988). Nesting bird species include common murre as the dominant species, and small numbers of Brandt's and pelagic cormorant, western gull, pigeon guillemot, black oystercatcher, and tufted puffin. Numerous other seabird species, including the endangered brown pelican, use ocean waters in the vicinity of Orford Reef as feeding grounds.

A large breeding colony of Steller sea lions utilizes several rocks at Orford Reef as haulouts and pupping areas (Figure 3.20). California sea lions and a small group of harbor seals also use the rocks as haulout sites. The Oregon Ocean Plan lists Orford Reef as especially sensitive bird and mammal habitat (Oregon Ocean Resources Management Task Force 1991).

Human Use

Orford Reef is a major harvest area for several commercial fisheries based out of the port of Port Orford. Bottomfish fisheries landed 421,480 pounds of cabezon, lingcod, and various shallow rockfish species to Port Orford in 1992. Approximately one third were caught in depths of 10 to 30 fathoms around Orford Reef (Hassett, pers. com. 1993). These fisheries use a variety of gear types, primarily vertical longline, bottom longline and jig gear. Orford Reef is the principal

harvest area for red sea urchins in Oregon, producing a peak harvest in 1989 of 5.3 million pounds and half of all urchins harvested in Oregon since the fishery's inception in 1986. Since 1989, urchin landings from Orford Reef have declined, and in 1993 ODFW and the urchin industry established an annual harvest guideline of 1.3 million pounds from the reef. Beginning in 1992, the urchin industry has voluntarily stopped urchin harvest at Orford Reef during the summer months to help meet the harvest guideline, to take advantage of better sea urchin market conditions that occur in late fall and winter, and to reduce human disturbance to Steller sea lions during the pupping season.

Sport fishermen use Orford Reef for bottom fishing, but this is currently a relatively small fishery. Sport SCUBA divers also occasionally visit the reef. At present there are no regularly scheduled charter vessels operating out of Port Orford. Orford Reef has also been the site of research on red urchins and on reef/kelp bed ecosystems. Use of the reef for research will continue and, most likely, increase in the future.

Management Authorities and Jurisdictions

- ODFW - Harvest regulations (marine invertebrates and finfish)
- DSL - Manager of submerged and submersible lands
- Manager of kelp harvest leases
- USFWS - Owner/manager of the offshore rocks (above ordinary high water) that are separated from the shore at high tide

Human Use Concerns and Suggested Management Approaches

- 1) Seal Rock and Long Brown Rock - Vessel disturbance to Steller sea lion pupping areas.
Suggested Approach: Observations by

ODFW and the USFWS in 1988 and 1989 indicated that Steller sea lion usage and pup production patterns at Orford Reef were being disrupted by human activities, particularly urchin harvest operations. These findings resulted in establishment of 1000 foot buffer zones around two major pupping sites (Seal Rock and Long Brown Rock) from May 1 to August 31 (Figure 3.20). In addition, ODFW and the Port of Port Orford launched an education effort to inform users of sea lion disturbance issues. At present, these closure zones do not apply to sport or other commercial fishery activities. As mentioned above, the urchin fishermen have provided additional protection by voluntarily staying off the reef during the pupping season. Steller sea lions have returned to the pupping sites and, so far, the seasonal closure seems to have been a success. ODFW will continue to monitor the Steller sea lion breeding population to ensure the program's continued success.

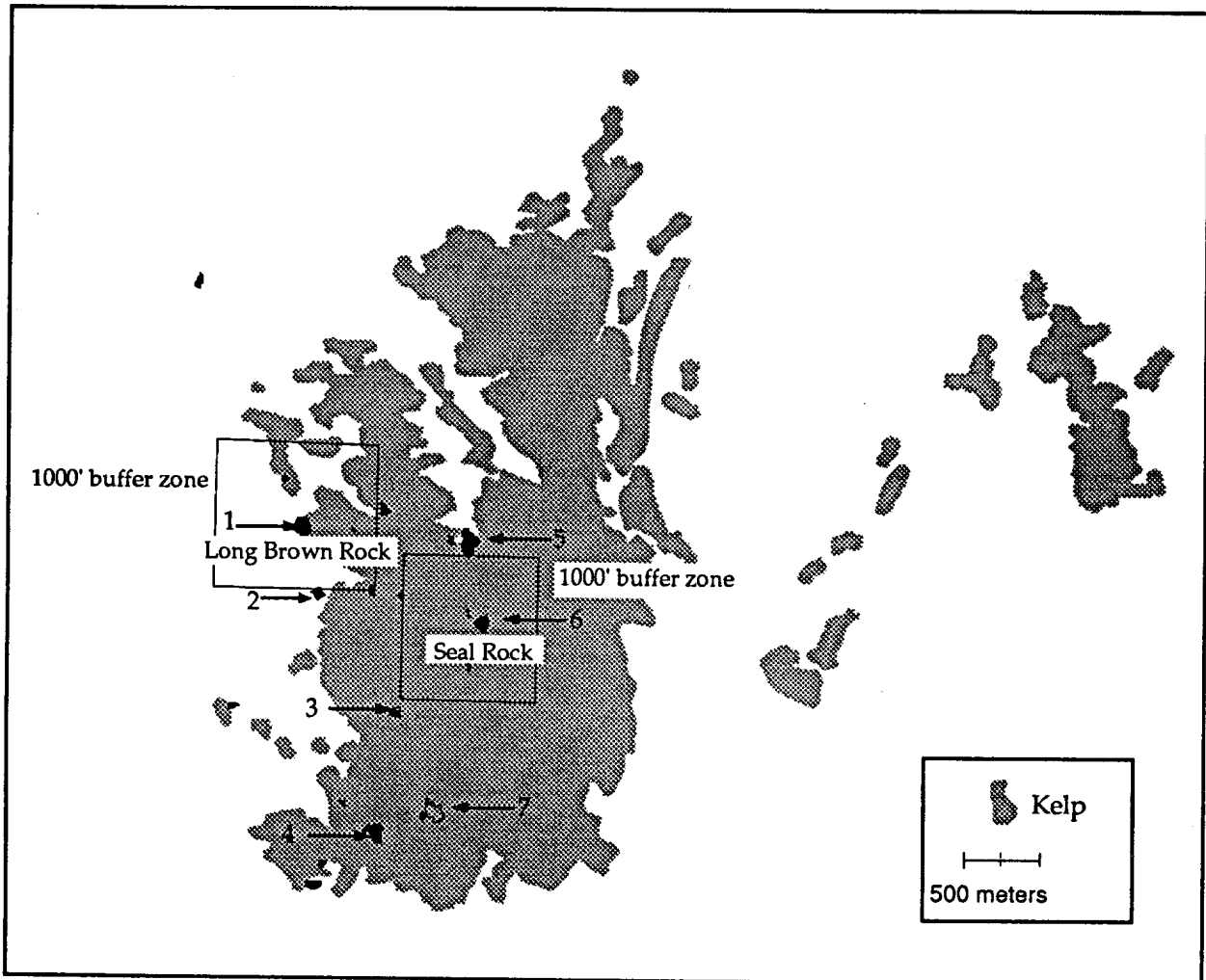
- 2) Other offshore rocks within the reef - Possible boat and aircraft disturbance to seabird nesting colonies.

Suggested Approach: Provide information to vessel and aircraft owners and operators concerning the need to minimize disturbance. The disturbances should be studied and management measures developed that are designed to address site specific concerns.

Additional Opportunities

There are opportunities to increase the educational efforts concerning seabird and marine mammal impact issues. The dock at Port Orford is the ideal site for educational signs and pamphlets.

Orford Reef Cell



ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
1	Seabird	1 small	Rocks	No	Aircraft, Vessel
1	Calif Sealion	1 medium	Rocks	No	Aircraft, Vessel
1	Steller Sea lion	1 large	Rocks	No	Aircraft, Vessel
2	Seabird	1 large	Rocks	No	Aircraft, Vessel
2	Calif Sea lion	1 medium	Rocks	No	Aircraft, Vessel
3	Seabird	1 large	Rocks	No	Aircraft, Vessel
3	Calif Sea lion	1 medium	Rocks	No	Aircraft, Vessel
4	Seabird	1 large	Rocks	No	Aircraft, Vessel
4	Calif Sea lion	1 medium	Rocks	No	Aircraft, Vessel
5	Seabird	1 small	Rocks	No	Aircraft, Vessel
5	Calif Sea lion	1 medium	Rocks	No	Aircraft, Vessel
5	Seabird	1 x-large	Rocks	No	Aircraft, Vessel
6	Seabird	1 small	Rocks	No	Aircraft, Vessel
6	Calif Sea lion	1 medium	Rocks	No	Aircraft, Vessel
6	Steller Sea lion	1 medium	Rocks	No	Aircraft, Vessel
7	Seabird	1 medium	Rocks	No	Aircraft, Vessel
7	Calif Sea lion	1 medium	Rocks	No	Aircraft, Vessel
7	Steller Sea lion	1 medium	Rocks	No	Aircraft, Vessel
7	Harbor Seal	1 small	Rocks	No	Aircraft, Vessel

T & E species that occur in cell: Brown pelican, Steller sea lion.

Figure 3.20. Rocky shore natural resources for the Orford Reef Cell.

CELL 21: PORT ORFORD

The Port Orford cell consists of a one mile stretch of rocky coastline that forms a large south-facing cove. A steep upland slope surrounds the northern perimeter of the cove, providing lee protection during summer when northwest winds prevail. The Port Orford cell has three rocky shore sites: 21.1 The Heads, 21.2 Nellie's Cove and Tichenor Cove, and 21.3 Battle Rock (Figure 3.21a). Shoreline features include steep cliffs, two high-elevation rocks, several low-elevation rocks, small rocky intertidal areas, subtidal reefs, sand beach, the Port of Port Orford dock, and a protective ocean jetty.

Easily accessible sites include Battle Rock, a small rocky point west of Battle Rock, and the east portion of Tichenor Cove near the port parking lot (Graveyard Point). A small gravel beach within Nellie's Cove can be reached by descending an unmaintained trail along the adjacent upland slope. Mainland cliff areas, Tichenor Rock, and Klooqueh Rock are inaccessible to foot traffic but are often closely approached by boats.

Shoreline and landward portions of The Heads are part of Port Orford Heads State Park, with a small parking area and maintained foot trail leading to scenic overlooks. The city of Port Orford manages a park at Battle Rock that includes a paved scenic overlook, day-use facilities and a beach access trail. Lands around Tichenor Cove and the small headland west of Battle Rock are private with several ocean-front residences. The Port of Port Orford owns the dock facilities at Graveyard Point.

Rocky Shores Resources

Exposed rock strata in the Port Orford area consist of hard sandstones of the Otter Point Formation (Baldwin 1976). The predominant habitat types include moderate to steep-sloped rocky platforms and steep cliff. At Battle Rock and the adjacent small headland, boulders and cobble eroded from the seaward face have formed a small rocky intertidal area. Small gravel and cobble beaches fringe parts of Nellie's and Tichenor Coves.

The exposed nature of these sites to ocean swell from the south has influenced the type of intertidal communities found in this area. High-slope rocky platforms and cliff faces are covered with California mussels, gooseneck barnacles and several species of chitons, limpets, snails and sea stars. Boulder and cobble areas near Battle Rock provide additional microhabitats for anemones, hydrozoans, tunicates, crustaceans, sponges, bryozoans, and a diverse assemblage of algal species.

Thick beds of bull kelp (*Nereocystis leutkeana*) and associated subtidal reefs fringe the shoreline throughout the area. The shallow (less than 10 m. depth), low-slope reefs at Nellie's Cove and The Heads have a heavy growth of *Pterygophora californica*, a perennial brown algae. This algal community provides habitat for many species of fish and invertebrates, including bottom fish, juvenile rockfish, octopus, flat abalone, red sea urchins, and many crustaceans.

The cliffs and rocks of Port Orford support numerous small seabird nesting colonies and a harbor seal haulout (Figure 3.21b). There are a total of 13 seabird nesting colonies, each of which has fewer than 50 birds (USFWS 1988). Species that utilize the colony sites include pigeon guillemot, western gull, pelagic cormorant, and black oystercatcher. The endangered brown pelican and Aleutian Canada goose utilize rocks along the shoreline. Harbor seals haul out on the outer coastline of the cell (Figure 3.21b). California gray whale use the cove at Port Orford year round.

Human Use

Human activities along the shore include sight seeing, tide pooling, bird watching, whale watching, clamming, sea kayaking, commercial fishing, angling, and SCUBA diving. The small rocky intertidal area on the east side of Tichenor Cove is easily accessed from the port parking lot and receives moderate use, primarily from local residents. Battle Rock and the adjacent headland, located near a large scenic overlook along Highway 101, receive heavy use during summer from both tourists and local residents. It is an Oregon State Parks whale watching site. Popular sand beaches on each side of this site provide access to intertidal rocks and a foot trail leads to the top of Battle Rock. The Port of Port Orford

provides easy access to the open ocean for small boats, which are used on nearshore reefs for angling and diving. The boats often closely approach cliff faces and offshore rocks. A commercial fishery for red sea urchins uses all subtidal reefs in the area. Nellie's and Tichenor Coves are popular SCUBA diving locations. The coves have been used for an urchin out-planting experiment.

Management Authorities and Jurisdictions

- ODFW - Harvest regulations (marine invertebrates and finfish)
- PRD - Owner/manager of Orford Heads State Park
 - Co-manager of beaches with DSL
- DSL - Manager of submerged and submersible lands
 - Co-manager of beaches with PRD
 - Manager of kelp harvest leases
- USFWS - Owner/manager of the offshore rocks (above ordinary high water) that are separated from the shore at high tide
- Corps of Engineers - Responsible for maintenance of jetty, dredging of Port Orford harbor, and disposal of dredge spoils
- Curry County - Planning and zoning regulations
- City of Port Orford - Planning and zoning regulations
 - Owner/manager of Battle Rock City Park
- Port of Port Orford - Owner/manager of port facilities at Graveyard Point
- Private Property Owners

Human Use Concerns and Suggested Management Approaches

- 1) Battle Rock (site 21.3) - Disturbance to nesting

seabirds caused by foot traffic.

Suggested Approach: Place interpretive signs to inform public of seabird disturbance. The magnitude of the disturbance should be examined and the foot trail leading to the top of Battle Rock should be seasonally closed, if warranted.

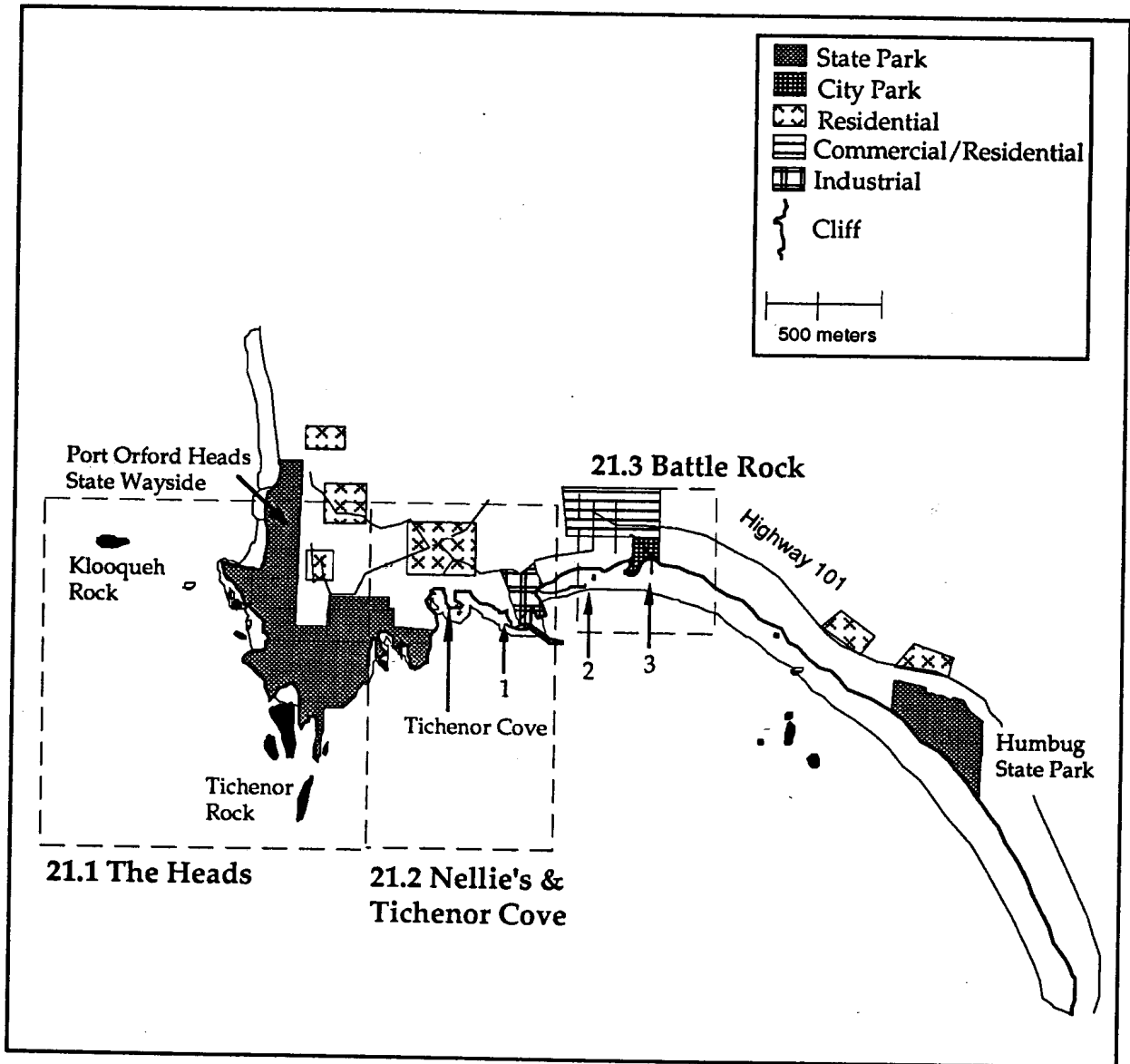
- 2) The Heads, Tichenor Rock and Klooqueh Rock (site 21.1) - Possible disturbance to nesting seabirds by sport fishing and dive boats.

Suggested Approach: Provide information to vessel owners and operators concerning the need to minimize disturbance. The disturbances should be studied and management measures developed that are designed to address site specific concerns.

Additional Opportunities

There are currently no interpretive or educational programs offered at sites in the Port Orford area other than posters and information about avoiding disturbance to Steller sea lions. Additional opportunities exist for placement of signs at the port parking lot and Battle Rock City Park that interpret rocky intertidal areas and marine birds and mammals. The port hoist area provides an excellent site to inform boat anglers, divers, and commercial fishermen about sensitivity of seabirds and mammals on offshore rocks and reefs. Nellie's and Tichenor Coves provide excellent areas for conducting research projects because of their rich and diverse subtidal habitats, easy accessibility, and nearly year-round protection from rough seas.

Port Orford Cell

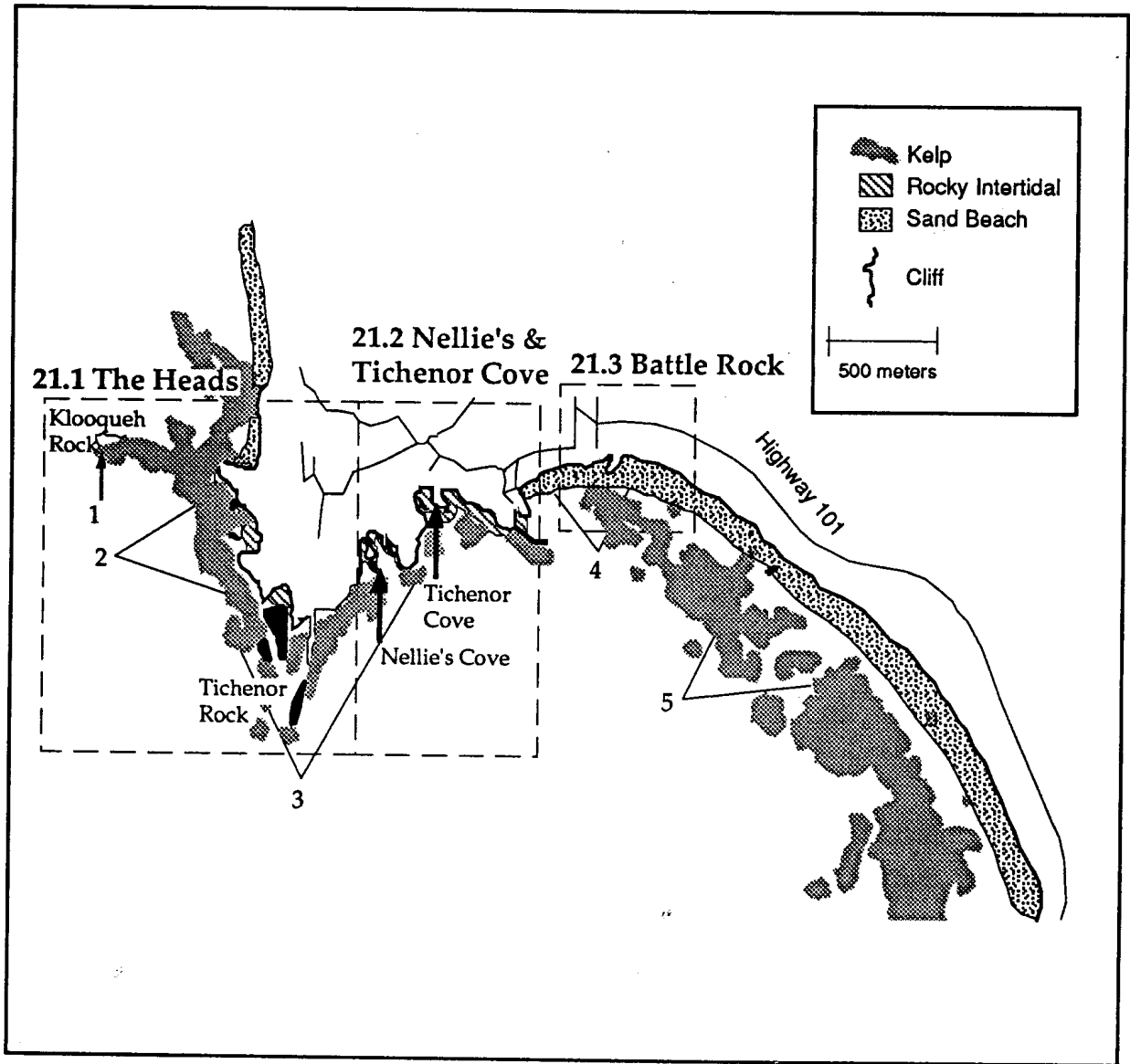


ID No	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/Trail Difficulty*	Length (ft)
1	Graveyard Point		50+	primitive/E	10
2	Port Road@		50	beach/E	200
3	Battle Rock State Park@		20	beach/E	100

* (E = easy M = moderate D = difficult)
 † Same parking area for Accesses 1 and 2.
 @Vehicle and foot access to beach.

Figure 3.21a. Upland characteristics for the Port Orford Cell.

Port Orford Cell



ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
1	Seabird	1 small	Rocks	No	
2	Seabird	1 small	Cliff	No	
2	Harbor Seal	1 medium	Rocks	No	
3	Seabird	6 small	Cliff/Rocks	No	
4	Seabird	2 small	Cliff/Rocks	Yes	Foot
5	Seabird	3 small	Rocks	No	

T & E species that occur in cell: Brown pelican, Peregrine falcon

Figure 3.21b. Rocky shore natural resources for the Port Orford Cell.

CELL 22: HUMBUG MOUNTAIN

The Humbug Mountain cell consists of a series of rocky shorelines, offshore rocks, and a large headland just south of Port Orford. The cell contains three sites: 22.1 Rocky and Coal Points, 22.2 Redfish and Island Rocks, and 22.3 Humbug Mountain (Figure 3.22a). Most of the landward parts of the cell lie within Humbug Mountain State Park. PRD manages the headland as a protected preserve (Hewitt, pers. com. 1993). The south end of Humbug Mountain is privately owned. Humbug Mountain State Park provides visitor facilities at the Brush Creek Campground. There are several turnouts and scenic overlooks along Highway 101, some providing access to the Rocky and Coal Point areas (22.1). Access to the shore around Humbug Mountain (22.3) is restricted due to the terrain, walking distance, and private ownership. The south end of the cell can be reached from a trail that leads to the sandy beach south of Humbug Mountain.

Natural Resources

The rocky points and numerous offshore rocks of the cell are resistant rock types of the Otter Point Formation (Baldwin 1976). These include hard sandstone, siltstone, conglomerate, and various metamorphic rock types. Humbug Mountain (site 22.3) rises 1,756 feet above sea level with bedrock cliffs over 200 feet high, and is southern Oregon's most prominent headland (PRD 1992). Much of the shoreline consists of large boulder/cobble intertidal areas, backed by seaward sloping bedrock and vegetated cliffs. A subtidal reef extends westward from the mainland for approximately one mile (Oregon Ocean Resources Management Task Force 1991). Seastacks and washrocks cluster along the shoreline.

The intertidal habitats of the cell are a complex mix of boulder crevices, overhangs, and rock-bottom pools. This area is rich in both algal and invertebrate species, with both high diversity and abundance. The extensive intertidal shore on the south side of Humbug Mountain site (22.3) has the richest communities, possibly due, in part, to its isolation. Sea grass and *Laminaria* beds lie within the mid to low intertidal, merging to *Nereocystis* kelp beds in the surf. The boulder

and cobble intertidal habitat of Rocky and Coal Points (site 22.1) is more heavily used and shows some signs of human impact, such as overturned boulders.

Dense subtidal kelp beds extend along much of the cell's shoreline. The beds, composed primarily of bull kelp (*Nereocystis*), indicate the existence of significant nearshore reefs along the coastline. In a 1990 survey, these kelp beds accounted for about 15% of the total subtidal kelp bed resource off of Oregon (Ecoscan 1991). The associated subtidal reefs support a significant commercial fishery for red sea urchins, especially off Island Rock and off the south side of Humbug Mountain. Commercial fishermen harvest rockfish and lingcod from the reefs using hook and line gear.

The Humbug Mountain cell supports numerous seabird nesting colonies. Redfish and Island Rocks (site 22.2) have the most extensive nesting habitat. The seabird diversity is high at Redfish Rocks with seven different seabirds breeding here. Over 20,000 common murres and 200 Brandt's cormorants were counted at Redfish Rocks in 1988 (Oregon Ocean Resources Management Task Force 1991). Diversity is higher at Island Rocks where eleven species of seabirds can be found. USFWS counted more than 20,000 common murres on Island Rock in 1988. Other species include Brandt's cormorant and tufted puffins. Endangered species using Island Rock include Aleutian Canada goose (during Spring), and the brown pelican (roosting from Spring to Fall). Brown pelicans also use Redfish Rocks. The Oregon Ocean Plan lists Redfish and Island Rocks as especially sensitive bird and mammal habitats (Oregon Ocean Resources Management Task Force 1991). The cliffs and adjacent rocks of Humbug Mountain support three small seabird nesting colonies (Figure 3.22b). The principal nesting species include pigeon guillemot and black oystercatcher (USFWS 1988). Harlequin duck, listed as sensitive by the state, have been observed within the rocky intertidal of Rocky and Coal Points (site 22.1). Peregrine Falcons have been seen flying through the area, but no nests have been found (Hewitt, pers. com. 1993). The shoreline of Humbug Mountain (site 22.3) is a pinniped haulout area (Brown 1993).

Human Use

The Humbug Mountain Cell lies in Oregon's most isolated coastal county, since no route connects it to inland Oregon. The area, therefore, sees much less use and overall development than other coastal regions of Oregon. Uses of the Humbug Mountain cell include hiking, bicycling, sight seeing, tide pooling, beach combing, intertidal harvesting, angling, camping, picnicking, SCUBA diving, and commercial fishing. Shore use is limited primarily to the part of the cell north of Humbug Mountain headland (Rocky and Coal Points, site 22.1). Visitor use approached 130,000 visitor-days at Humbug Mountain State Park and 35,000 camper-nights at the Brush Creek Campground (PRD 1993). The Rocky Point intertidal area is a popular site for butter and littleneck clam harvest. State Parks occasionally conducts interpretive programs at this site for high school classes. The offshore reefs support commercial fisheries for red urchin and various bottomfish species.

Management Authorities and Jurisdictions

- ODFW - Harvest regulations (marine invertebrates and finfish)
- PRD - Owner/manager of Humbug Mountain State Park property
- Co-manager of beaches with DSL
- DSL - Manager of submerged and submersible lands
- Co-manager of beaches with PRD
- Manager of kelp harvest leases
- ODOT - Owner of highway right-of-way (includes pull-offs from Highway 101)
- USFWS - Owner/manager of the offshore rocks (above ordinary high water) that are separated from the shore at high tide
- Curry County - Planning and zoning regulations
- Private Property Owners

Human Use Concerns and Possible Solutions

1) Redfish and Island Rocks (site 22.2) - Potential boat and aircraft disturbance to seabird nesting colonies.

Suggested Approach: Provide information to vessel and aircraft owners and operators concerning the need to minimize disturbance. Install interpretive signs and distribute flyers at boat docks, launch sites,

and camp grounds in surrounding areas. This should be done in coordination with current public information efforts concerning Steller sea lion use of Orford Reef. The disturbances should be studied and additional management measures developed that are designed to address site specific concerns.

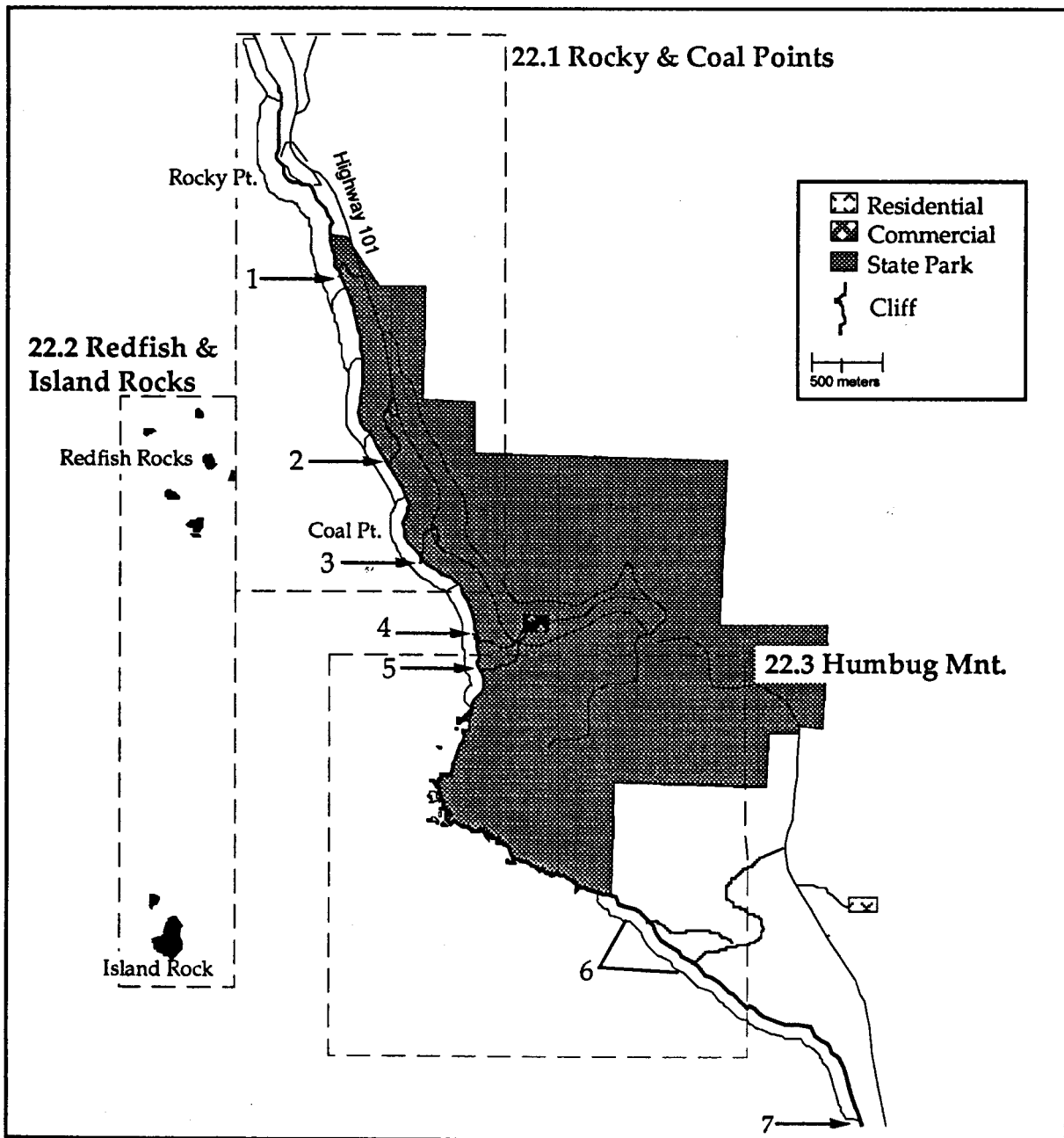
2) Rocky and Coal Points (site 22.1) - Possible overuse (excessive trampling, harvest, or disturbance of substrate) of the rocky intertidal areas.

Suggested Approach: The limited parking and access currently provided along the highway helps control human traffic of the intertidal areas. Interpretive signs and volunteers should be employed to educate the public about appropriate intertidal etiquette. These areas may need more intensive management; however, current use patterns and impacts are poorly known. Human use at the site needs to be studied before developing specific management plans.

Additional Opportunities

Planned future improvements to the docks at Port Orford will increase the boat traffic and use of the nearshore and offshore resources of this cell. Diving within the kelp bed and nearshore reef system will most likely increase in the future. The capacity and setting of the adjacent Brush Creek Campground attracts many people to this area. The boat dock and campground provide excellent areas for interpretive efforts aimed at reducing impacts and providing education about marine resources. Rocky intertidal use concentrates at Rocky and Coal Points. This provides opportunities for quality public recreational use and development of interpretive activities. The current facilities at the campground, and the presence of the nearby town of Port Orford, provide a possible source of volunteers for human use and disturbance studies, and for the staffing of interpretive programs. The isolated rocky intertidal area and submerged reef and kelp system of the Humbug Mountain area (site 22.3) provide excellent opportunities for research of natural ecosystems. Other than urchin harvest in the subtidal area, these areas receive little human use.

Humbug Mountain Cell

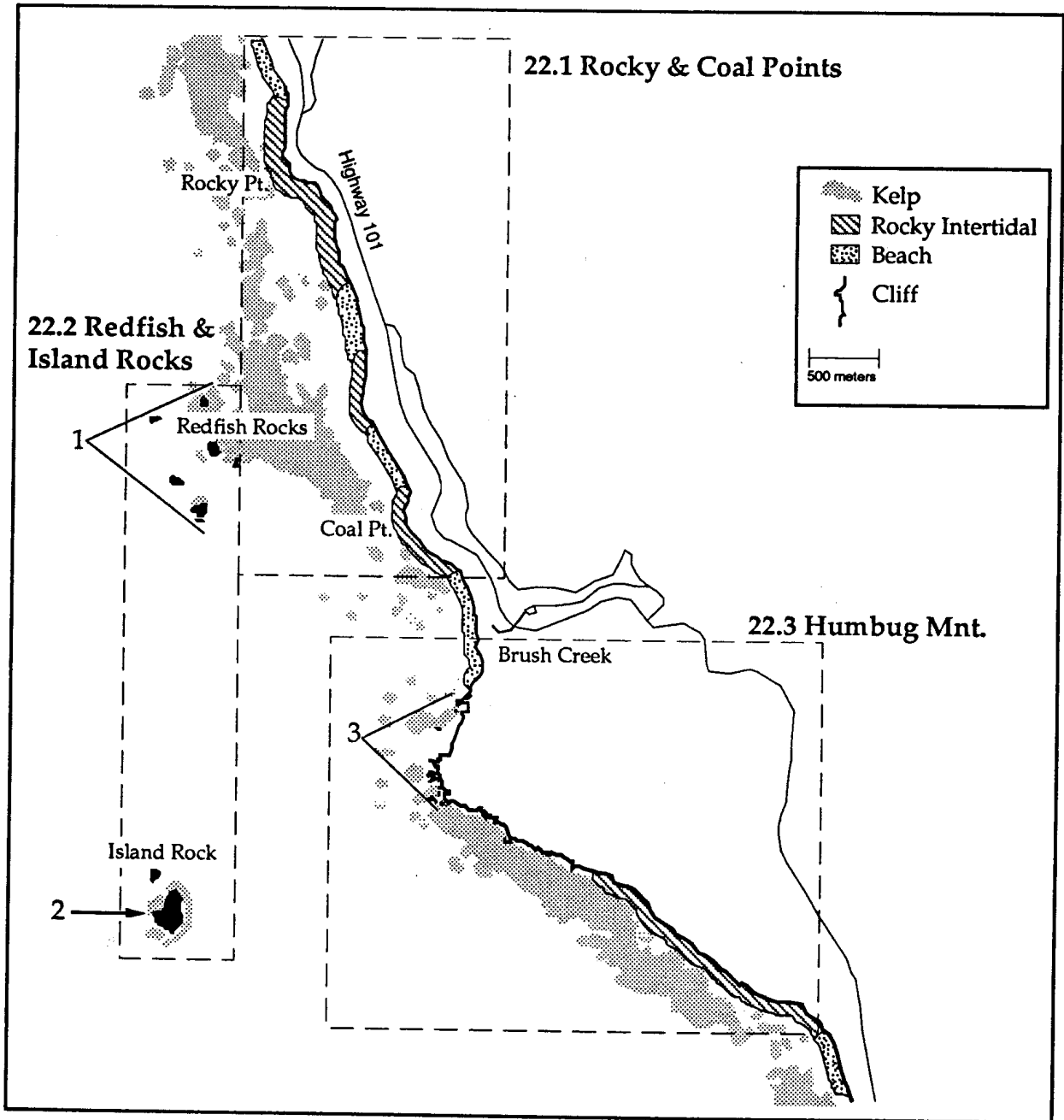


ID No.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/ Difficulty*	Trail Length (ft)
1	Rocky Point		7	paved/M	50
2	Hillside Meadow		2	primitive/M	1400
3	Coal Point		3	primitive/U	1000
4	Brush Creek Camp	130,000	U	beach/E	2500
5	S. Brush Creek		4	beach/E	1000
6	Humbug Mountain		1	primitive/D	3960
7	Humbug Mountain beach		10	beach/M	7000

* (E = easy M = moderate D = difficult) U = unknown

Figure 3.22.a Upland characteristics for the Humbug Mountain Cell.

Humbug Mountain Cell



ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
1	Seabird	1 medium	Rocks	No	Aircraft, Vessel
1	Seabird	4 large	Rocks	No	Aircraft, Vessel
2	Seabird	1 large	Rocks	No	Aircraft, Vessel
2	Seabird	1 x-large	Rocks	No	Aircraft, Vessel
3	Seabird	3 small	Cliff/Rocks	No	
3	Harbor Seal	1 small	Cliff base	No	

T & E species that occur in cell: Brown pelican, peregrine falcon, Aleutian Canada goose

Figure 3.22.b Rocky shore natural resources for the Humbug Mountain Cell.

CELL 23: FRANKPORT

The Frankport cell is located south of Humbug Mountain between Port Orford and Gold Beach and has four rocky shore sites: 23.1 Lookout Rock, 23.2 Arizona Beach, 23.3 Sisters Rocks, and 23.4 Devil's Backbone (Figures 3.23a and 3.23b). Shoreline features include extensive rocky intertidal areas, low and high-elevation offshore rocks, steep cliffs, subtidal reefs and sand beaches. Access to these sites varies. The rocky points just north and south of Arizona Beach can be reached by walking along the beach from a private campground. A small gravel road leads off Highway 101 to Sisters Rocks, providing access to intertidal areas to the north and south. About one mile of rocky shoreline north of Lookout Rock is difficult to access, but can be reached over brush-covered slopes from pullouts along Highway 101. Heavy brush and steep terrain prevent access to Lookout Rock and Devil's Backbone.

Shorefront lands at Arizona Beach are developed as a private campground with 125 full-hookup spaces and day-use facilities. The Bureau of Land Management (BLM) has recently acquired ownership of shorefront and adjacent lands at Sisters Rocks. Lands adjacent to Lookout Rock and Devil's Backbone are privately owned.

Rocky Shores Resources

The rocky headlands and offshore rocks of this area consist of a mixture of sedimentary, volcanic and metamorphic rock types of the Otter Point Formation (Baldwin 1976; Oregon Div. of Geology and Mineral Industries 1976). Rocks of volcanic origin, primarily basalt, comprise the major type at each site. Minor rock types forming sections of exposed bedrock, boulders, and cobble include sandstone, conglomerate, and various hard metamorphic rocks.

A variety of rocky intertidal habitat types exist in this cell. The one mile section of coastline north of Lookout Rock is a complex mixture of broken bedrock, very large boulders, small areas of cobble, and many nearshore, low-elevation inaccessible rocks. Both Lookout Rock and Devil's Backbone are small headlands with a

mixture of steep cliffs and large boulders on the seaward face and cobble around the inshore base of each headland. The Sisters Rocks site includes three high-elevation dome-shaped rocks, two of which are attached to the mainland and the third is offshore and inaccessible (Figure 3.23b). A series of heavily eroded rocky points comprised of high-relief broken bedrock, boulders and cobble extends north and south of Sisters Rocks.

The variety of habitat types has formed very rich biological communities at several sites. One outstanding site is the stretch of rocky shoreline north of Lookout Rock, where the many microhabitats formed by a mixture of bedrock, boulders and cobble support a diverse group of invertebrates. Areas primarily composed of cobble support very diverse and abundant communities of algae, particularly north of Lookout Rock, the south side of Sisters Rocks, and rocky points to the north and south. The inshore perimeter of most rocky points is generally less diverse, where periodic sand burial and scouring from adjacent sand beaches are major environmental factors. Small patches of bull kelp (*Nereocystis luetkeana*) indicate the presence of subtidal reefs near each headland in the cell.

The cell supports 13 seabird nesting colonies on cliffs, headlands, and nearshore rocks (Figures 3.23c and 3.23d). Sisters Rock has the largest colony in the cell with nearly 400 birds, according to a 1988 survey (USFWS 1988). The principal nesting species on the rock include double crested cormorant, pelagic cormorant, and western gull. The smaller colonies in the cell support primarily pigeon guillemot and pelagic cormorant. The endangered brown pelican and peregrine falcon also use rocky shoreline habitat in the cell. Cliff swallows use the inaccessible cliff faces at Sisters Rocks and the rocky point to the north for nesting.

Human Use

Human activities in the cell include beach combing, tide pooling, angling, bird watching, and sea kayaking. Intertidal areas at rocky points north and south of Arizona Beach receive moderate to heavy use during summer from visitors at the nearby campground. The beach at Sisters Rocks is easily accessible to vehicles but receives only moderate use due to the relatively

undeveloped nature of this site. Devil's Backbone, Lookout Rock and the rocky shoreline to the north receive little use due to difficult access.

Management Authorities and Jurisdictions

- ODFW - Harvest regulations (marine invertebrates and finfish)
- PRD - Co-manager of beaches with DSL
- DSL - Manager of submerged and submersible lands
- Co-manager of beaches with PRD
- ODOT - Owner of highway right-of-way (includes pull offs from Highway 101)
- USFWS - Owner/manager of the offshore rocks (above ordinary high water) that are separated from the shore at high tide
- BLM - Owner/manager of shoreline and landward portions of Sisters Rocks
- Curry County - Planning and zoning regulations

Private Property Owners

Human Use Concerns and Suggested Management Approaches

- 1) Areas north and south of Arizona Beach (site 23.2) - Possible overuse of rocky intertidal.
Suggested Approach: Use interpretive signs and volunteers to educate the public about appropriate intertidal etiquette.

2) Sisters Rocks and shoreline areas to the south (site 23.3) - Possible disturbance of seabird colonies due to sea kayaks and other boats.

Suggested Approach: Provide information to vessel owners and operators concerning the need to minimize disturbance. Provide educational information to sea kayak publications and clubs.

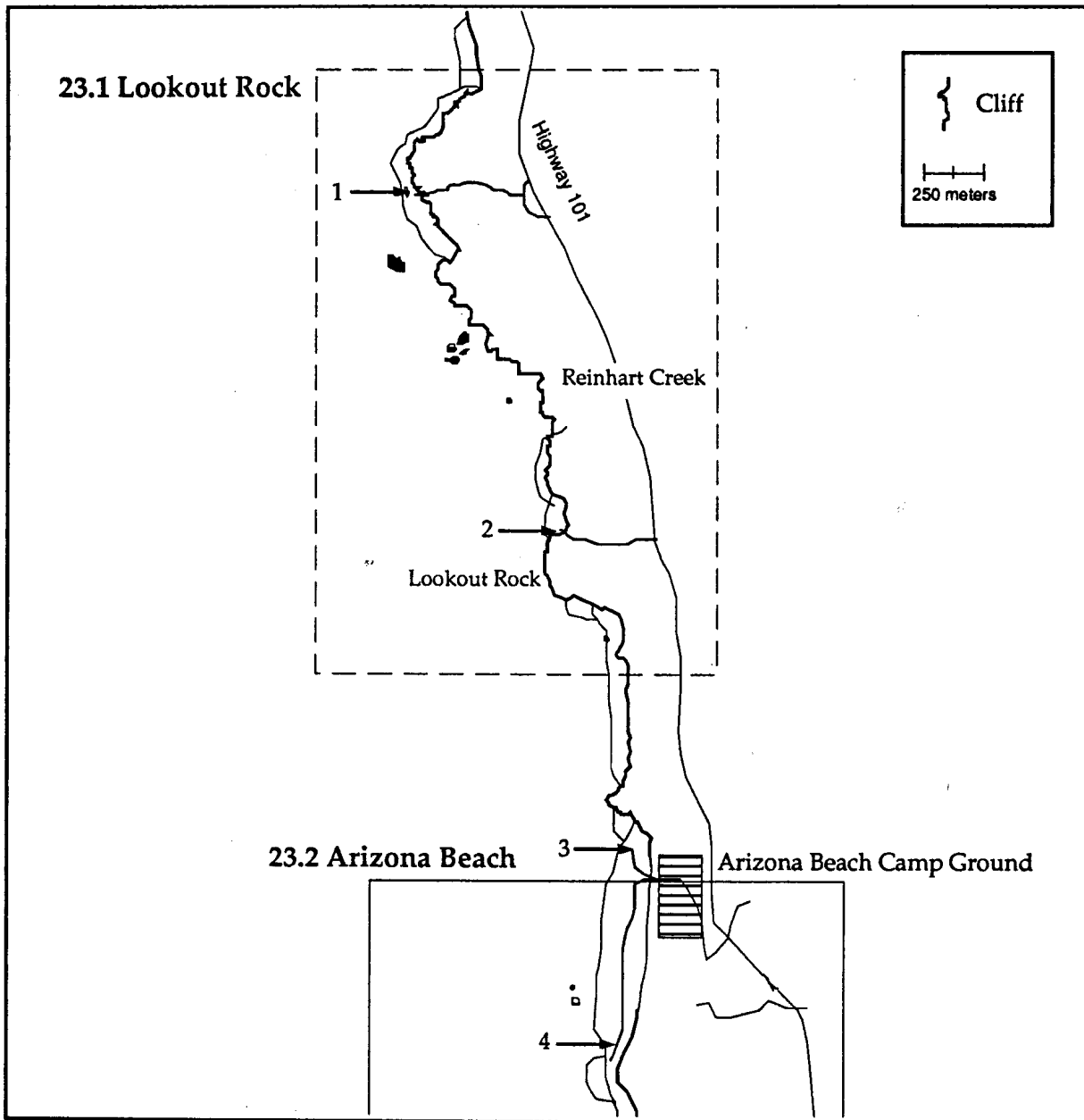
3) Sisters Rocks (site 23.3) - Possible future overuse problem of rocky intertidal areas and disturbance to nesting seabirds resulting from proposed US BLM plans to improve vehicular access to beach and provide day-use facilities.

Suggested Approach: Development plans should not include improved public access to mainland rocks used by nesting seabirds. Interpretive signs should be used near any day-use facilities to inform the public about the sensitivity of nesting sites and intertidal areas to human disturbance.

Additional Opportunities

Much of the cell receives little use because it is remote and shorelines are difficult to access. The primary opportunity for increased interpretive efforts is at Sisters Rocks, especially if BLM improves access and facilities at the site. The Arizona Beach campground provides a good site for interpretive programs on rocky intertidal habitat.

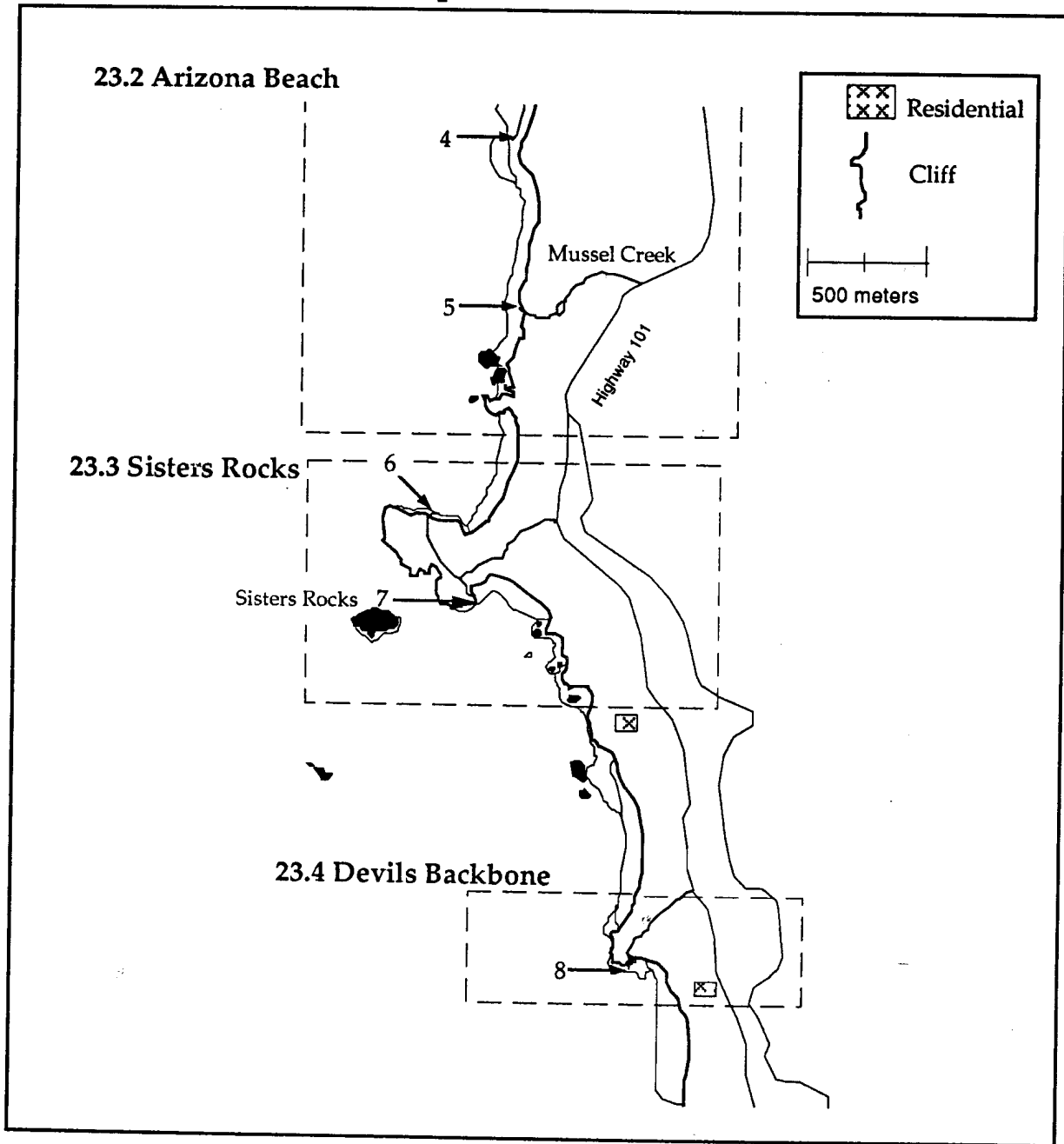
Frankport Cell (north)



ID No.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/Trail Difficulty*	Length (ft)
1	Highway 101 pullout		5	primitive/M	1200
2	Lookout Rock		U	primitive/D	1320
3	Arizona Beach		125+	gravel-beach/E	1300
4	Arizona Beach - south		125	gravel-beach/E	2600
* (E = easy M = moderate D = difficult)				U = unknown	
†Combined count for access 3 and 4.					

Figure 3.23a. Upland characteristics for the northern Frankport Cell.

Frankport Cell (south)

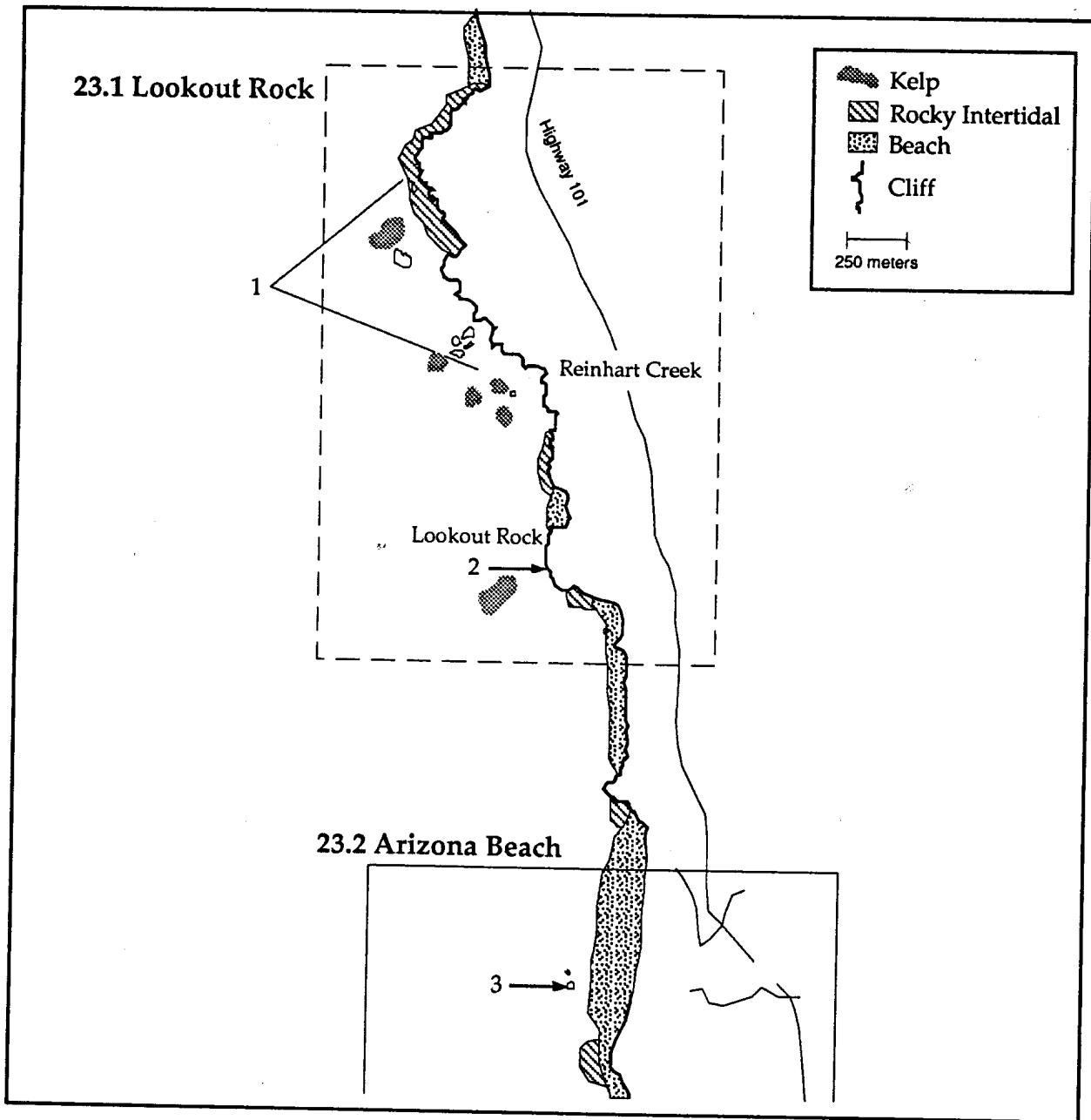


ID No.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/Trail Difficulty*	Length (ft)
5	Pigeon Point Roads		5	gravel/E	1000
6	Sisters Rock - north		50+	gravel-beach/E	3040
7	Sisters Rock - south		50	gravel/E	1760
8	Devil's Backbone		3	primitive/D	1000

* (E = easy M = moderate D = difficult)
 †Same parking area for Access 6 and 7.

Figure 3.23b. Upland characteristics for the southern Frankport Cell.

Frankport Cell (north)

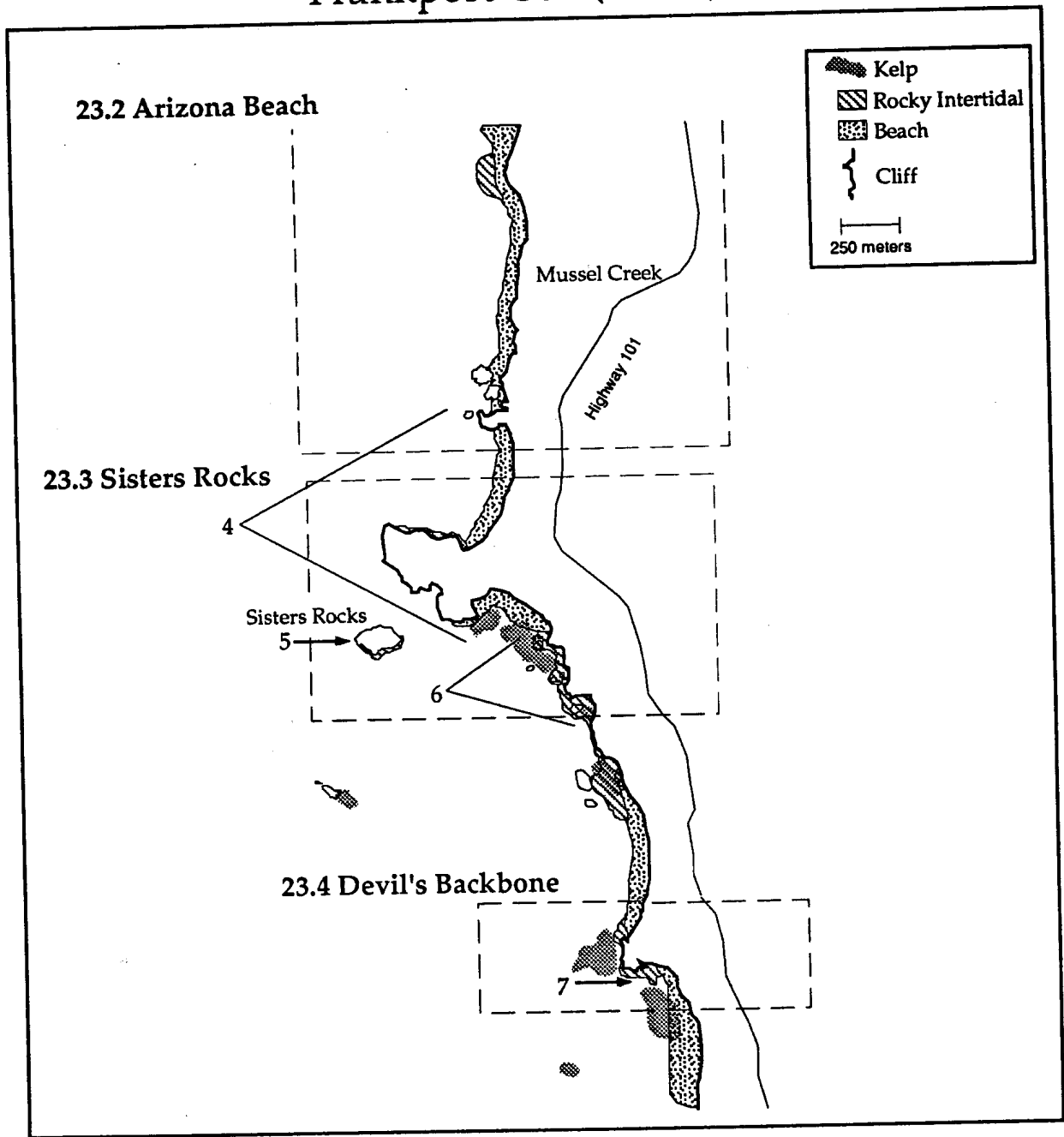


ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
1	Seabird	5 small	Rocks	No	
2	Seabird	1 small	Cliff	Yes	
3	Seabird	1 small	Rocks	Yes	

T & E species that occur in northern half of cell: none

Figure 3.23c. Rocky shore natural resources for the northern Frankport Cell.

Frankport Cell (south)



ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
4	Seabird	3 small	Cliff	No	
5	Seabird	1 medium	Rock	No	Aircraft, Vessel
6	Seabird	1 small	Rocks	Yes	
7	Seabird	1 small	Cliff	Yes	

T & E species that occur in southern half of cell: Brown pelican, peregrine falcon.

Figure 3.23d. Rocky shore natural resources for the southern Frankport Cell.

CELL 24: HUBBARD

The Hubbard cell is located north of Gold Beach and includes three rocky shore sites: 24.1 Nesika Head, 24.2 Hubbard Mound Rocks, and 24.3 Otter Point (Figure 3.24a). Shoreline features include extensive rocky intertidal areas, steep cliffs, sand and gravel beaches, and numerous low-elevation offshore rocks. Otter Point State Wayside provides access to intertidal areas from Otter Point north to Hubbard Mound. The south side of Otter Point can also be reached along the beach by four-wheel drive vehicles gaining access at the Rogue River south jetty. Hubbard Mound and Nesika Head are private lands with restricted beach access.

Rocky Shores Resources

The shoreline is part of the Otter Point Formation, a mixture of sedimentary, volcanic and metamorphic rock types (Baldwin 1976). Hard, tilted sandstone strata form the cliffs at each rocky point and provide the source of boulders and cobble in adjacent areas. Boulders and cobble of conglomerate and metamorphic rock types are also common intertidally. A marine terrace composed of very soft sandstone overlies each rocky point.

The outer, exposed portions of each rocky point are primarily steep cliff. Adjacent rocky intertidal areas are a mixture of low-slope eroded bedrock and cobble, with sand and gravel filling most rock fissures and tidepools. Numerous low-elevation rocks within the surf zone remain inaccessible during low tide. Most of the intertidal areas between each rocky point are subject to sand scouring and periodic sand burial resulting in low macroinvertebrate diversity. Areas of steep cliff and large boulders have invertebrate communities adapted to a high energy environment. Many algal species are well adapted to a sand-influenced habitat and there is a moderate to high diversity and abundance of algae at each site. Nearshore subtidal reefs support numerous patches of bull kelp (*Nereocystis leutkeana*) in most years (Figure 3.24b).

The cell's cliffs and offshore rocks support a total of 10 seabird nesting colonies. Dog rock

and an unnamed rocks off Hubbard Mound (site 24.2) have the largest colonies (Figure 3.24b). Together, both rocks support over 15,000 birds according to a 1988 survey (USFWS 1988). Common murre is the principal bird species on these rocks; other species include Brandt's cormorant and western gull. Dog rock is one of five major haulout sites for harbor seals on the south coast (Oregon Ocean Resources Management Task Force 1991). The Oregon Ocean Plan lists both rocks as especially sensitive bird and mammal habitats (Oregon Ocean Resources Management Task Force 1991). Species that comprise the numerous small colonies in the cell include pelagic cormorant, western gull, pigeon guillemot, and black oystercatcher. The endangered brown pelican also uses the cell. Soft sandstone strata on top of Otter Point are full of burrows used by violet-green and rough-winged swallows.

Human Use

Human activities in the cell include picnicking, beach combing, tide pooling, angling, bird watching and whale watching. A commercial fishery for red sea urchins uses subtidal reefs throughout the area. Rocky intertidal areas at each site receive low to moderate human use, primarily by local residents. There are no signs leading travelers along Highway 101 to Otter Point State Wayside, therefore tourist visitation is currently low. Beach access to areas near Hubbard Mound and Nesika Beach is limited by private land ownership.

Management Authorities and Jurisdictions

ODFW	- Harvest regulations (marine invertebrates and finfish)
PRD	- Owner/manager of Otter Point State Wayside - Co-manager of beaches with DSL
DSL	- Manager of submerged and submersible lands - Co-manager of beaches with PRD - Manager of kelp harvest leases
USFWS	- Owner/manager of the offshore rocks (above ordinary high water) that are separated from the shore at high tide
Curry County	- Planning and zoning regulations
Private Property Owners	

Human Use Concerns and Suggested Management Approaches

1) Dog Rock and unnamed rock off Hubbard Mound (site 24.2) - Possible boat and aircraft disturbance to seabird nesting colonies.

Suggested Approach: Provide information to vessel and aircraft owners and operators concerning the need to minimize disturbance. The disturbances should be studied and management measures developed that are designed to address site specific concerns.

2) Otter Point (site 24.3) - Possible disturbance to nesting seabirds and swallows caused by foot traffic.

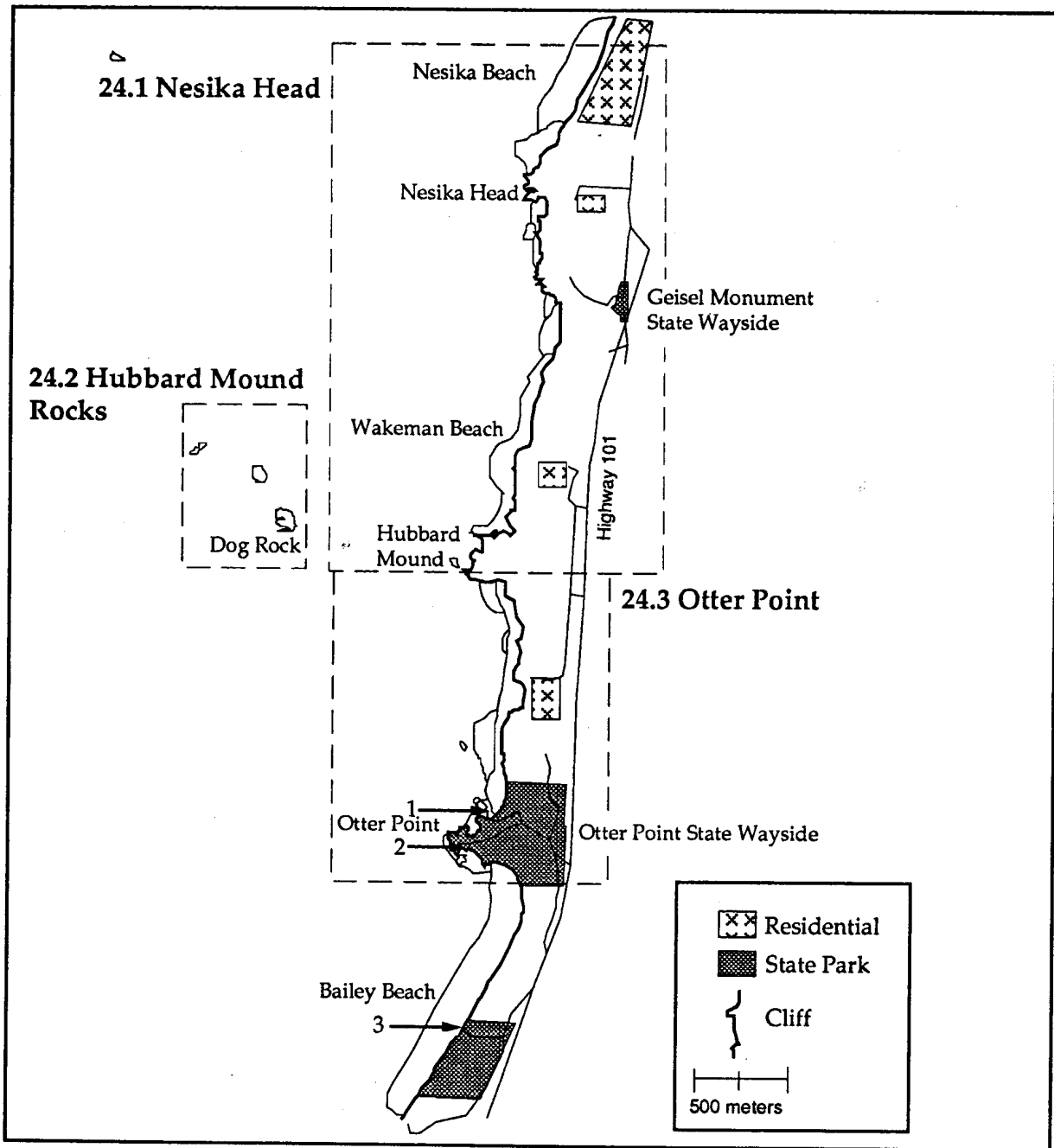
Suggested Approach: There are currently several foot trails leading to cliff-side picnic tables in areas used by burrow-nesting birds. Possible solutions include: a) move picnic tables away from cliff edge or remove during

nesting season, b) re-vegetate current cliff-side picnic sites and focus day-use to other less sensitive sites on Otter Point, and c) use interpretive signs at access trail to inform public of possible disturbance to birds during nesting season. It may be necessary to close access to the tip of Otter Point to minimize disturbance to burrow nesting seabirds. The disturbances should be studied and final management solutions should be designed to address site specific concerns.

Additional Opportunities

There are currently no interpretive or educational programs offered at sites in this area. Human use and impacts on intertidal areas is low at this time. Opportunities exist for interpretive signs at Otter Point that inform the public of possible disturbance to burrow and cliff-nesting bird species during nesting season.

Hubbard Cell

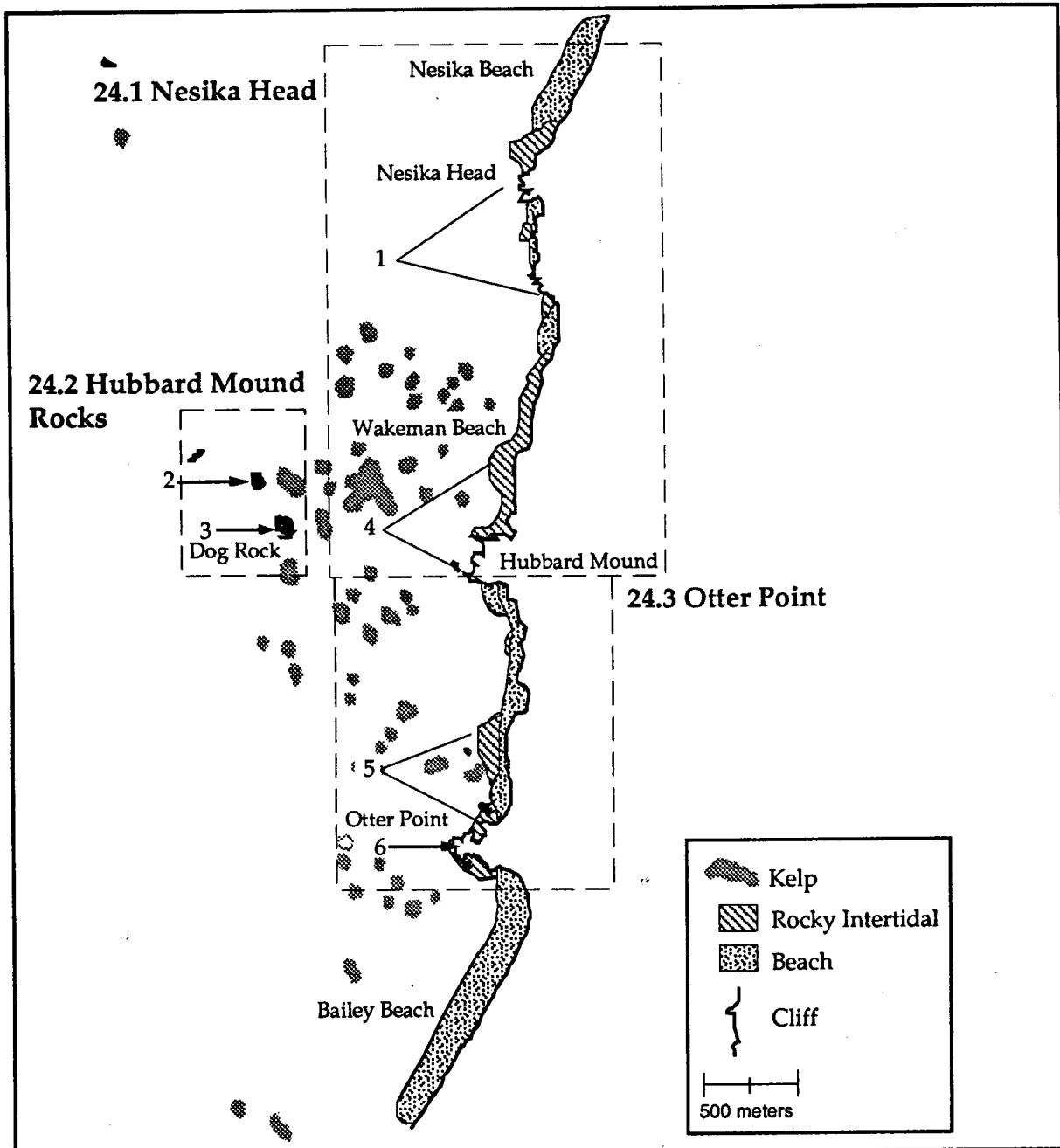


ID No.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/Trail Difficulty*	Length (ft)
1	Otter Point State Park	44,000	10	primitive/M	1000
2	Otter Point (view only)		10+	primitive/E	500
3	Bailey Beach		U	beach/M	3000

* (E = easy M = moderate D = difficult)
 †Combined count for Access 1 and 2.
 U = unknown

Figure 3.24a. Upland characteristics for the Hubbard Cell.

Hubbard Cell



ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
1	Seabird	2 small	Rocks	Yes	
1	Seabird	1 medium	Cliff	Yes	
2	Seabird	1 x-large	Rocks	No	Aircraft, Vessel
3	Seabird	1 large	Rocks	No	Aircraft, Vessel
3	Harbor Seal	1 medium	Rocks	No	Aircraft, Vessel
4	Seabird	1 small	Rocks	Yes	
4	Seabird	1 medium	Cliff	Yes	
5	Seabird	2 small	Rocks	Yes	Foot
6	Seabird	1 small	Cliff	Yes	Foot

T & E species that occur in cell: Brown pelican

Figure 3.24b. Rocky shore natural resources for the Hubbard Cell.

CELL 25: ROGUE REEF

Rogue Reef is a nearshore rocky reef system that begins approximately one and one-half miles northwest of the Rogue River mouth and extends three and one-half miles west of the mainland. Two small areas of reef to the north and west of Hubbard Mound are associated with Rogue Reef. This cell includes several emergent rocks up to 106 feet in elevation, numerous wash rocks, approximately two square miles of submerged rocky reef less than 60 feet in depth, and extensive seasonal beds of bull kelp (*Nereocystis leutkeana*).

Rocky Shores Resources

Rogue Reef is a relic formation of rock types eroded from a Pleistocene headland once extending from the Otter Point area. It is composed of material from the Otter Point Formation, a mixture of sedimentary, volcanic and metamorphic rock types, late Jurassic in age (Baldwin 1976). Rock types exposed at Otter Point and directly north at Hubbard mound include hard sandstones, conglomerate, and various metamorphic rocks. Presumably these same rock types form the structure of Rogue Reef.

Intertidal rocks support a California mussel/gooseneck barnacle assemblage typical of high-energy environments. This community covers almost all intertidal space available. The sea palm (*Postelsia palmaeformis*) exists on some rocks.

Portions of the reef support dense beds of bull kelp (*Nereocystis leutkeana*). In a 1990 survey, the reef's kelp beds accounted for about 9% of Oregon's bull kelp resources (Ecoscan 1991). In years when heavy seas occur during early to mid-summer, kelp that is in its emergent stage may be torn free, limiting growth of the reef's kelp bed. In 1992 SCUBA surveys, ODFW documented very diverse and abundant invertebrate and fish communities throughout Rogue Reef.

The rocks of Rogue Reef support large seabird nesting colonies and pinniped haulouts. A total of over 3,000 birds use three colony sites

on the rocks (USFWS 1988). Nesting bird species include common murre as the dominant species, and small numbers of Brandt's and pelagic cormorant, western gull, pigeon guillemot, black oystercatcher, and tufted puffin. The largest breeding colony of Steller sea lions in the state uses the rocks of Rogue Reef as haulouts and pupping areas (Figure 3.25). California sea lions and a large group of harbor seals also use the rocks as haulout sites (Brown 1993). The Oregon Ocean Plan lists Rogue Reef as especially sensitive bird and mammal habitat (Oregon Ocean Resources Management Task Force 1991).

Human Use

The close proximity of Rogue Reef to the Port of Gold Beach makes this a popular site for recreational bottomfish fisheries, primarily during summer months. The primary commercial use of Rogue Reef is red sea urchin harvest, also primarily a summer fishery. Commercial urchin divers first landed red urchins from Rogue Reef in 1988. Between 1988 and 1991, divers landed a total of 6.8 million pounds of red urchins from the reef and the Nesika Beach area. There is a growing commercial bottomfish fishery on the reef.

Management Authorities and Jurisdictions

- ODFW - Harvest regulations (marine invertebrates and finfish)
- DSL - Manager of submerged and submersible lands
- Manager of kelp harvest leases
- USFWS - Owner/manager of the offshore rocks (above ordinary high water) that are separated from the shore at high tide

Human Use Concerns and Suggested Management Approaches

1) Pyramid Rock - Vessel disturbance to Steller sea lion pupping areas.

Suggested Approach: Observations by ODFW and the USFWS in 1988 and 1989 indicated that Steller sea lion usage and pup production patterns at Orford Reef were being disrupted by human activities, particularly urchin harvest operations. These findings resulted in establishment of 1000 foot buffer zones around two rocks on Orford Reef (Figure 3.20) and around

Pyramid Rock on Rogue Reef (Figure 3.25) that excluded the urchin fishery from May 1 to August 31. In addition, ODFW and the Port of Gold Beach launched an education effort to inform users of sea lion disturbance issues. Beginning in 1994, ODFW applied the Pyramid Rock closure zone to sport or other commercial fishery activities to reduce the overall vessel disturbance.

2) Other offshore rocks within the reef - Possible boat and aircraft disturbance to seabird nesting colonies.

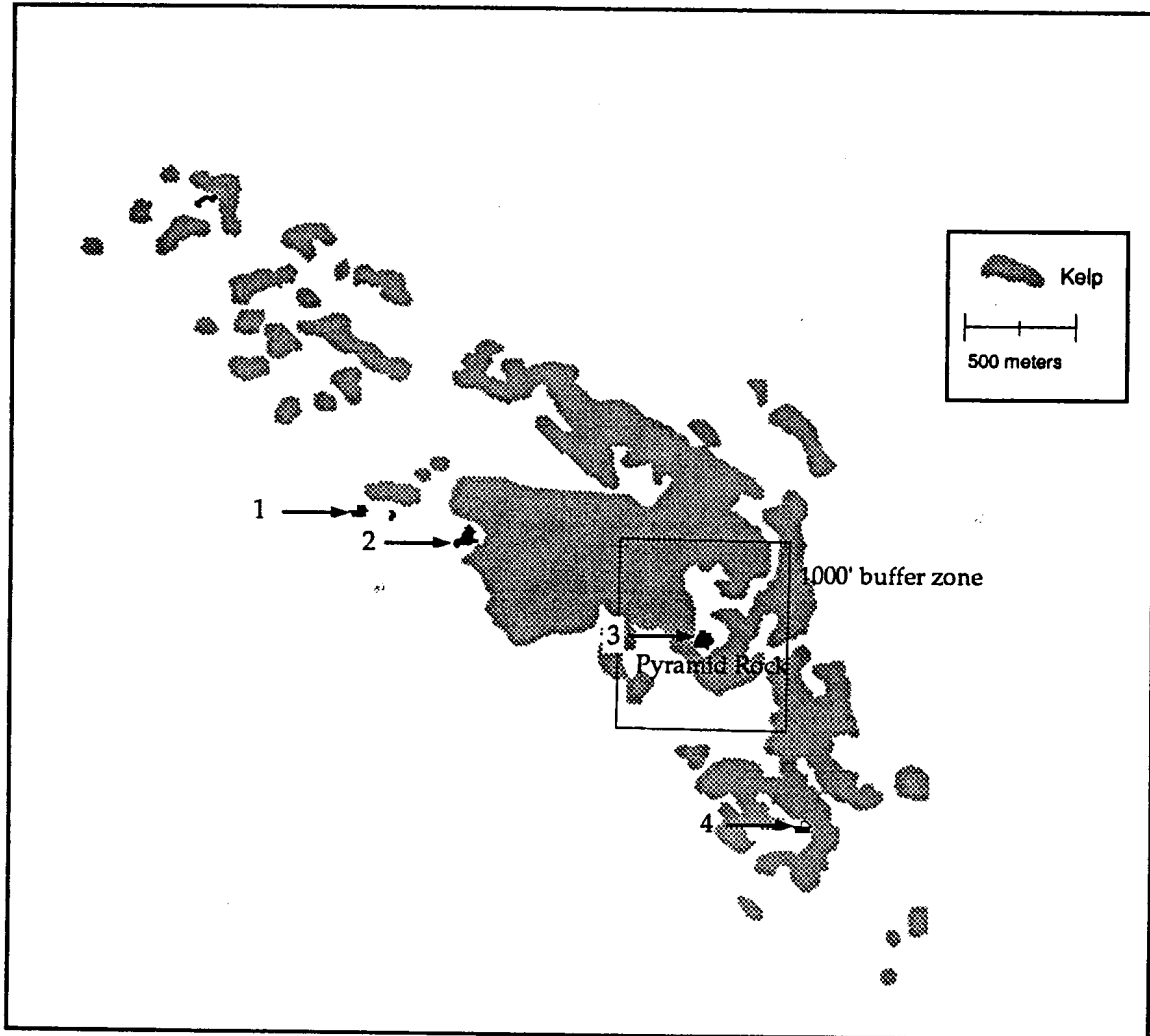
Suggested Approach: Provide information to

vessel and aircraft owners and operators concerning the need to minimize disturbance. The disturbances should be studied and management measures developed that are designed to address site specific concerns.

Additional Opportunities

There are opportunities to increase the educational efforts concerning seabird and marine mammal impact issues. The Port of Gold Beach is an ideal site for educational signs and pamphlets.

Rogue Reef Cell



ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
1	Seabird	1 medium	Rocks	No	Aircraft, Vessel
1	Calif Sealion	1 medium	Rocks	No	Aircraft, Vessel
2	Seabird	1 large	Rocks	No	Aircraft, Vessel
2	Calif Sealion	1 medium	Rocks	No	Aircraft, Vessel
3	Seabird	1 medium	Rocks	No	Aircraft, Vessel
3	Calif Sealion	1 small	Rocks	No	Aircraft, Vessel
3	Steller	1 large	Rocks	No	Aircraft, Vessel
4	Harbor Seal	1 medium	Rocks	No	Aircraft, Vessel
4	Steller Sealion	1 small	Rocks	No	Aircraft, Vessel

T & E species that occur in cell: Steller sea lion, Peregrine falcon

Figure 3.25. Rocky shore natural resources for the Rogue Reef Cell.

CELL 26: CAPE SEBASTIAN

Cape Sebastian is a prominent rocky headland about six miles south of Gold Beach. This cell has two rocky shore sites: 26.1 Cape Sebastian and 26.2 Meyers Creek Rocks (Figure 3.26a). Shoreline features include steep cliffs, small rocky intertidal areas, cobble and sand beach, one large island, and several nearshore low and high-elevation rocks. The western cliff face of Cape Sebastian is inaccessible, while the small rocky intertidal area on the south side at Hunters Cove is accessed either by a one-half mile walk along the beach from Highway 101 or by a two-mile trail leading from the top of the cape. The north side of the cape is reached by hiking along the beach from access sites south of Gold Beach. A cluster of sea stacks exists close to shore near the mouth of Meyers Creek and adjacent to a large scenic overlook along Highway 101. The inshore rocks are easily accessible during low tide, while the outer rocks and Hunters Island to the north remain inaccessible. State Parks manages Cape Sebastian and shorelands at Hunters Cove as part of Cape Sebastian State Park. Part of the Meyers Creek area is in the Pistol River State Park.

Rocky Shores Resources

Cape Sebastian consists of two geologic formations, both late Cretaceous in age. The western portion of the cape is composed of sandstone and conglomerates of the Cape Sebastian Formation (Baldwin, 1976). Siltstone and sandstone of the Hunter Creek Formation overlay the cape, and extend intertidally on the south side at Hunters Cove and form the first small headland on the north side of the cape. The seastacks and wash-rocks at Meyers Creek exist as resistant relics of the Otter Point Formation, late Jurassic in age.

The predominant rocky intertidal habitat types in this area are moderate to high-slope platform and steep cliff. The southwest portion of Cape Sebastian is high-relief platform with numerous surge channels, while the northwest face is mostly sheer cliff. Hunters Island and the Meyers Creek seastacks consist of cliff and high-slope platform. Small areas of cobble and

boulders exist on the south (Hunters Cove) and north sides of the cape, and on the inshore, protected faces of several of the Meyers Creek seastacks. Sand scour and burial influence the cobble areas at Hunters Cove and all the rocks at Meyers Creek. Intertidal communities at these sites have low to moderate diversity but some species adapted to periodic sand burial may be very abundant. These include aggregating and green anemones and several algal species. The exposed outer faces of Cape Sebastian, Hunters Island and the Meyers Creek seastacks have biological communities adapted to a high-energy environment, primarily California mussels, gooseneck barnacles, sea palm and *Laminaria* algae. There are several kelp patches off Hunters Island and Meyers Creek Rocks (Figure 3.26b).

Seabirds and pinnipeds utilize several parts of the cell (Figure 3.26b). Hunters Island has the largest seabird nesting colony in the cell with about 22,000 birds (USFWS 1988). This includes about 20,000 leaches storm petrels that build nest burrows in the island's thick soil cover. Western gull, and both double crested and pelagic cormorant are also abundant on the island. In total, ten species nest on the island. The endangered Aleutian Canada goose utilizes Hunter Island during spring migrations and the brown pelican can be found in the area from spring through fall (Oregon Ocean Resources Management Task Force 1991). The island also provides a significant harbor seal haulout and pupping site (Brown 1993). The Oregon Ocean Plan lists Hunter Island as especially sensitive bird and mammal habitat (Oregon Ocean Resources Management Task Force 1991). Sea stacks adjacent to Meyers Creek (site 26.2) have smaller seabird nesting colonies. The largest of these colonies has about 400 leaches storm petrels (USFWS 1988). The cliffs of Cape Sebastian support several small nesting colonies (Figure 3.26b). The principal nesting species include pelagic cormorant and pigeon guillemot (USFWS 1988).

Human Use

Human uses in the cell include sight seeing, tide pooling, beach combing, bird watching, and windsurfing. The sand beach at Hunters Cove is a popular site for razor clam digging. The Meyers Creek seastacks are adjacent to a large scenic pullout on Highway 101 and the inshore

rocks receive moderate use, primarily by tourists and windsurfers. There are no nearby camping or day-use facilities, so most visitation is spontaneous when low tides are convenient. The only accessible intertidal portions of Cape Sebastian require walking over one-half mile along sand beach to reach. These sites receive little use. Hunters Cove has become a popular windsurfing area in recent years.

Management Authorities and Jurisdictions

- ODFW - Harvest regulations (marine invertebrates and finfish)
- PRD - Owner/manager of Cape Sebastian and Pistol River State Park property
- Co-manager of beaches with DSL
- DSL - Manager of submerged and submersible lands
- Co-manager of beaches with PRD
- Manager of kelp harvest leases
- ODOT - Owner of highway right-of-way (includes pull-offs from Highway 101)
- USFWS - Owner/manager of the offshore rocks (above ordinary high water) that are separated from the shore at high tide
- BLM - Owner of some of the rocks off Meyers Creek
- Curry County - Planning and zoning regulations
- Private Property Owners

Human Use Concerns and Possible Solutions

1) Hunters Island (site 26.1) - Potential boat (especially windsurfer) and aircraft disturbance to seabird nesting colonies.

Suggested Approach: Provide general information to vessel and aircraft owners and operators concerning the need to minimize disturbance. Specifically target windsurfers by placing information at windsurfer shops in the region and at access points. The disturbances should be studied and additional management measures developed that are designed to address site specific concerns.

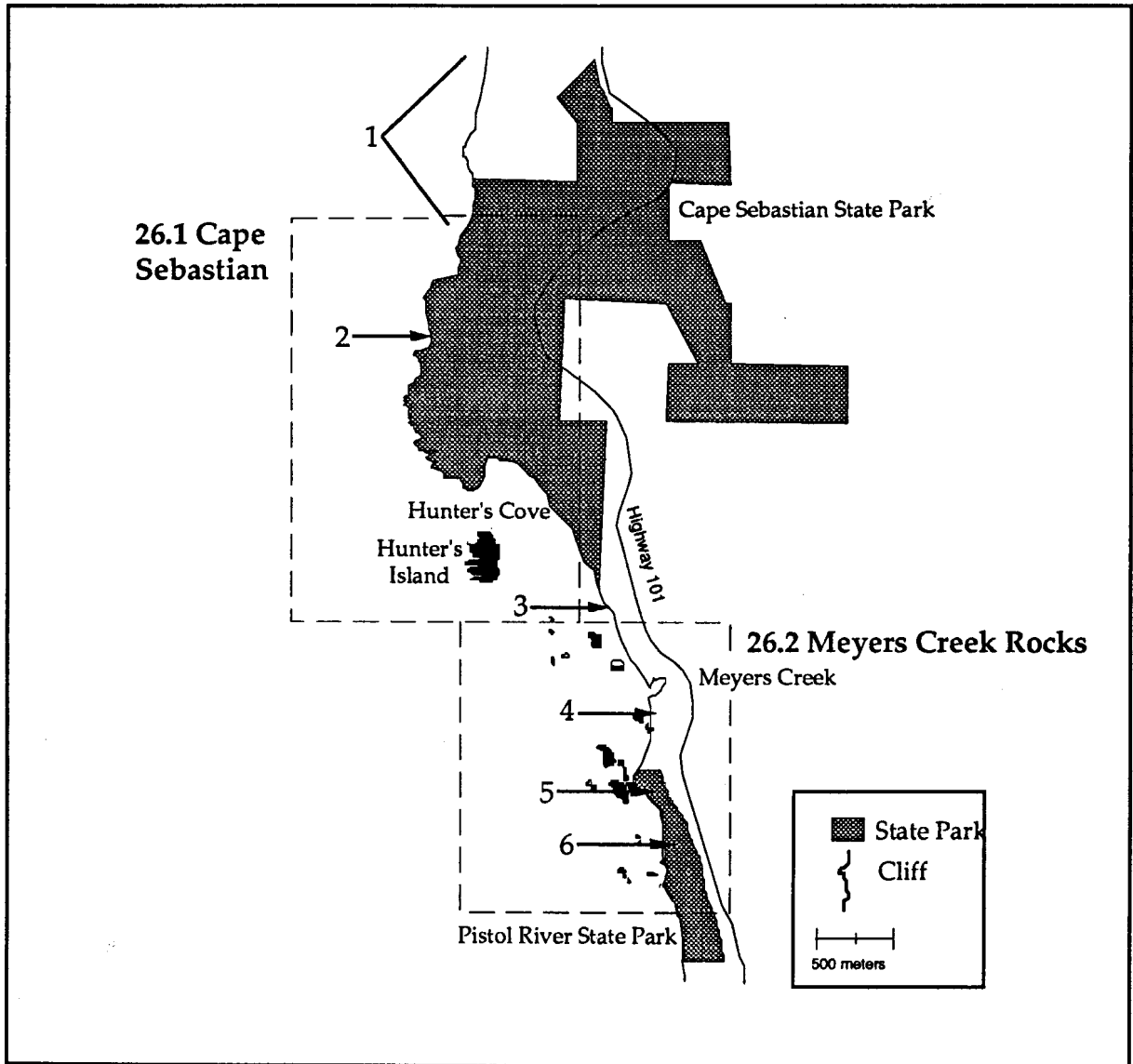
2) Meyers Creek Rocks (site 26.2) - Disturbance to bird nesting colonies on the nearshore accessible rocks.

Suggested Approach: Use interpretive signs to educate the public about possible human impacts to seabirds. Examine the disturbances in more detail and develop additional management measures that are designed to address site specific concerns.

Additional Opportunities

Signs offering interpretation of seabird nesting colonies should be placed on trails and highway pull offs that overlook nearshore rocks. Opportunities exist for placement of signs at Meyers Creek seastacks aimed at reducing impacts to seabirds.

Cape Sebastian Cell

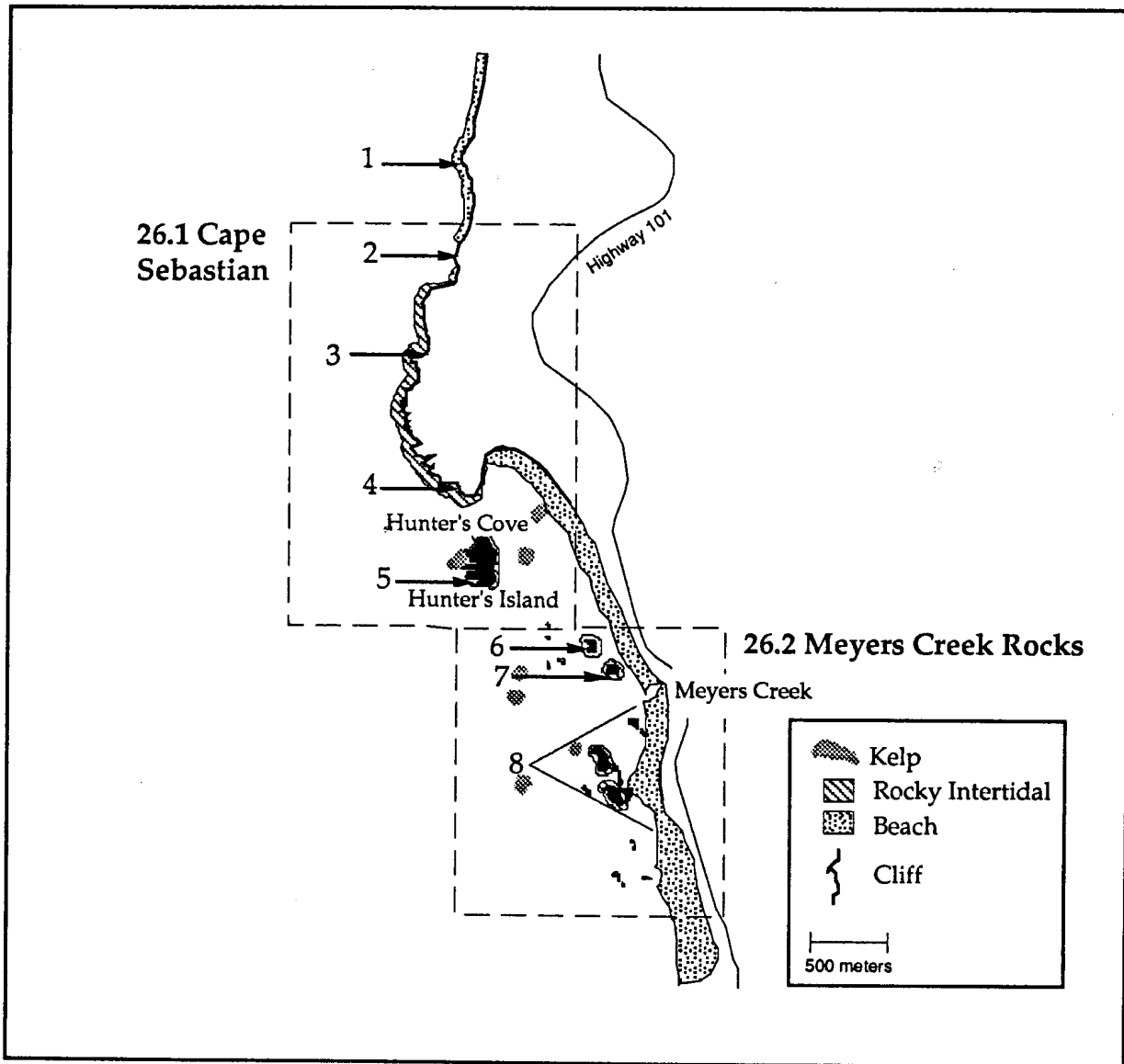


ID No.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/ Difficulty*	Trail Length (ft)
1	Beach north of Cape		U	beach/M	U
2	Cape Sebastian Park Trail	85,000	10	primitive/D	7920
3	Highway turnout		15	beach/M	2640
4	Meyer Creek Trail		20	beach/M	U
5	Pistol River State Park	67,000	30	beach/E	300
6	Pistol River Beach turnout		7	beach/E	U

* (E = easy M = moderate D = difficult) U = unknown

Figure 3.26a. Upland characteristics for the Cape Sebastian Cell.

Cape Sebastian Cell



ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
1	Seabird	1 small	Cliff	No	
2	Seabird	1 medium	Cliff	No	
3	Seabird	1 small	Cliff	No	
4	Seabird	1 small	Cliff	No	
5	Seabird	1 x-large	Rock	No	Aircraft, Vessel
5	Harbor Seal	1 medium	Rock	No	Aircraft, Vessel
6	Seabird	1 small	Rock	Yes	Foot, Vessel
7	Seabird	1 medium	Rock	Yes	Foot, Vessel
8	Seabird	1 medium	Rock	Yes	Foot, Vessel

T & E species that occur in cell: Brown pelican, Aleutian Canada goose

Figure 3.26b. Rocky shore natural resources for the Cape Sebastian Cell.

CELL 27: MACK ARCH

The Mack Arch cell is located south of Cape Sebastian and extends from Crook Point south six miles to Spruce Creek. This area includes five rocky shore sites: 27.1 Crook Point, 27.2 Mack Reef, 27.3 Mack Arch Cove, 27.4 North Boardman Park, and 27.5 Mid Boardman Park (Figures 3.27a and 3.27b). Shoreline features include extensive rocky intertidal areas, steep cliffs, numerous low and high-elevation offshore rocks, nearshore subtidal reefs with kelp beds, and sand and cobble beaches. The rugged, relatively undeveloped nature of the shoreline in this area makes beach access difficult at many sites. Access to Crook Point, Mack Point, and the rocky points north of Hooskanaden Creek requires walking one-half to two miles along sand and cobble beach, while the steep cliff faces, coves and headlands from Deer Point to Spruce Creek are mostly inaccessible.

Shorefront lands south of Burnt Hill Creek are managed by PRD as part of Samuel H. Boardman State Park and include several scenic overlooks along Highway 101, day-use facilities, and portions of the Coast Trail. The cove at Burnt Hill Creek and shorelands to the north, including Mack Point and Crook Point, are all private lands. A former salmon aquaculture facility is located at the mouth of Burnt Hill Creek and several private ocean-front residences are located to the north near Mack Point. Shorefront lands to the north of Crook Point and extending to Pistol River are part of Pistol River State Park.

Rocky Shores Resources

The rocky headlands and offshore rocks of this area consist of a mixture of sedimentary, volcanic and metamorphic rock types of the Otter Point and Hunter Creek Formations (Baldwin 1976; Oregon Div. of Geology and Mineral Industries 1976). Crook Point is primarily Otter Point basalt and forms the northern end of Mack Reef. The reef's most prominent feature is a fairly linear series of seastacks 100 to 200 feet high. These are relic ellipsoid pillow lavas formed underwater and subsequently lifted. Mack Point and the eroded headlands south to Hooskanaden Creek are composed of sandstone

strata of the Hunter Cove Formation. Southwest of Hooskanaden Creek, massive Otter Point conglomerates form Deer Point and adjacent seastacks. An outcrop of tilted sandstone strata is found just south of Arch Rock Wayside.

The cell contains a wide range of intertidal habitat types. Crook Point is a heavily eroded headland with high-relief broken bedrock and very large boulders on the outer, exposed portions and smaller boulders and cobble in more protected areas. Several broad areas of cobble interspersed with sand beach extend south toward Mack Point. The eroded sandstone headlands to the south include a mixture of boulder and cobble with some low to moderately-sloped platform. Moderate to steep-sloped platform and vertical cliff form the intertidal portions of headlands in the Deer Point area. The sites with a wide variety of habitat types have very diverse and abundant intertidal communities. Crook Point, though not extensive in area, has a particularly rich invertebrate and algal community. The many microhabitats formed within high-relief boulders and cobble areas support a diverse assemblage of invertebrates, while the low-slope cobble areas south of Crook Point and at Mack point have a very diverse and abundant assemblage of algal species. Another outstanding site is the series of eroded rocky points between Hooskanaden Creek and Burnt Hill Creek.

Dense subtidal kelp beds cover much of Mack Reef and extend along the cell's shoreline (Figures 3.27c and 3.27d). The beds, composed primarily of bull kelp (*Nereocystis*), indicate the existence of significant nearshore reefs along the coastline. In a 1990 survey, these kelp beds accounted for about 7.5% of the total subtidal kelp bed resource off of Oregon (Ecoscan 1991). The associated subtidal reefs help support a commercial fishery for red sea urchins, especially on Mack Reef. Commercial fishermen also harvest rockfish and lingcod from the reef.

The Mack Arch cell contains a total of 32 seabird nesting colony sites on cliffs, nearshore rocks, and offshore rocks (Figures 3.27c and 3.27d). The series of rocks extending from Crook Point to Mack Arch (sites 27.1 and 27.2) support some of the largest nesting colonies on the Oregon coast. A rock just north of Crook Point provides nesting habitat for about 100,000

seabirds while Saddle Rock, just off Crook Point, has nearly 90,000 birds (USFWS 1988). Leaches storm petrel is the primary nesting species, accounting for about 99% of the seabirds on the rocks. Other nesters include western gull and tufted puffin. Mack Arch supports about 14,000 nesting birds, primarily common murre. The other rocks of Mack Reef furnish habitat for numerous smaller colonies of common murre, Brandt's, double crested, and pelagic cormorants, western gull, leaches storm petrel, and pigeon guillemot. The Oregon Ocean Plan lists Mack Arch as an especially sensitive bird and mammal habitat (Oregon Ocean Resources Management Task Force 1991). The two rocks off Crook Point should be given equal status because they support large numbers of birds and are vulnerable to impact if use increases at the site. Most of the other colony sites in the cell extend along shoreline cliffs and nearshore rocks (Figures 3.27c and 3.27d). These colonies are relatively small and consist primarily of western gull, pigeon guillemot, double crested and pelagic cormorants, and black oystercatcher (USFWS 1988). The endangered peregrine falcon and brown pelican also use the cell (Lowe, pers. com. 1993).

The cell contains two harbor seal haulouts. Between 100 and 300 animals use the rocks adjacent to Crook Point and a smaller number of seals haul out on rocks near Deer Point (Figures 3.27c and 3.27d).

Human Use

Activities in this cell include sight seeing, beach combing, tide pooling, bird watching, and commercial fishing. The relative isolation of rocky shore sites and lack of developed beach access have resulted in little human use of intertidal sites in this area. Rocky areas between Crook Point and Hooskanaden Creek receive low use from people hiking along the beach. Scenic overlooks at the steep headlands to the south receive moderate to heavy use during summer, but access is limited to the shoreline at most of these sites. Burnt Hill Creek is the site of a former salmon aquaculture facility, including concrete holding ponds, a seawater pumping station and housing and maintenance buildings. This facility is not currently in operation. Shorelands at Mack Point have limited residential development. A commercial fishery

for red sea urchins uses Mack Reef and other nearshore reef sites. Mack Reef also provides a protective anchorage for boats.

Management Authorities and Jurisdictions

- ODFW - Harvest regulations (marine invertebrates and finfish)
- PRD - Owner/manager of Samuel H. Boardman State Park property
- Co-manager of beaches with DSL
- DSL - Manager of submerged and submersible lands
- Co-manager of beaches with PRD
- Manager of kelp harvest leases
- ODOT - Owner of highway right-of-way (includes pull-offs from Highway 101)
- USFWS - Owner/manager of the offshore rocks (above ordinary high water) that are separated from the shore at high tide
- Curry County - Planning and zoning regulations
- Private Property Owners

Human Use Concerns and Possible Solutions

1) Mack Arch (site 27.2) - Possible boat and aircraft disturbance to seabird nesting colonies.

Suggested Approach: Provide information to vessel and aircraft owners and operators concerning the need to minimize disturbance. The disturbances should be studied and additional management measures developed that are designed to address site specific concerns.

2) Crook Point Rocks (site 27.1) - Possible future disturbance to seabird nesting colonies if human use increases.

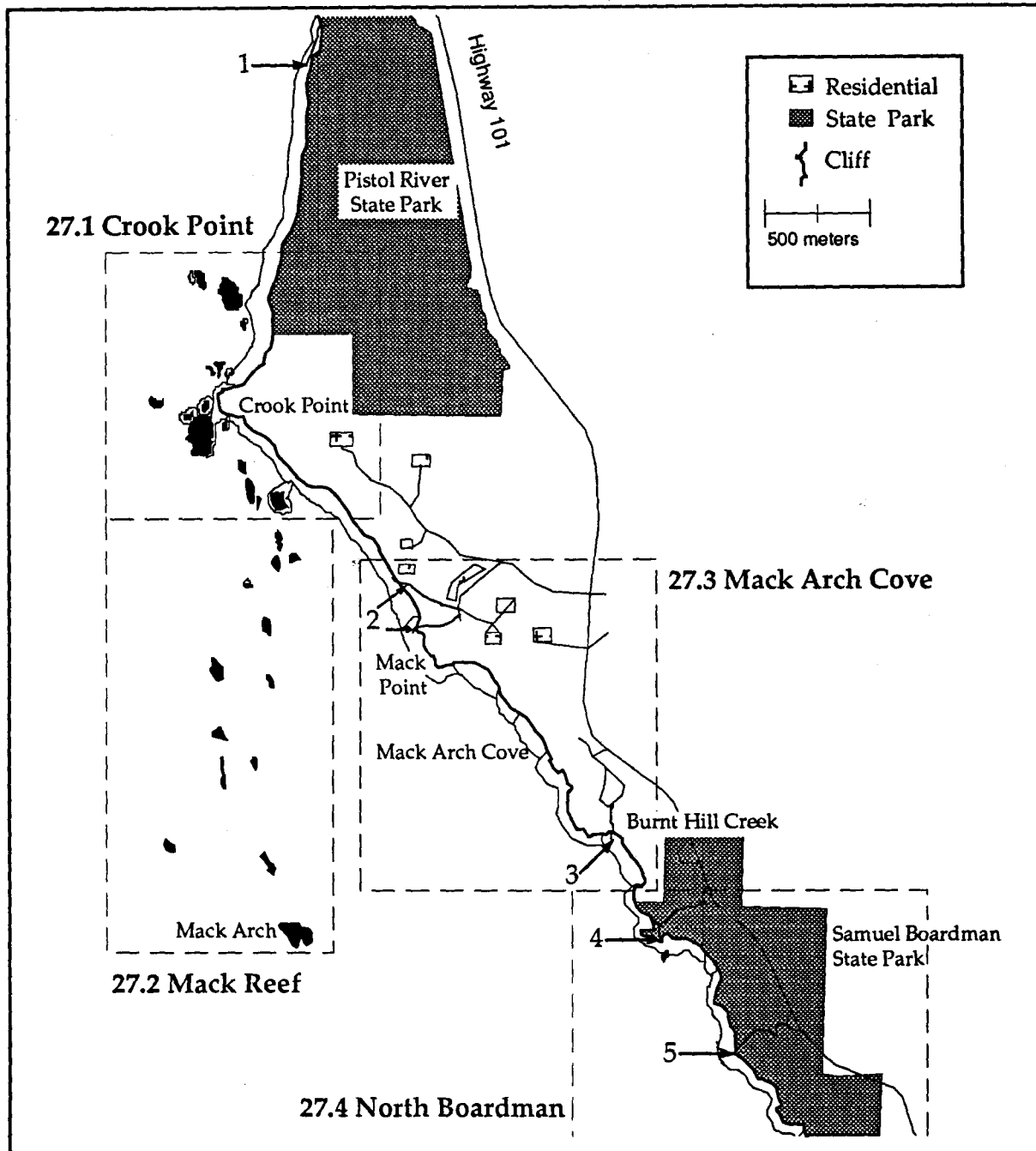
Suggested Approach: Future development may significantly increase human use of the beach at Crook Point. Any proposed development needs to be designed to minimize impacts to the seabird colonies. The residents in the development will need to be informed of the need to protect the nesting colonies and informational signs should be posted at the beach access. It may be necessary to close beach areas directly adjacent to the rocks if impacts are not controlled by education.

Additional Opportunities

Excellent opportunities exist for placement of seabird interpretive signs the scenic overlooks

along Highway 101. Current use of the shoreline is low and few other educational opportunities exist at this time.

Mack Arch Cell (north)

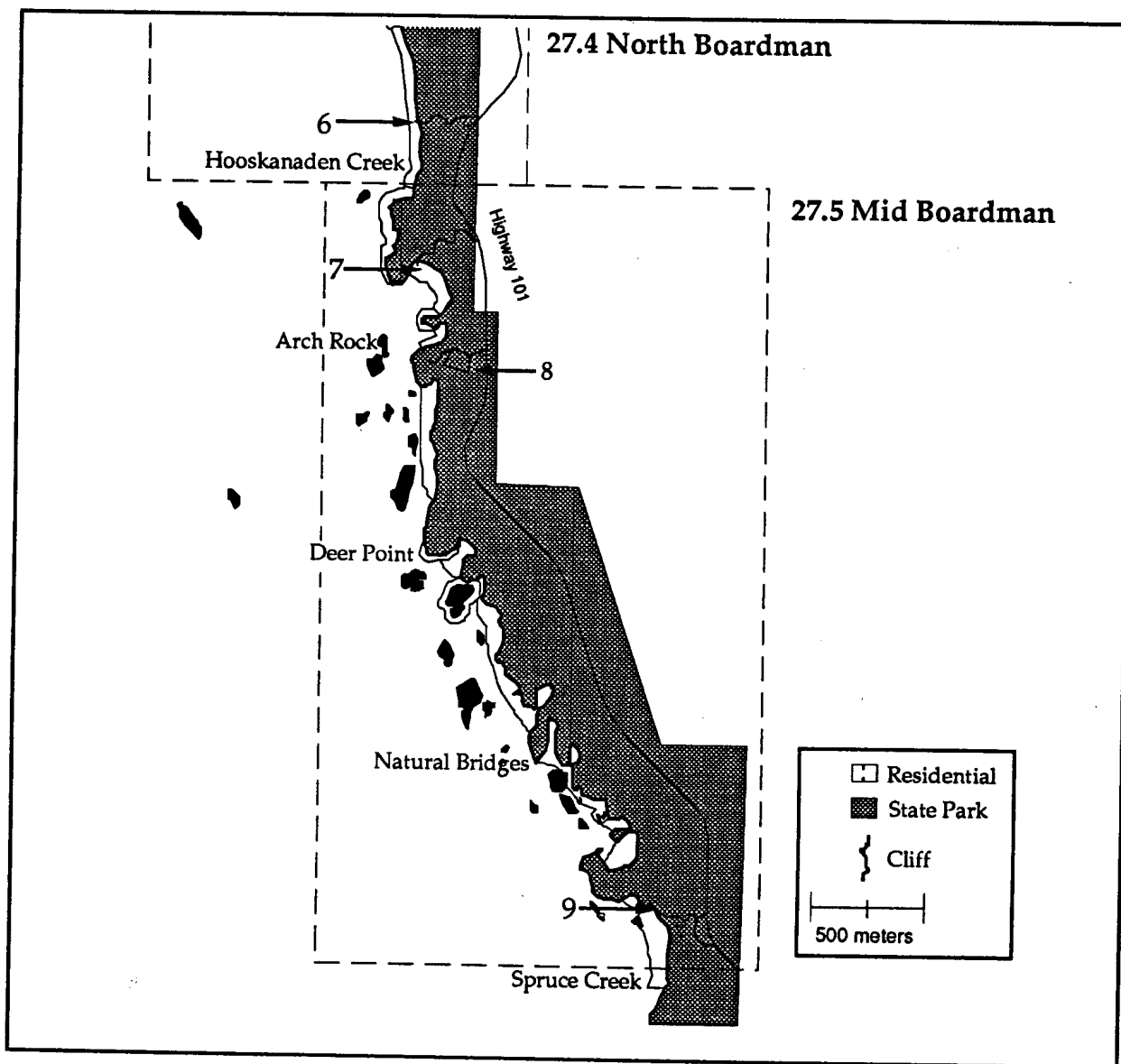


ID No.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/ Difficulty*	Trail Length (ft)
1	Beach Access (Pistol Park)		U	primitive/beach/D	10,560
2	Birdie Drive (private)		U	gravel/chipsD	2640
3	Burnt Hill Salmon Ranch		10	beach/M	2640
4	turnout S. of Burnt Hill Ck.		5	primitive/E	1000
5	central Boardman State Park		10	gravel/beach/E	1320

* (E = easy M = moderate D = difficult)
U = unknown

Figure 3.27.a Upland characteristics for the northern Mack Arch Cell.

Mack Arch Cell (south)

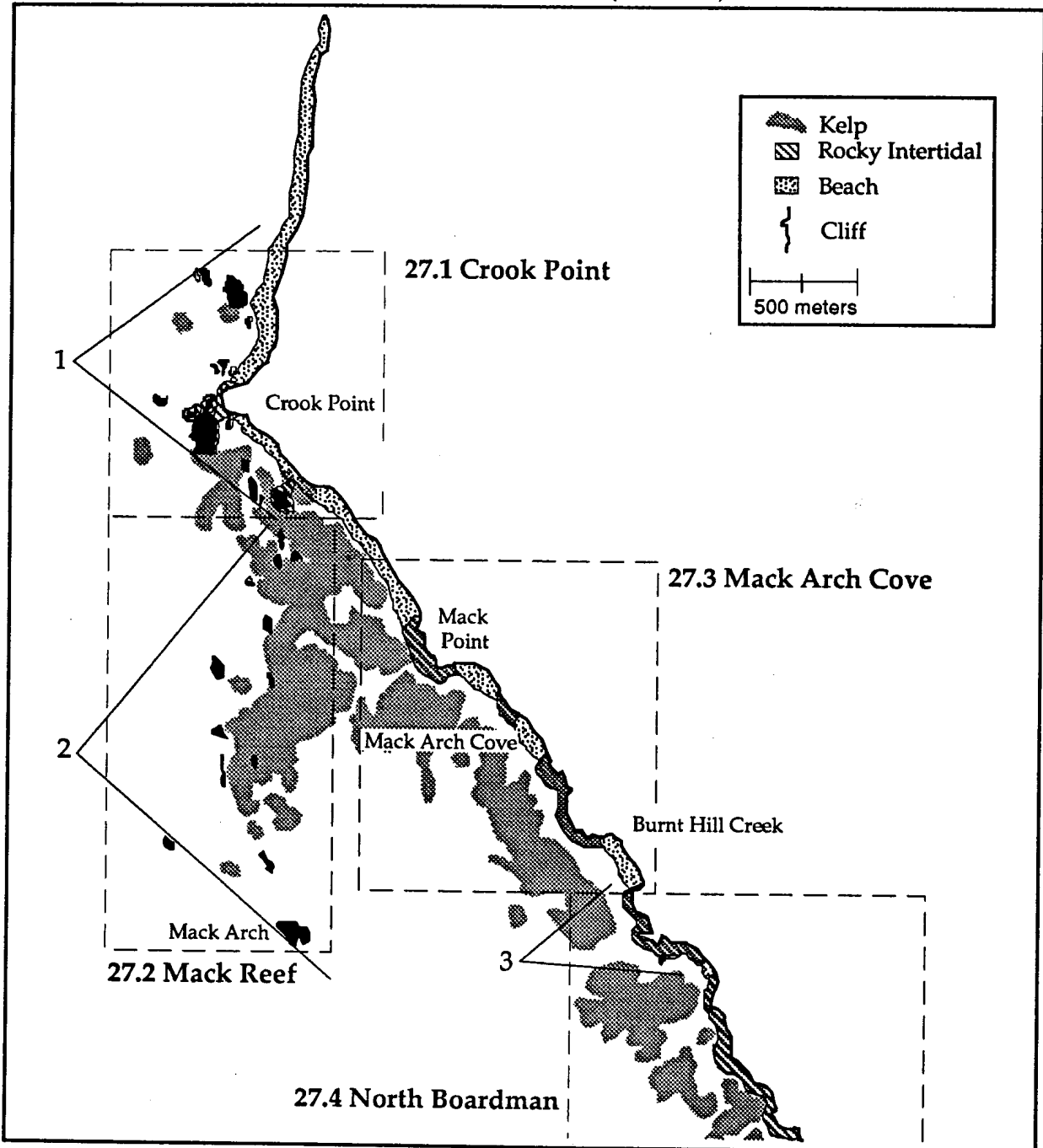


ID No.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/ Difficulty*	Trail Length (ft)
6	Boardman State Park		U	gravel/chips/E	1320
7	turnout s. of Houstenader Ck.		2	primitive/D	660
8	Arch Rock (viewpoint only)	108,000			
9	viewpoint trail n. of Spruce Creek		10	primitive/D	600

* (E = easy M = moderate D = difficult) U = unknown

Figure 3.27b. Upland characteristics for the southern Mack Arch Cell.

Mack Arch Cell (north)

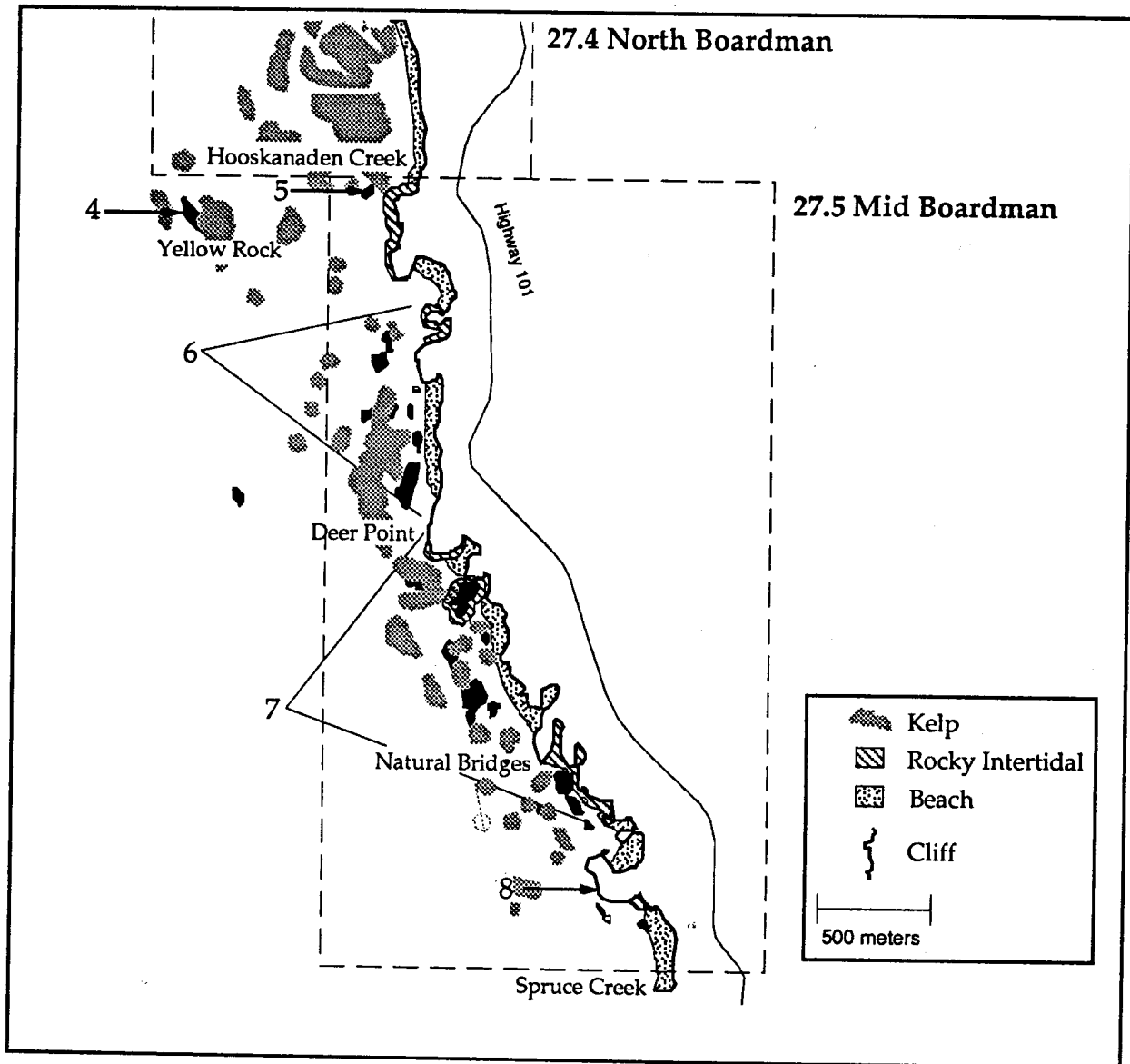


ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
1	Seabird	5 small	Rocks, Cliff	Yes	Foot, Vessel
1	Seabird	1 medium	Rocks	No	Foot, Vessel
1	Seabird	2 x-large	Rocks	Yes	Foot
1	Harbor Seal	1 medium	Rocks	Yes	Aircraft, Foot, Vessel
2	Seabird	3 small	Rocks	No	Aircraft, Vessel
2	Seabird	2 medium	Rocks	No	Aircraft, Vessel
2	Seabird	1 x-large	Rocks	No	Aircraft, Vessel
3	Seabird	2 small	Rocks	yes	

T & E species that occur in northern half of cell: Brown pelican, peregrine falcon.

Figure 3.27c. Rocky shore natural resources for the northern Mack Arch Cell.

Mack Arch Cell (south)



ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
4	Seabird	1 medium	Rock	No	Aircraft, Vessel
5	Seabird	2 small	Rocks/Cliff	Yes	Foot, Vessel
6	Seabird	6 small	Rocks/Cliff	No	Foot, Vessel
7	Seabird	7 small	Rocks/Cliff	No	Vessel
7	Harbor Seal	1 small	Rock	No	
8	Seabird	1 small	Cliff	Yes	Foot

T & E species that occur in southern half of cell: none

Figure 3.27d. Rocky shore natural resources for the southern Mack Arch Cell.

CELL 28: WHALESHEAD

The Whaleshead cell begins at Black Point, four miles north of the Chetco River, and extends north six miles to Thomas Creek. The cell has six rocky shore sites: 28.1 Thomas Creek, 28.2 Indian Sands, 28.3 Whaleshead Cove and Rocks, 28.4 Cape Ferrelo, 28.5 South Boardman Rocks, and 28.6 South Boardman Beaches. Shore features include extensive rocky intertidal areas, steep cliffs, numerous offshore rocks, subtidal reefs, and sand beaches. Most of the cell's shorelands are part of Samuel H. Boardman State Park. Lone Ranch Beach and Whaleshead Cove have day-use facilities and provide the only access to intertidal areas. Other sites are primarily steep cliff with difficult or no beach access. There are several scenic overlooks off Highway 101 and the Coast Trail provides additional overlooks for hikers.

Rocky Shores Resources

The shoreline is composed primarily of late Jurassic sedimentary strata of the Otter Point and Dothan Formations (Baldwin 1976; Oregon Dept. of Geology and Mineral Industries 1976). North of Whaleshead Cove, the steep cliffs, coves and nearshore rocks are composed of Otter Point sandstones and conglomerates. Cape Ferrelo is predominantly graywacke sandstone and siltstone of the Dothan Formation, with some boulders and cobble of volcanic rock, chert and conglomerate (Baldwin 1976; Oregon Dept. of Geology and Mineral Industries 1976).

North of Whaleshead Cove, the predominant intertidal habitat is steep cliff and high-slope platform, with many small coves and surge channels. Whaleshead Cove has a small cobble beach on its northern shore. Large detached boulders surround the points, with smaller cobble inshore in more protected areas. Sand beaches are found at Whaleshead Cove, at Lone Ranch Beach, and in several small coves along Cape Ferrelo. Whaleshead Island and the high-elevation rocks offshore of Cape Ferrelo are all sheer cliff. The extent of rocky shoreline, pristine nature of the site and variety of intertidal habitats at Cape Ferrelo make this one of the biologically richest sites in Oregon. The exposed, outer face of each rocky point has a community of mussels,

gooseneck barnacles, sea palm (*Postelsia*) and *Laminaria* algae typical of high-energy environments. The complex mixture of detached boulders and cobble surrounding each point provides many microhabitats of cracks, overhangs, pools and vertical faces. These support a diverse assemblage of sea stars, chitons, limpets, snails, nudibranchs, hydrozoans, sponges, tunicates, bryozoans, crustaceans, and both red and brown algae. This is also one of the few Oregon sites south of Cape Arago where relatively high numbers of purple sea urchins are found intertidally. At sites where moving sand is a factor, particularly Whaleshead Cove, Lone Ranch Beach, and smaller coves along Cape Ferrelo, diversity is lower but some species adapted to periodic sand burial may be very abundant.

Numerous small subtidal kelp beds form a near continuous strip along much of the cell's shoreline. The beds, composed primarily of bull kelp (*Nereocystis*), indicate the existence of significant nearshore reefs along the coastline. These reefs support a significant commercial fishery for red sea urchins.

The cliffs and offshore rocks of this cell provide some of the most extensive seabird nesting habitat on the coast. USFWS has identified 27 separate colony sites (Figures 3.28c and 3.28d). The largest colonies, with a combined total of approximately 160,000 birds, are located on Whaleshead Rocks (site 28.3), Twin Rocks (site 28.5), and a rock south of Indian Sands (site 28.2). A total of over 100,000 leaches storm petrels nest in the Whaleshead Rock and Indian Sands colonies (USFWS 1988). Common murrelets are abundant in the Whaleshead colony and are the predominant species on the Twin Rocks colonies. A total of ten seabird species nest on Whaleshead rocks. The endangered brown pelican also uses Whaleshead rocks and other offshore rocks as roosting sites. The Oregon Ocean Plan lists Whaleshead and Twin Rocks as especially sensitive bird and mammal habitats (Oregon Ocean Resources Management Task Force 1991). Harbor seals use many of the nearshore rocks in the cell as haulouts (Figures 3.28c and 3.28d). The principal sites are at Whaleshead Island and Cape Ferrelo.

Human Use

Human activities include sight seeing, beach combing, tide pooling, bird watching, angling, scuba diving, and sea kayaking. Lone Ranch Beach, the southern part of Cape Ferrelo, and Whaleshead Cove are the only sites providing easy access to intertidal areas. Lone Ranch Beach has a large parking lot and day-use facility. Total visitor count in 1992 was 180,000 visitor-days (PRD 1993). This beach provides access to several rocky points to the south and on the south side of Cape Ferrelo. Local school groups occasionally use the rocky intertidal area at Lone Ranch Beach for instruction. Cape Ferrelo is also an Oregon State Parks whale watching site. There are no maintained trails along much the rugged shoreline just north of Cape Ferrelo. The rocky shore at Whaleshead Cove is small but easily accessible and receives moderate use. Visitor count at the Whaleshead Wayside was 97,000 visitor-days in 1992 (PRD 1993). Small side trails branching from the Coast Trail provide access to cliffs near Thomas Creek, Indian Sands and the headlands north of Whaleshead Cove. There is a commercial fishery for red sea urchins on nearshore reefs all along the shoreline of the cell. Private and charter fishing vessels from Brookings also fish the nearshore reefs, kelp beds, and around the offshore rocks. Many of the nearshore reefs are popular among recreational SCUBA divers.

Management Authorities and Jurisdictions

ODFW	- Harvest regulations (marine invertebrates and finfish)
PRD	- Owner/manager of state park property - Co-manager of beaches with DSL
DSL	- Manager of submerged and submersible lands - Co-manager of beaches with PRD - Manager of kelp harvest leases
USFWS	- Owner/manager of the offshore rocks (above ordinary high water) that are separated from the shore at high tide
Curry County	- Planning and zoning regulations
Private Property Owners	

Human Use Concerns and Suggested Management Approaches

1) Whaleshead Rock (site 28.3) - Possible seabird disturbance from boats, aircraft, and sea kayaks

Suggested Approach: Signs should be posted at beach accesses to inform sea kayakers and other ocean users of the sensitivity of the nesting colony. In addition, similar information needs to be provided to vessel and aircraft owners and operators that originate from other areas. The disturbances should be studied and management measures developed that are designed to address site specific concerns.

2) Twin, Rainbow, and White Rocks (site 28.5) - Possible boat and aircraft disturbance to seabird nesting colonies.

Suggested Approach: Provide information to vessel and aircraft owners and operators concerning the need to minimize disturbance. The disturbances should be studied and management measures developed that are designed to address site specific concerns.

3) Accessible nesting sites on rocks and cliffs - Possible human disturbance to nesting seabirds from foot traffic.

Suggested Approach: Post signs at access trails that inform beach users of the sensitive nature of these sites to disturbance.

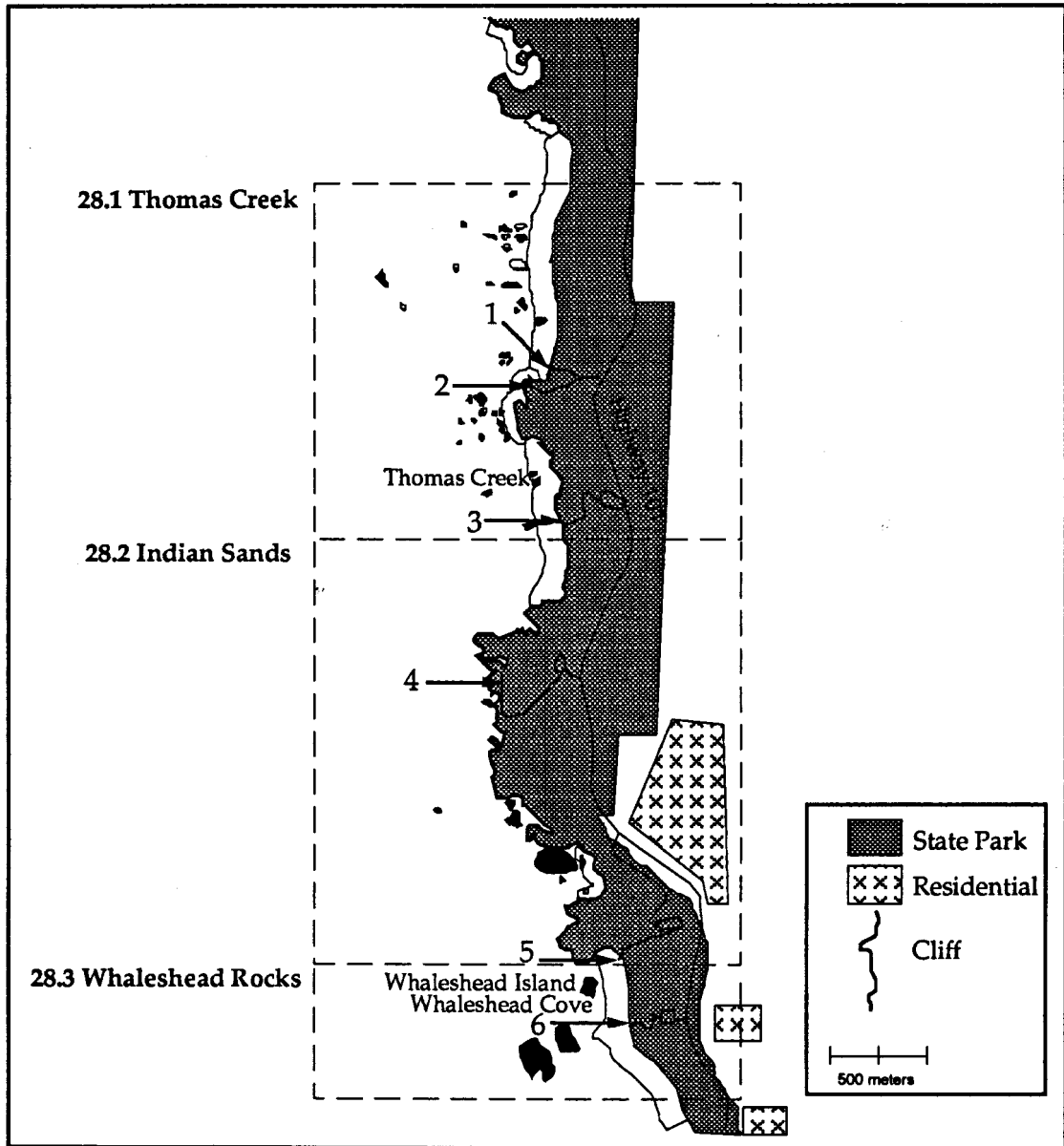
4) Rocky intertidal areas north and south of Lone Ranch Beach (sites 28.4 and 28.6) and in Whaleshead Cove (site 28.3) - Possible overuse.

Suggested Approach: Use interpretive signs and volunteers to educate the public about appropriate intertidal etiquette.

Additional Opportunities

Lone Ranch Beach is a good candidate for an interpretive program due to its high visibility from Highway 101, heavy use during summer, and easy access. Intertidal areas at both Lone Ranch Beach and Whaleshead Cove would benefit from interpretive signs at beach access trails. The numerous highway pull offs and scenic overlooks in Samuel Boardman Park provide an excellent opportunity for interpretive signs about seabird nesting and the sensitivity of the nesting sites.

Whaleshead Cell (north)

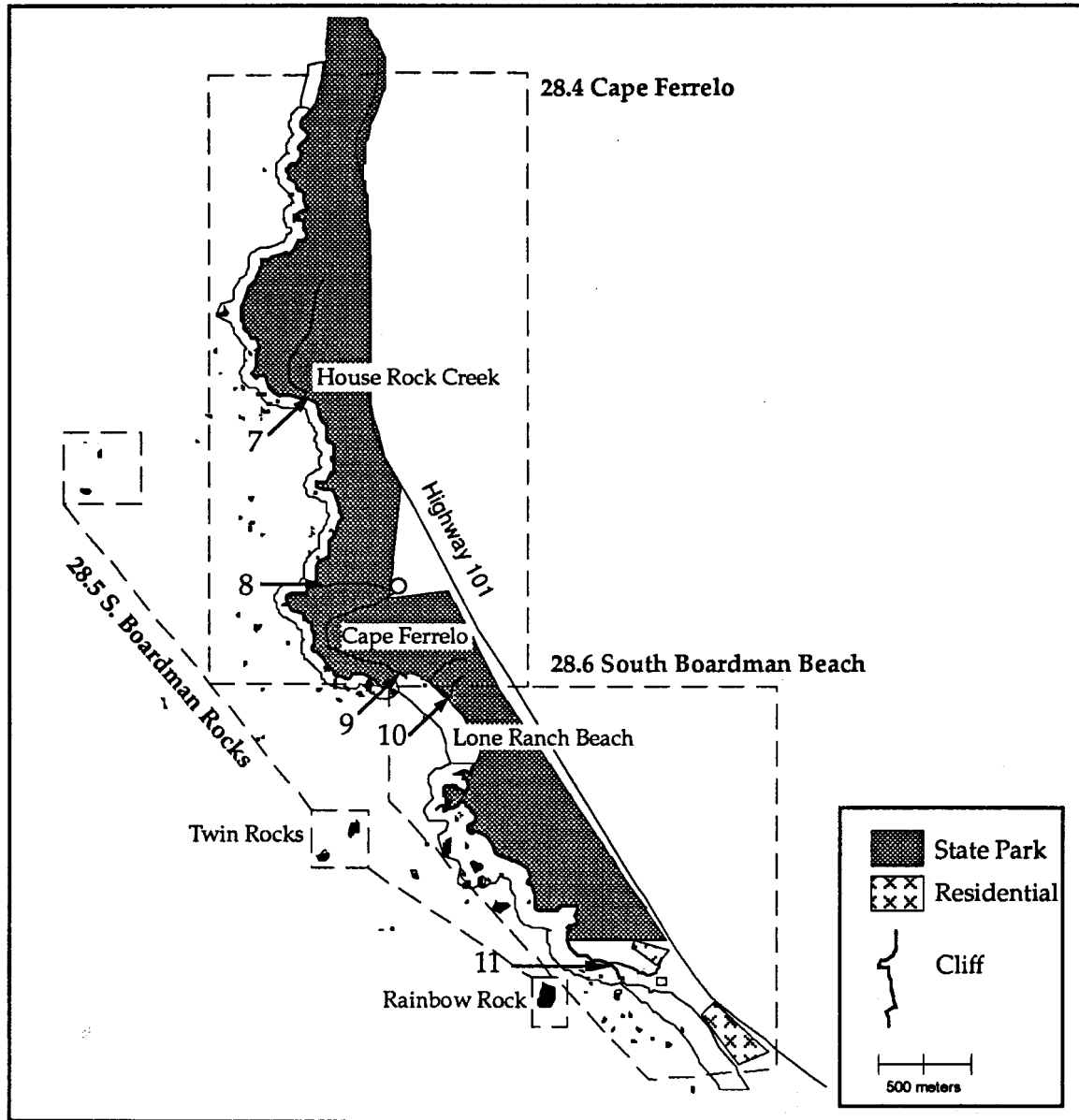


ID No.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/ Difficulty*	Trail Length (ft)
1	North Island Trail		5†	primitive/D	1760
2	North Thomas Trail			primitive/M	1320
3	Thomas Creek Trail		10	primitive/D	2640
4	Indian Sands Trail	105,000	30	primitive/E	1320
5	Whaleshead Wayside	97,000	30	paved/E	600
6	Whaleshead Viewpoint	55,000	30	primitive/M	1000

* (E = easy M = moderate D = difficult)
 † Combined counts for Accesses 1 and 2

Figure 28a. Upland Characteristics for the northern Whaleshead Cell.

Whaleshead Cell (south)

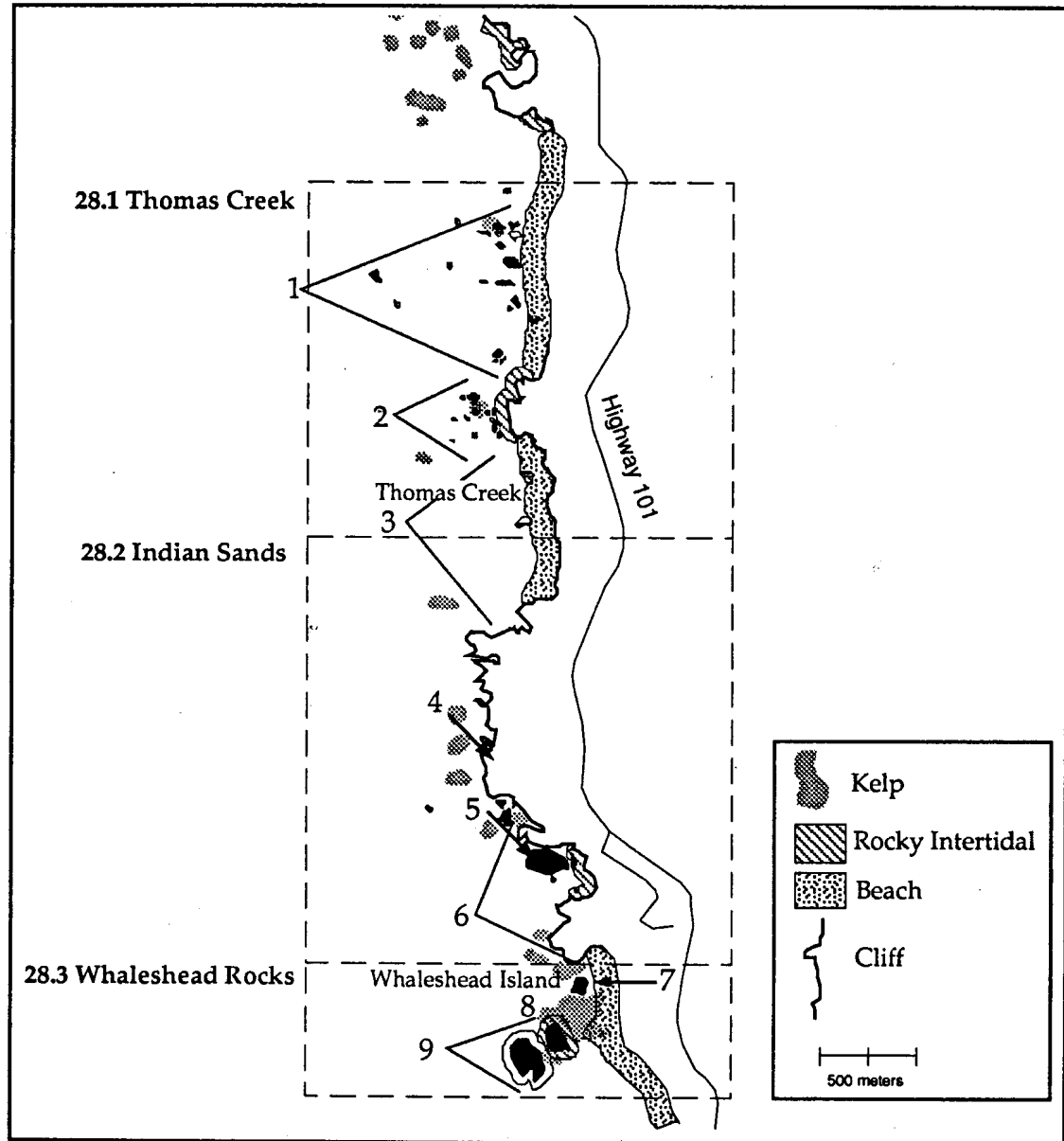


ID No.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/ Difficulty*	Trail Length (ft)
7	House Rock	66,000	30	primitive/M	1760
8	Cape Ferrelo	65,000	15	primitive/M	2640
9	South Cape Ferrelo		5	primitive/M	2640
10	Lone Ranch Beach	180,000	100	paved/E	300
11	Rainbow Rock Condos	@	@	primitive/E	1000

* (E = easy M = moderate D = difficult) U = unknown
 @ residential access only

Figure 28b. Upland characteristics for the southern Whaleshead Cell.

Whaleshead Cell (north)

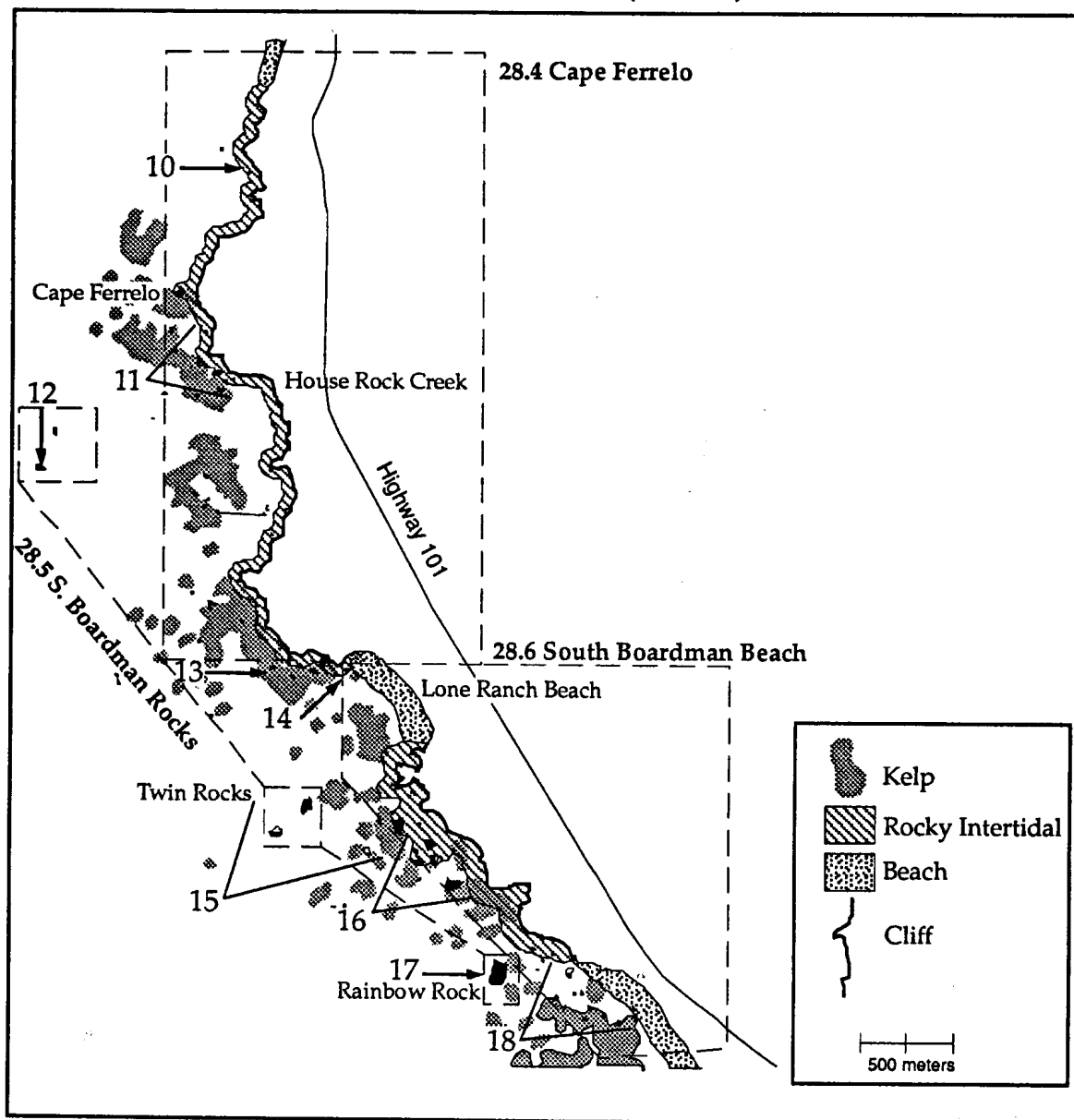


ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
1	Seabird	8 small	Rocks	Yes	Foot, Vessel
2	Seabird	1 medium	Rocks	Yes	Foot, Vessel
3	Seabird	3 small	Rocks	Yes	Foot, Vessel
4	Seabird	1 small	Cliff	Yes	Foot, Vessel
5	Seabird	1 x-large	Rocks	No	Foot, Vessel
6	Seabird	3 small	Rocks/Cliff	No	Foot, Vessel
7	Seabird	1 medium	Rocks	Yes	Aircraft, Foot, Vessel
8	Harbor Seal	1 small	Rocks	Yes	Aircraft, Foot, Vessel
9	Seabird	2 x-large	Rocks	No	Aircraft, Vessel

T & E species that occur in the northern half of the cell: Brown Pelican, Aleutian Canada Goose

Figure 28c. Rocky shore natural resources for the northern Whaleshead Cell.

Whaleshead Cell (south)



ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
10	Seabird	1 small	Rocks	Yes	Foot
11	Seabird	1 small	Rocks	Yes	Foot
12	Seabird	1 small	Rocks	No	Aircraft, Vessel
13	Harbor Seal	1 small	Rocks	Yes	
14	Seabird	1 small	Rocks	Yes	Foot
15	Seabird	3 large	Rocks	No	Aircraft, Vessel
16	Seabird	1 small	Rocks	Yes	Aircraft, Foot, Vessel
16	Harbor Seal	1 small	Rocks	Yes	Aircraft, Foot, Vessel
17	Seabird	1 medium	Rocks	No	Aircraft, Vessel
18	Seabird	1 small	Rocks	Yes	Foot, Vessel
18	Harbor Seal	1 small	Rocks	Yes	

T & E species that occur in the southern half of the cell: Brown Pelican

Figure 28d. Rocky shore natural resources for the southern Whaleshead Cell.

CELL 29: BROOKINGS

The Brookings cell extends from just north of the City of Brookings, south to the California border. The cell includes four rocky shore sites: 29.1 Goat Island, 29.2 Harris Beach, 29.3 Chetco Point, and 29.4 Harbor Beach (Figures 3.29a and 3.29b). The city of Brookings is situated on the north side of the Chetco River, while the community of Harbor is on the south side. Shore features in this area include extensive rocky intertidal areas, numerous low-elevation offshore rocks, a large nearshore island, steep cliffs, sand beaches and the Chetco River and jetty. Oregon State Parks manages most of the northern shoreline of this area near Goat Island (Harris Beach State Park), with full hook-up camping, day-use facilities, and beach access trails. North and south of the state park, shorefront lands are all privately owned and covered primarily with single and multi-unit residential development. There is limited public beach access outside of state park lands, but most rocky intertidal areas are accessible by foot trails. Goat Island is managed by USFWS as part of Oregon Islands National Wildlife Refuge.

Rocky Shores Resources

The rocky headlands and intertidal platforms at Harris Beach and Brookings are composed of late Jurassic sedimentary strata of the Dothan Formation, predominantly graywacke sandstone and siltstone (Baldwin 1976; Oregon Dept. of Geology and Mineral Industries 1976). Exposed strata are severely folded. At Chetco Point and Chetco Cove, more resistant boulders of volcanic rock, chert and conglomerate from the same formation are also found. Harris Beach consists of several eroded headlands of sandstone bedrock, interspersed with sand beach. Large boulders surround the exposed parts of the headlands, with smaller cobble inshore in more protected areas. South of Harris Beach at Chetco Point and Chetco Cove, extensive intertidal areas are formed from a mixture of low-slope bedrock platform, cobble, gravel, and occasional large boulders.

The complexity of cobble, boulder, platform and cliff habitats at the rocky headlands of Harris Beach has formed a very diverse community of

invertebrates and algae in a small area. Exposed rock faces support a community of California mussels, gooseneck barnacles, sea palm (*Postelsia*) and *Laminaria* algae. Adjacent boulders and cobbles provide numerous microhabitats of cracks, overhangs and vertical faces. These more protected habitats support a diverse invertebrate and algae community. The high-energy zone of low-slope bedrock platform at Chetco Point has formed a different, less diverse invertebrate community. Overlying much of the platform areas are unconsolidated cobble and gravel. This habitat supports burrowing organisms such as worms and littleneck and butter clams, but movement of loose material from heavy wave action appears to prevent establishment of many sessile, surface invertebrates. This area does support a very diverse and abundant algal community. There is extensive intertidal boulder and cobble habitat along the beaches between the Chetco and Winchuck rivers. Access to these areas is mostly private, preventing us from visiting the sites in our 1993 survey.

Patchy subtidal kelp beds extend along much of the cell's shoreline (Figures 3.29c and 3.29d). The beds, composed primarily of bull kelp (*Nereocystis*), indicate the existence of significant nearshore reefs along the coastline. In a 1990 survey, these kelp beds accounted for about 4.5% of the total subtidal kelp bed areas off of Oregon (Ecoscan 1991). The associated subtidal reefs support a significant commercial fishery for red sea urchins and a recreational bottomfish fishery.

Seabird and pinniped use of the cell is concentrated north of the Chetco River. Goat Island, supporting over 100,000 nesting seabirds, is one of the largest nesting colonies in the state (USFWS 1988). It is the largest island off Oregon and is one of few islands with significant amounts of soil for burrow nesters. The island is particularly important for Leach's storm petrel (Puchy and Marshall 1993). Eleven seabird species nest on Goat Island. In addition, the endangered brown pelican, peregrine falcon, and Aleutian Canada goose use the island as a roosting or feeding site (Lowe, pers. com. 1993). Dusky Canada geese winter on the island. Goat Island is also a harbor seal haulout site (Brown 1993). The Oregon Ocean Plan lists the island as an especially sensitive bird and mammal habitat (Oregon Ocean Resources Management Task

Force 1991). There are six additional seabird colonies located on cliffs and offshore rocks (Figure 3.29c). The principal species in these colonies include common murre, pelagic cormorant, and pigeon guillemot (USFWS 1988).

Human Use

Human uses of the cell include sight seeing, beach combing, tide pooling, bird watching, angling, commercial fishing and sea urchin harvest, and small-scale personal harvest of edible seaweeds. Harris Beach state park is the focal point for shoreline use. The park recorded nearly 500,000 visitor-days and over 100,000 camper-nights in 1992 (PRD 1993). Harris Beach State Park staff have initiated an outreach program providing intertidal education to Curry County school groups and others on request. This program takes intertidal animals (by permit) and education materials to school groups, then returns animals to natural habitat at Harris Beach. During summer, three guided intertidal tours each month are presented by park staff. State Park managers have also noted high summer use of rocky intertidal areas at Harris Beach by other small and large organized groups. Harris Beach is also an Oregon State Parks whale watching site. Public access to Chetco Point, Zwagg Island and Chetco Cove is limited. Use of these areas is primarily by local residents and includes beach combing, angling and clamming (littleneck and butter clams). This is also a popular site for SCUBA diving and boat angling because it is easily accessed by small craft from the Chetco River. There is a commercial fishery for red sea urchins in all inshore areas where subtidal reefs occur. There is also some commercial fishing for bottomfish near Goat Island

Management Authorities and Jurisdictions

- ODFW - Harvest regulations (marine invertebrates and finfish)
- Education/Research collection permit (area extending from 1/4 mile north of Harris Beach State Park to the mouth of the Chetco River)
- PRD - Owner/manager of State Park property
- Co-manager of beaches with DSL
- DSL - Manager of submerged and submersible lands

- Co-manager of beaches with PRD
- Manager of kelp harvest leases
- ODOT - Owner of highway right-of-way (includes pull-offs from Highway 101)
- USFWS - Owner/manager of the offshore rocks (above ordinary high water) that are separated from the shore at high tide
- Curry County - Planning and zoning regulations
- City of Brookings - Planning and zoning regulations
- Private Property Owners

Human Use Concerns and Suggested Management Approaches

1) Harris Beach (site 29.2) - Possible overuse of rocky intertidal areas.

Suggested Approach: Continue and expand existing intertidal interpretive programs. Use interpretive signs at beach access trails to educate the public about appropriate intertidal etiquette. This is a very high use site; impacts from trampling and disturbance should be examined and appropriate management measures developed.

2) Chetco Point (site 29.3) and Zwagg Island (site 29.2) - Possible overuse of rocky intertidal areas resulting from planned multi-unit residential development at Mill Beach and improved public access.

Suggested Approach: Use interpretive signs at Chetco Point and Mill Beach access trails to educate the public about appropriate intertidal etiquette.

3) Goat Island (site 29.1) - Potential boat, aircraft, and sea kayak disturbance to large seabird nesting colonies.

Suggested Approach: Provide information to vessel and aircraft owners and operators concerning the need to minimize disturbance. The disturbances should be studied and management measures developed that are designed to address site specific concerns.

4) Proposed development of processing facilities for large volumes of groundfish at Port of Brookings and potential water quality problems effecting intertidal areas north of the Chetco River.

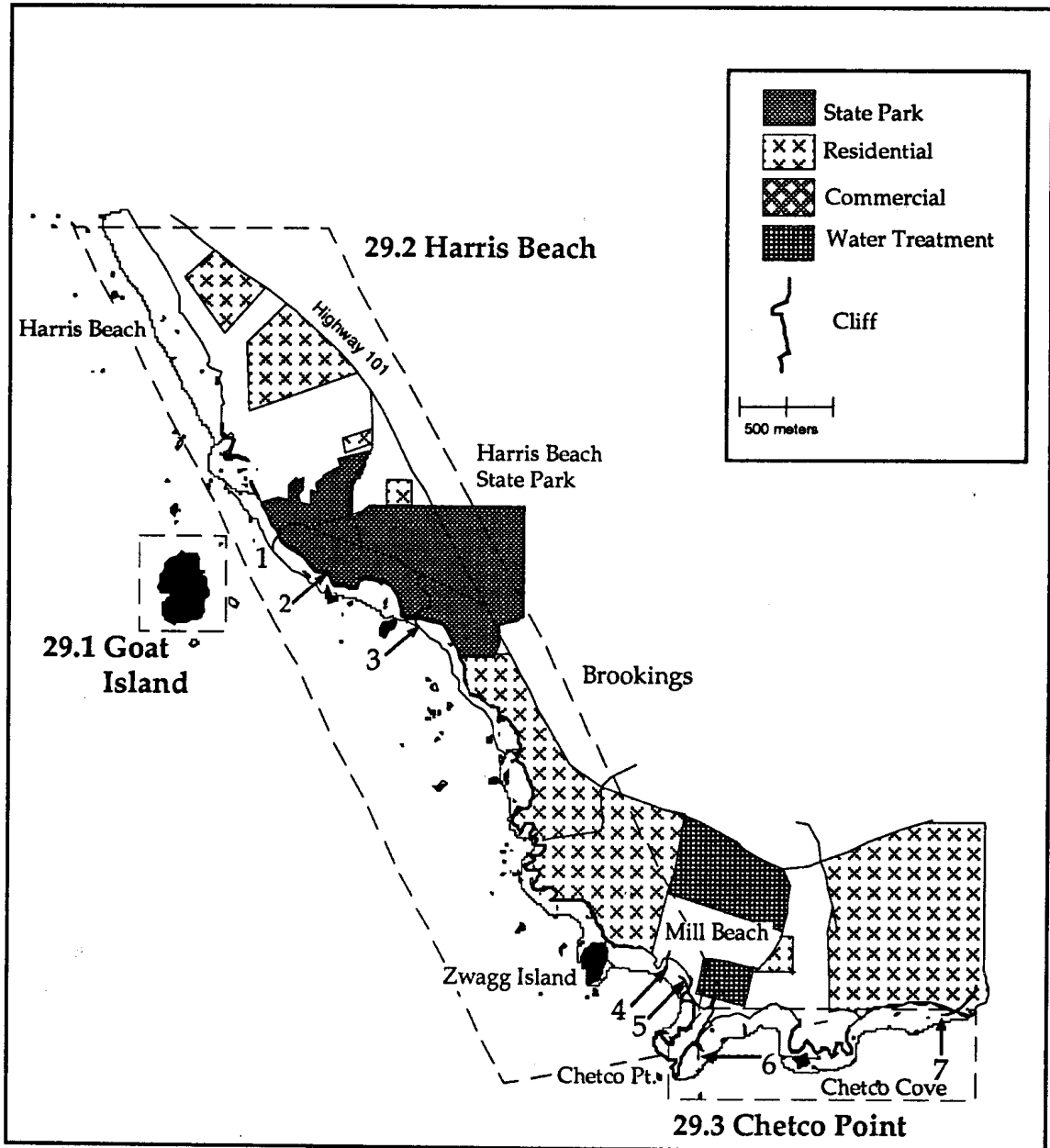
Suggested Approach: Require facilities to meet all state water quality standards.

Additional Opportunities

Current rocky intertidal interpretive programs provide a valuable service and should be encouraged to continue and expand. Guided

walks may be the best way to control human disturbance impacts. Opportunities exist for placement of interpretive signs at beach access trails at Harris Beach, Mill Beach, Chetco Point and north Chetco jetty. In addition to rocky intertidal information, interpretive signs at Harris Beach should focus on the Goat Island seabird colonies.

Brookings Cell (north)

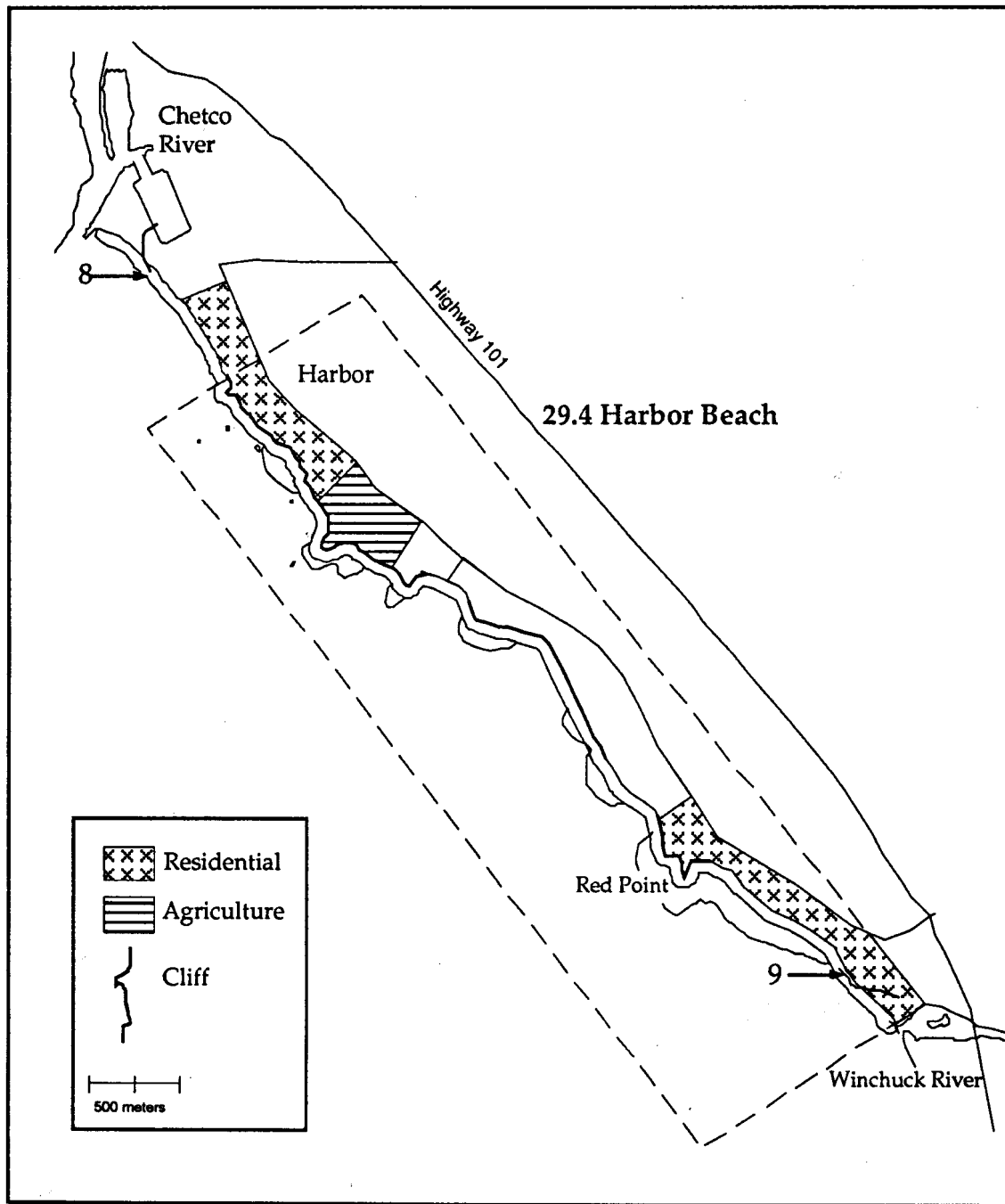


ID No.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/ Difficulty*	Trail Length (ft)
1	Harris Beach north	465,000	75	paved/E	300
2	Harris Creek		8	paved/E	1000
3	Harris Beach south		U	primitive/E	U
4	Mill Beach		3	primitive/E	1000
5	Chetco Point		3	primitive/E	500
6	Chetco Point		U	primitive/E	500
7	North Jetty		2	paved/steps/E	500

* (E = easy M = moderate D = difficult) U = unknown

Figure 3.29a. Upland characteristics for the northern Brookings Cell.

Brookings Cell (south)

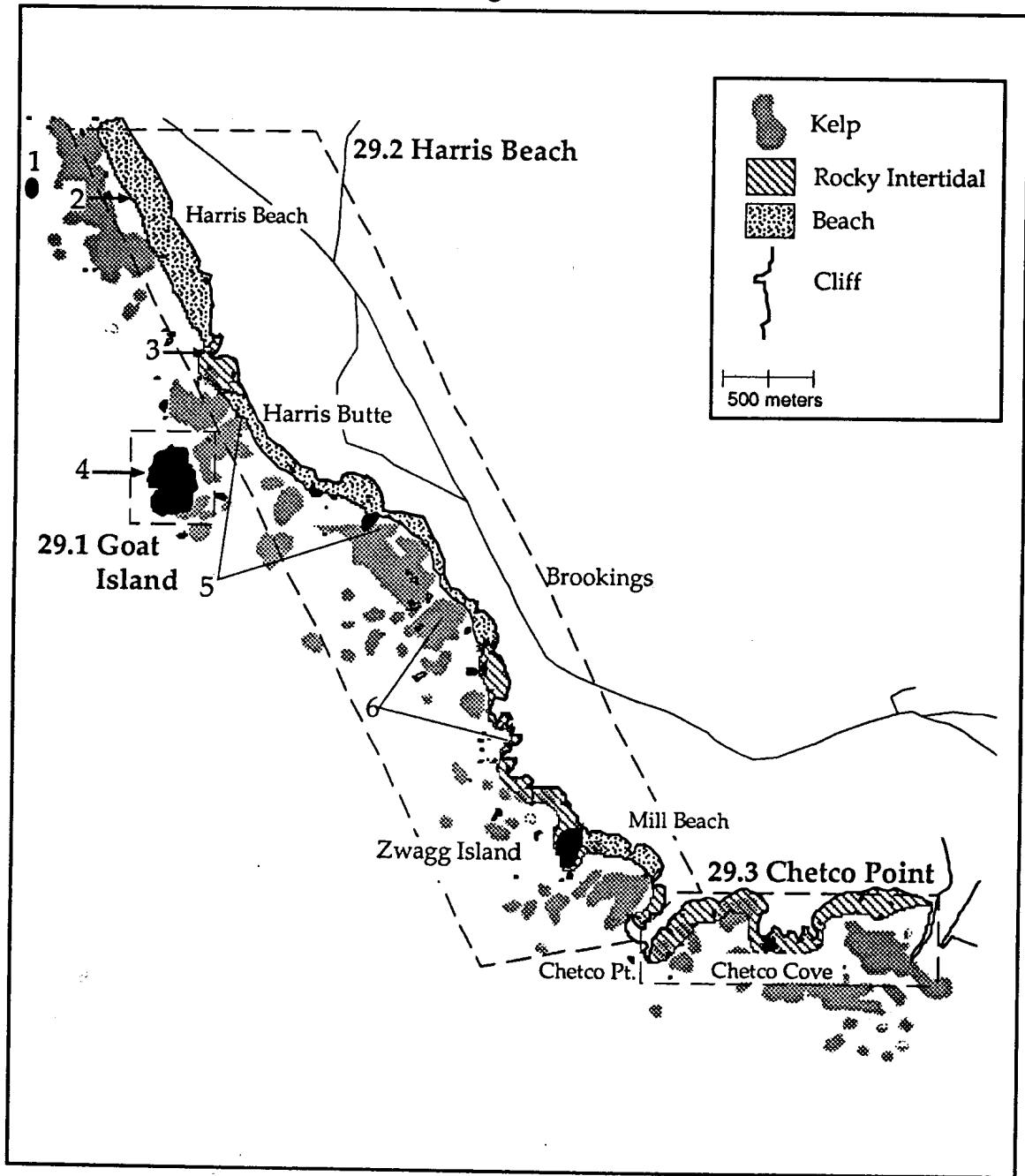


ID No.	Rocky Shore Access	1992 Visitor Count	Parking Spaces	Trail Type/ Difficulty*	Trail Length (ft)
8	South Jetty access		U	beach/E	2800
9	Winchuck River		U	beach/E	2200

* (E = easy M = moderate D = difficult) U = unknown

Figure 3.29b. Upland characteristics for the southern Brookings Cell.

Brookings Cell (north)

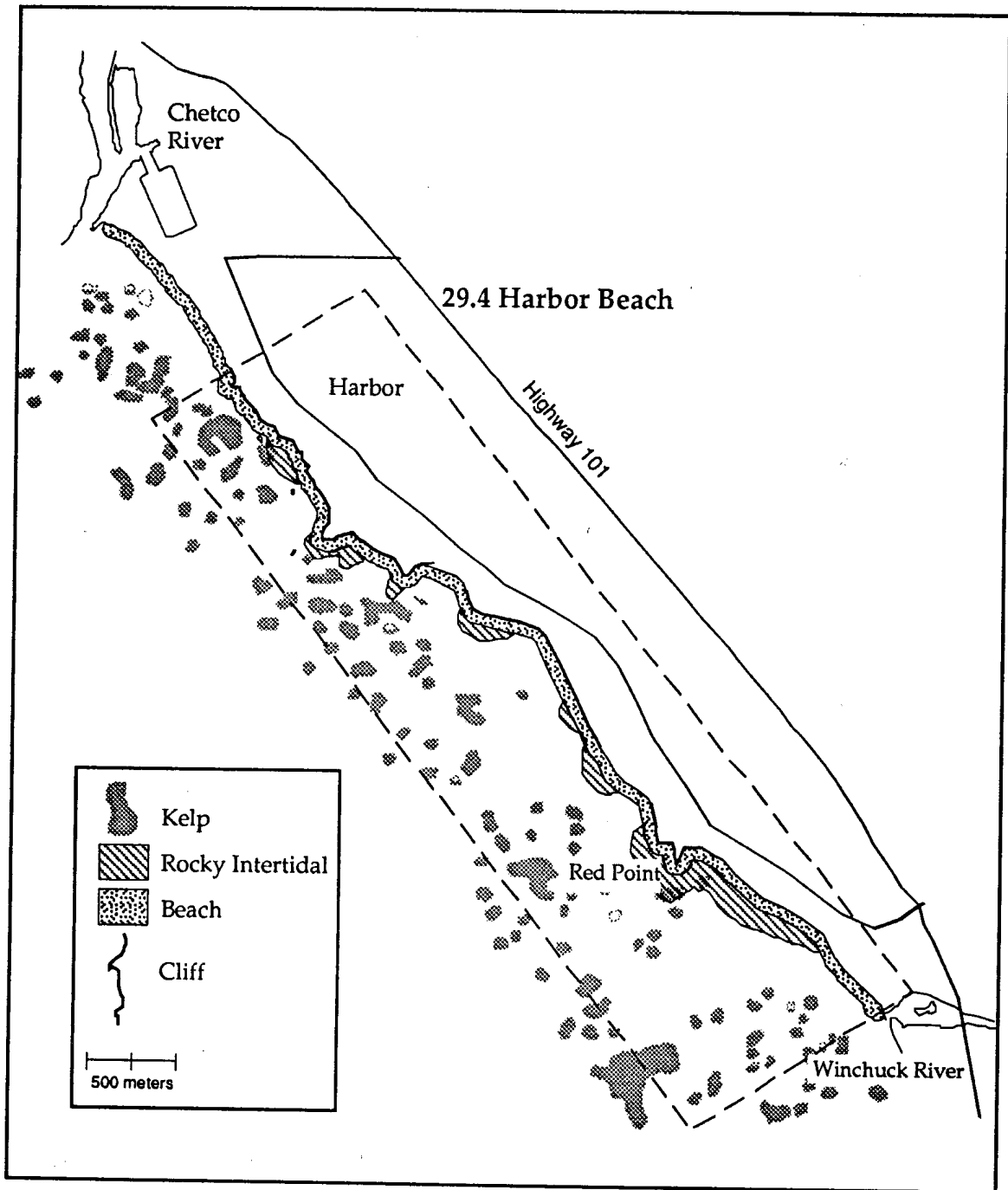


ID No.	Colony Type	Colony No./Size	Location	Foot Access To Rocks	Source of Potential Disturbance
1	Seabird	1 small	Rocks	No	Aircraft
2	Seabird	1 medium	Rocks	Yes	Foot, Vessel
3	Seabird	1 small	Rocks	Yes	Foot, Vessel
4	Seabird	1 x-large	Rocks	No	Aircraft, Vessel
4	Harbor Seal	1 small	Rocks	No	Vessel
5	Seabird	3 small	Cliff/Rocks	Yes	Foot, Vessel
6	Seabird	3 small	Cliff/Rocks	Yes	Foot, Vessel

T & E species that occur in the northern half of the cell: peregrine falcon, brown pelican, Aleutian Canada goose

Figure 3.29c. Rocky shore natural resources for the northern Brookings Cell.

Brookings Cell (south)



There are no seabird colonies or pinniped haul outs in the southern half of the Brookings Cell.

Figure 3.29d. Natural resources for the southern Brookings Cell.

RIVER MOUTH JETTIES

Jetties are rock structures designed to improve navigation through river mouths and into harbors. Ten rivers along the Oregon coast have jetties on the north and south flanks of their mouths (Figure 3.30). The primary purpose of the jetties is to constrict the opening of the river into the ocean so river and tidal currents will keep the mouth free of shallow sandbars and minimize dredging needs. The jetty materials also provide rocky intertidal and subtidal habitat, as well as areas for fishing and other uses. The total length of all jetties in Oregon exceeds 19.5 miles, of which about 9 total miles of structures extend into the ocean beyond the ocean beach line (Table 3.1). Most of the jetties have convenient human access and many are adjacent to state or county parks (Table 3.1).

Rocky Shores Resources

The jetties consist of large boulders placed to form a structure that is resistant to forces of waves and currents. Most of the boulders range in diameter from 2 to 10 feet and consist of basalt or other hard, erosion-resistant rock. In many cases the rock was quarried in other parts of the state and transported to the jetty sites. The jetties have caused considerable changes in the mouths of the rivers they protect and in the surrounding beaches. River mouths have been narrowed and deepened. In addition to protecting the river mouths, jetties also protect adjacent ocean beaches from ocean waves and currents, thus causing sand deposition and widening of the beaches (Lizarraga-Arciniega and Komar 1975).

The jetties provide a narrow band of boulder intertidal habitat. Intertidal communities consist of mussel and barnacle assemblages similar to those found in other wave-exposed rocky shores. Mussel beds are large enough to support commercial mussel harvest on the south jetty of the Columbia River.

There is a significant amount of rocky subtidal habitat created by the jetties. Almost all of the jetties support shore-based recreational

fisheries for lingcod, rockfish, and other bottomfish species. Some of the jetties, such as the north jetty of Yaquina Bay support small subtidal kelp beds.

Many of the jetties have pinniped haulouts. The most notable is the haulout at the tip of the Columbia River's south jetty (Figure 3.30). This haulout supports Steller Sea Lions, California Sea Lions, and harbor seals (Brown 1993). Most of the other jetties are used by harbor seals only.

Human Use

Human uses of the jetties include fishing, mussel harvest, sight seeing, SCUBA diving, and surfing. Nearly all of the jetties have convenient access. They support the bulk of the shore-based angling on the open coast. SCUBA diving is popular along the south jetty of Yaquina Bay. The south jetties of the Umpqua River form an enclosed body of water used for mussel aquaculture.

Management Authorities and Jurisdictions

- ODFW - Harvest regulations (marine invertebrates and finfish)
- PRD - Owner/manager of state parks adjacent to jetties
- DSL - Manager of submerged and submersible lands adjacent to the jetties
- Corps of Engineers - Owner of jetties

Human Use Concerns and Suggested Management Approaches

No human use concerns have been identified.

Additional Opportunities

The jetties provide excellent opportunities for increased human use due to the access, existing facilities, and lack of resource impact concerns. Fishing use can be increased by advertising the availability of fishing opportunities from the jetties and educating people about proper jetty fishing techniques.

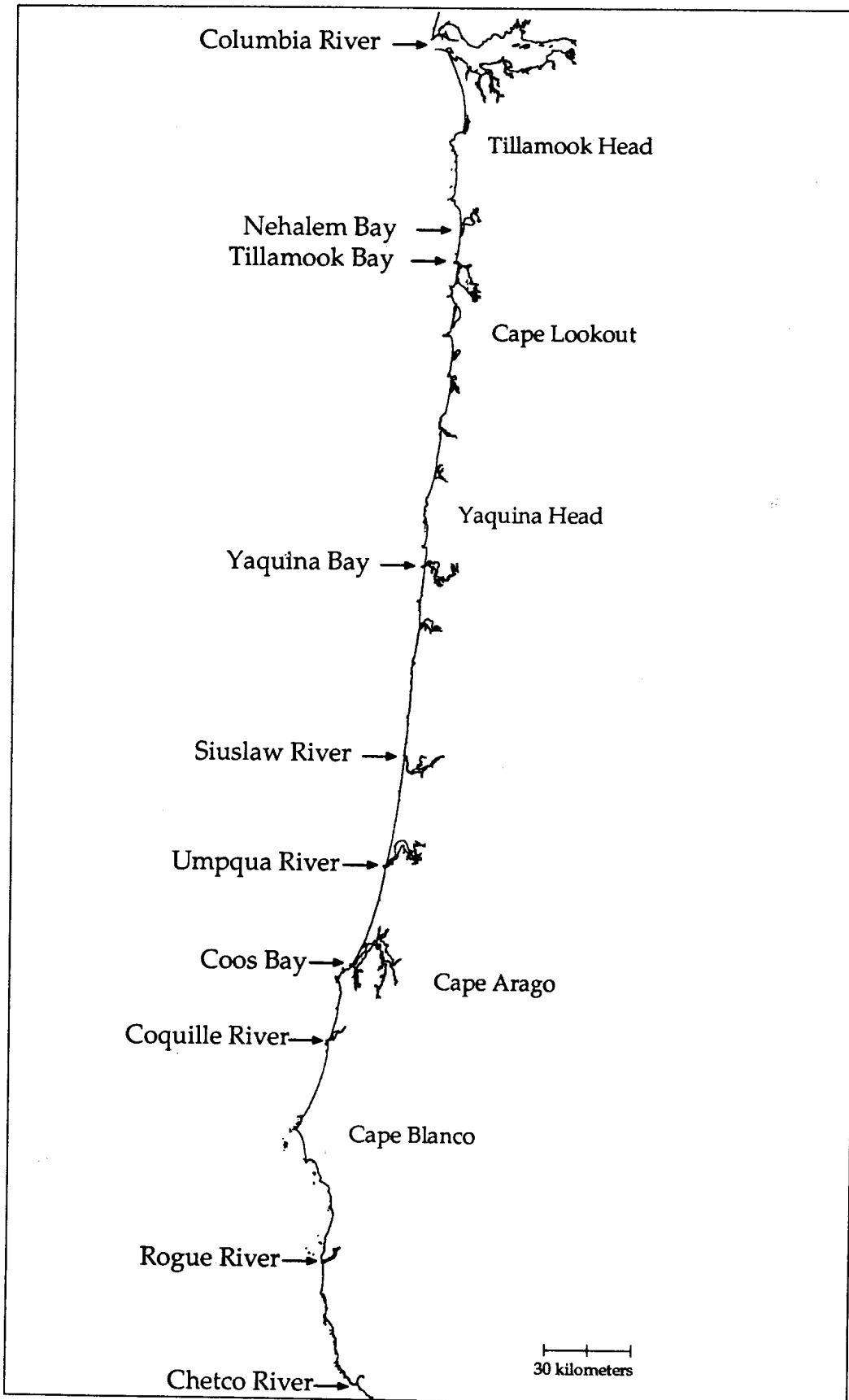


Figure 3.30. Oregon coast jetties.

Table 3.1. Jetty length and access facilities.

River/Bay	Jetty	Overall Jetty Length (m)	Nearest Access Facility	Parking Spaces
Columbia	south	8125	Ft. Stevens State Park	100
Nehalem	north	567	Nehalem Bay State Park	170
	south	1102	Public street end (Beach Dr.)	unknown
Tillamook	north	1838	Barview Jetty County Park	200
	south	2354	Bayocean spit (county)	50
Yaquina	north	1747	Yaquina Bay State Park	150
	south	1765	South Jetty (county)	40
Siuslaw	north	2331	Harbor Vista Park (county)	100
	south	1573	Oregon Dunes NRA (Forest Service)	70
Umpqua	north	2473	Oregon Dunes NRA (Forest Service)	unknown
	south	790	South Jetty Umpqua (county)	unknown
Coos	north	2157	North Spit (BLM)	unknown
	south	562	South Jetty Road (county)	50
Coquille	north	1029	Bullards Beach State Park	80
	south	444	South Jetty County Park	100
Rogue	north	1007	Doyle Pt. (Corps of Engineers)	100
	south	820	South Jetty (Port of Gold Beach)	100
Chetco	north	520	Public street end	unknown
	south	437	Port of Brookings	100

4. GLOSSARY

access - in this inventory, access refers to pedestrian or foot access into rocky shores areas. In most cases, only public access points are inventoried.

algae (plural of alga) - any of a group of chiefly aquatic non-vascular plants that have chlorophyll, often masked with brown or red pigments. Algae referred to in this inventory are marine macroscopic (large) algae.

basalt - a dark gray to black dense rock of volcanic origin.

bedrock - refers to contiguous slabs or outcroppings of rock in rocky intertidal or reef areas.

BLM - United States Bureau of Land Management.

boulder - a detached rock greater than 25.6cm (10in.) in diameter.

cell (rocky shores cell) - a group of rocky shores areas that occur within a geographically distinct area such as a headland. This inventory divides Oregon's rocky shores into 29 cells.

cliff - a high, very steep vertical or overhanging face of rock or earth. Generally, this inventory includes only cliffs that are part of a rocky shores complex. Sandstone cliffs fronted by sandy beaches with no other adjacent rocky shore features are not included in this inventory.

cobble - a rock between 6.4cm (2.5 in.) and 25.6cm (10 in.) in diameter.

docent - a person who conducts groups in interpretive programs.

DSL - Oregon Division of State Lands.

endangered species - any species of plant or animal listed as endangered under the U.S. Endangered Species Act.

exposure - in terms of rocky shores, exposure usually refers to the degree to which an area is exposed to ocean wave action.

gravel - rocks smaller than 6.4cm (2.5 in.) in diameter.

Habitat Refuge - one of four OPAC management designations for rocky shore areas. Habitat Refuges are designated in selected rocky shore areas that are needed to maintain the overall health of the rocky shore ecosystem.

haulout - a site on land, intertidal locations, or offshore rocks where pinnipeds rest out of the water. Pinnipeds also bear and raise their young on haulout sites. Haulout sites are generally used repeatedly day after day and year after year.

human use concern - a statement that an human-caused impact to natural resources may be occurring at a particular location. Human use concerns included in this inventory were derived from biologists and resource managers familiar with the area and resource in question. The magnitude of impacts (if any) related to each concern have not necessarily been documented with scientific study. Each concern would need to be thoroughly documented before attempting a resolution.

impact concern - see human use concern.

intertidal - land that is periodically covered by the tides. Open coast rocky intertidal areas include rocky substrates that fall between the lowest estimated tide (Extreme Low Water Spring Tide or about -3' MLLW) and the upper limit of the splash zone (about +10' to +14' MLLW, depending on wave exposure).

intertidal etiquette - human conduct or behavior in intertidal areas that minimizes impacts to natural resources. Avoiding turning over rocks, walking through tidepools, and pulling attached organisms off rocks are examples of good intertidal etiquette.

jetty - human-made rock structures designed to improve navigation and create safe passage for vessels through river mouths and into harbors. Ten rivers along the Oregon coast have jetties on the north and south flanks of their mouths. The

primary purpose of the jetties is to constrict the opening of the river into the ocean so river and tidal currents will keep the mouth free of shallow sandbars and minimize dredging needs.

kelp bed - generally, any cluster of marine algae belonging to groups commonly called kelps (Laminariales or Fucales). Kelp beds documented in this inventory include subtidal beds of bull kelp (*Nereocystis luetkeana*) and giant kelp (*Macrocystis integrifolia*).

Marine Garden - current (1994) ODFW definition: rocky intertidal areas where taking or harvest of marine invertebrates is prohibited (except single mussels may be taken for bait). Marine Gardens include Haystack Rock, Otter Crest, Yaquina Head, and Cape Perpetua.
new OPAC definition: one of four OPAC management designations for rocky shore areas. Marine Gardens are designated in selected intertidal areas intended to be focal points for visitors seeking to enjoy or learn about the intertidal environment. These areas will be promoted and managed for visitor use with special emphasis on marine education programs.

Marine Shore - one of four OPAC management designations for rocky shore areas. Marine Shores are areas of general biological, aesthetic, or geologic interest, open to the public for recreational, educational, scientific, or commercial use as allowed by general regulations. A Marine Shore designation is intended for all rocky shoreline sites not otherwise designated as Marine Garden, Habitat Refuge, Scientific Research Reserve, or listed in the Territorial Sea Management Plan as not yet designated.

MHHW - Mean Higher High Water. MHHW is the average of all higher high tides in an area.

MLLW - Mean Lower Low Water. MLLW is the average of all lower low tides in an area and is designated as 0 feet on the tide charts.

ODFW - Oregon Department of Fish and Wildlife.

ODOT - Oregon Department of Transportation.

offshore rock (offshore island) - a large rocky structure in either the intertidal or subtidal area

that is not connected to the mainland and extends above the surface of the water. Most of Oregon's offshore rocks that are separated from the shore at high tide and that extend above MHHW are owned by U. S. Fish and Wildlife Service and managed as part of the Oregon Islands National Wildlife Refuge.

OPAC - Oregon Ocean Policy Advisory Council.

Oregon Ocean Plan - a plan that set guidelines for managing ocean areas off of Oregon. The Oregon Ocean Plan was developed by a legislatively created task force in 1991.

pinniped - animals of the suborder Pinnipedia. Pinnipeds that occur in Oregon include primarily harbor seals, California sea lions, Steller sea lions, and northern elephant seals.

PRD - Oregon Parks and Recreation Department

primitive (trails) - trails that are not surfaced with gravel, wood chips, or pavement.

reef - an area of hard substrate on the seafloor. This inventory includes selected subtidal nearshore rocky reefs.

research/education permit areas - rocky intertidal areas where take or harvest of most intertidal invertebrates is prohibited except by an ODFW permit that allows harvest for educational or scientific purposes. Recreation harvest of mussels, piddocks, and other clams is permitted at these sites.

Research Reserve - one of four OPAC management designations of rocky shore areas. Research Reserves are designated in selected rocky shore areas suitable or currently used for scientific purposes such as baseline study, monitoring, or applied research.

rocky intertidal - see intertidal

rocky shore - an area of the shoreline or nearshore ocean consisting of one or more of the following features: rocky cliffs, rocky intertidal area, nearshore subtidal rocky reefs, kelp beds, and offshore rocks.

seabird (marine bird) - a bird that depends almost exclusively on the marine environment.

These birds generally get all of their food from the ocean and only depend on land for nesting or resting.

sessile invertebrate - invertebrate that is attached to the substrate or stationary during most of its life.

site (rocky shores site) - a contiguous stretch of rocky shoreline that is generally distinct from adjacent rocky shores due to a combination of one or more of the following factors: access, use, natural resources present. There are 87 rocky shore sites in this inventory. Not all rocky shore areas fall within a site.

splash zone - the portion of the intertidal area above the highest tide but within the area experiencing splash from ocean waves.

subtidal - areas of the ocean deeper than the lower limit of intertidal areas. On the Oregon coast, subtidal areas include all areas deeper than -3' MLLW.

surge channel - a crevice in the rock substrate where water rushes back and forth due to wave action.

T&E species - threatened and endangered species.

Territorial Sea Management Plan - a plan that sets specific policies and standards for managing

resource use and conservation within Oregon's Territorial Sea (from the shoreline to the 3-mile limit). The Ocean Policy Advisory Council completed the first phase of the Territorial Sea Management Plan in 1994 and will continue to add to the plan into the future.

threatened species - any species of plant or animal listed as threatened under the U.S. Endangered Species Act.

tidepool - an impression in the rock at a rocky intertidal site that impounds seawater during low tide. Sometimes the term tidepool area is used to refer to the entire rocky intertidal area.

tide pooling - observing organisms and habitat in tidepools and other rocky intertidal areas for educational or recreational purposes.

upland - any land area shoreward of the shoreline.

USCG - United States Coast Guard.

USFS - United States Forest Service.

USFWS - United States Fish and Wildlife Service.

visitor-day - a unit for expressing counts of day-use visitation at a site. Visitor-days expresses the total number of visitors on a given day.

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APPENDIX 1: Site Evaluation Criteria and Ranking System

This appendix describes the site evaluation criteria that are displayed on the summary map in Figures 2.1a and 2.1b. The site evaluation criteria include:

- site type,
- environmental considerations, and
- site use.

Site type is determined by the sites' location with respect to the shore and by the type of human access and potential disturbance. Offshore sites include offshore rocks, submerged reefs, and subtidal kelp beds. They can only be accessed by boat, and human interactions with the resource occur from boats or aircraft. Shoreline sites include cliffs, rocky intertidal areas, and associated subtidal habitat and rocks. Shoreline sites can generally be accessed by foot, and foot traffic provides the primary source of interactions with resources. Shoreline sites may also be affected by boats and aircraft. In addition, a nearshore rock that cannot be accessed from shore can be classified as a shoreline site if nearby foot traffic affects resources on the rock. Sites that have both offshore and shoreline features are classified on the summary map as "both".

The summary map displays several data elements that represent environmental considerations and site use. These include:

Environmental Considerations

- Intertidal Habitat
 - Habitat size
- Animal Concentrations
 - Seabird colony size
 - Pinniped haulout size
- Resource Conflict Concerns
 - Intertidal overuse concern
 - Bird and mammal conflict concerns
 - Presence of threatened or endangered species

Site Use

- Current Use
 - Visitation
 - Accessibility
- Type of Use
 - Educational/interpretive use
 - Commercial use
 - Recreational use

Each of the above elements are ranked on a relative scale to allow comparison among sites. The ranking systems are described below.

INFORMATION DESCRIBING ENVIRONMENTAL CONSIDERATIONS

Intertidal Habitats

Rocky intertidal areas vary in size and diversity along the coast. In most cases, initial planning priorities need to be focused on the larger, more diverse areas. The summary map displays rocky intertidal size. The combined experience of researchers and managers provides judgment on which sites are considered to be the most diverse. These include Cape Lookout, Boiler Bay, Whale Cove, Otter Crest Marine Gardens, Yaquina Head, Seal Rock, Parts of Yachats, Strawberry Hill, Sunset Bay, Cape Arago coves, Cape Blanco, Humbug Mountain, Crook Point through North Boardman, Cape Ferrelo, and Harris Beach and surrounding areas. This inventory does not compare relative diversity among those sites or to compare these with the many other sites on the coast because data are not available to form a basis for comparison.

Intertidal Habitat Size - Size of intertidal sites is represented by the length in miles of rocky intertidal areas along the shoreline. Each site is rated using the sum of all intertidal lengths within its boundaries. The data do not include narrow bands of intertidal habitats at the base of vertical or steep cliffs. Categories for intertidal habitat size are as follows:

Extremely Large	over 1.75 miles of coastline
Large	1.25 - 1.75 miles of coastline
Medium	0.25 - 1.25 miles of coastline

Small less than 0.25 miles of coastline

Animal Concentrations

Seabird Colonies - The relative size of seabird colonies is ranked by number of birds counted during a 1988 USFWS colony census (USFWS 1988). Categories for ranking colony size are as follows:

Very High	more than 10,000 birds
High	1,000 - 10,000 birds
Medium	100 - 1,000 birds
Low	0 - 100 birds

Pinniped Haulouts - The relative size of pinniped haulouts is ranked by number of seals and sea lions counted during annual ODFW haulout censuses (Brown 1993). Categories for ranking haulout size are as follows:

Very High	more than 1,000 animals
High	300 - 1,000 animals
Medium	100 - 300 animals
Low	0 - 100 animals

Resource Conflict Concerns

Conflicts between users and natural resources occur in several areas along the coast. In most cases these conflicts and resultant environmental impacts have not been systematically studied or documented. Concerns about resource conflicts and impacts have been generated based on knowledge of human use, exposure and sensitivity of resources, and on experience of coastal biologists, resource managers, and users. Three elements are used to express these concerns:

- 1) intertidal habitat overuse concerns,
- 2) potential conflicts with marine birds and mammals, and
- 3) presence of threatened and endangered species at a site.

1) Intertidal Overuse Concern - This data element indicates our level of concern about human impacts to rocky intertidal habitats. There is currently little information on the effects of overuse on Oregon's rocky intertidal areas. Impacts have been documented for only three areas along the coast. We cannot complete a coast-wide analysis of intertidal impacts at this time; however, we can express our relative

concern about intertidal overuse based on professional knowledge and experience. Relative overuse concern is based on recent research by Deborah Brosnan and others (Brosnan and Crumrine 1992a; Brosnan and Crumrine 1992b), ODFW biologists' knowledge of human use in certain intertidal areas, and on interviews with state park district managers and other land managers. Categories for intertidal overuse concern are as follows:

Extremely High	known high level of habitat impact based on recent research
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High	suspected high level of habitat impacts
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Medium	some habitat impacts may be occurring
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Low	little or no concern about human impacts
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Unknown	not enough experience with the site to make a judgment
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2) Potential Conflicts with Marine Birds and Mammals - This data element represents concerns about possible negative impacts to seabird nesting colonies and pinniped haulouts caused by human disturbance. Roy Lowe, USFWS (seabirds), and Robin Brown, ODFW (pinnipeds), provided the information for ranking sites. They based their information on over 10 years of seabird and pinniped surveys. Lowe and Brown rated relative impact potential using observations of actual human disturbance, knowledge of disturbance effects experienced in other states, sensitivity of the species involved, and potential exposure of sensitive species to human disturbance. These are also summarized in Appendix 2. In ranking relative impact concern, we examined the impact potential expressed by Lowe and Brown and increased the level of concern anytime a threatened or endangered species, large or extra-large nesting colony or haulout, or pupping area was involved. Categories for bird and mammal impact concern are as follows:

Extremely High	impact potential rated as severe, or impact potential rated as high and a T&E species is present, or impact potential rated as high
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and a large colony/haulout or pupping area is involved

High impact potential rated as high (other than cases listed above), or impact potential rated as moderate and a T&E species is present, or impact potential rated as moderate and a large colony/haul out or pupping area is involved

Medium impact potential rated as moderate (other than cases listed above), or impact potential rated as low and a T&E species is present, or impact potential rated as low and a large colony/haulout or pupping area is involved

Low impact potential rated as low (other than cases listed above)

None no impact potential noted

3) Presence of Threatened or Endangered Species - This element indicates whether a state or federally listed threatened or endangered species is present at the site. The information is based on USFWS and ODFW surveys, and on State Park Master Plans. The summary data indicate only presence or absence of the species. The detailed descriptions in Section 3 list the species involved.

INFORMATION DESCRIBING SITE USE

Current Use

The preferred method of describing total use of rocky shores habitats would be to present counts of individuals actually utilizing the intertidal areas and rocky cliffs. With one or two exceptions, this type of information currently does not exist on the Oregon coast. We can, however, gain an understanding of the potential for human use by examining visitor counts at site parking and camping facilities in combination with the ease of access from site facilities to the rocky-shore habitats. The visitor count and access data elements are described below.

Visitation - Visitation is described by existing visitor count data at the upland facilities adjacent to rocky shores sites. These data are recorded for many state and federal parks, and a few other areas. Sources of the data include Oregon Parks and Recreation Department, Bureau of Land Management (BLM), U.S. Forest Service, YWCA, Nature Conservancy, Boy Scouts, and Sea Lion Caves. About 50% of the rocky shores sites have visitor use data. Categories for visitor use are as follows:

Extremely High	more than 500,000 visitor-days annually
High	200,000 - 500,000 visitor-days annually
Medium	10,000 - 200,000 visitor-days annually
Low	fewer than 10,000 visitor-days annually

This analysis represents visitor count as the sum of annual visitor-days from the day use statistics.

Accessibility - The accessibility data element describes shoreline foot access on public trails. Ease of access is influenced by length and difficulty of access trails, and the size of parking lots and related facilities that accommodate visitors at a site. ODFW biologists rated trail difficulty, estimated trail length, and examined parking facilities while visiting rocky shores sites in spring of 1993 (see Appendix 3). The Inventory of Oregon Coastal Beach Access Sites (Benkendorf Associates 1989) also provided information for this element. Categories for ranking access are as follows:

Extremely High existence of one or more trails that are less than 500 feet long and rated as easy or moderate, and parking for more than 50 vehicles including RV and bus parking, and presence of restrooms and picnicking facilities.

High existence of one or more trails that are less than 2000 feet long and rated as easy or moderate, and parking for more than 50 vehicles

Medium existence of easy or moderate trails that are more than 2000 feet long, or parking for 10 to 50 vehicles

Low all trails rated as difficult, or parking for less than 10 vehicles

None no public access trails present

High finfish - ranked as high by fishery biologists
 urchins - use by multiple vessels on any given day during season

Medium finfish - ranked as medium by fishery biologists
 urchins - use by at least one vessel on most days during season
 mussels - use by more than one harvester

Low finfish - ranked as low by fishery biologists
 urchins - occasional use
 mussels - use by a single harvester

None no commercial harvest

Type of Use

Educational/Interpretive Use - This data element indicates sites that have either an organized rocky shores interpretive program or are known to be used by school groups. The information is based on interviews with state park district managers, personnel from USFWS, BLM, Hatfield Marine Science Center, Oregon Institute of Marine Biology, South Slough Estuarine Research Reserve, and individuals involved in the Haystack Rocky Awareness Program and Shoreline Education of Awareness.

Commercial Use - This element represents commercial finfish, mussel, and urchin fisheries. The information is based on ODFW commercial fisheries catch data and knowledge of ODFW biologists that are involved in managing and tracking these fisheries. A relatively small portion of Oregon commercial finfish activity occurs in rocky shore habitats. The most common activity is small boats catching rockfish using various types of hook and line gear. The relative intensity of finfish fisheries in different areas is rated using experience of ODFW fishery biologists. Urchin harvest intensity is based on the number and frequency of vessels fishing a site. Mussel harvest is based on present or historic (within the past 5 years) intensity of use. This analysis does not rate mussel harvest above the medium level because this activity has not been intense in recent years. Categories for commercial use are as follows:

Recreational Use - Recreational use of rocky shorelines includes site seeing, hiking, angling, nature viewing, bird watching, photography, pleasure boating, collection of animals for food, souvenirs, or aquaria, and many other activities. The vast majority of rocky shoreline use is recreational. There has been no systematic survey of recreational use of rocky shore habitats. We ranked recreational use by combining a number of different factors. For shoreline sites, visitation and accessibility provided the primary indicator of the amount of recreational use. Since most of the shoreline users are recreational, sites with high visitation and access have high rankings for recreational use. Other shoreline recreational use information includes State Park district manager knowledge of areas and ODFW information on shore angling and invertebrate harvest. Recreational use of offshore sites includes primarily fishing. Other activities such as SCUBA diving, sea kayaking, and wind surfing are also included. ODFW sport fishing biologists and samplers provided the primary information for ranking relative offshore recreational use.

**APPENDIX 2: Resource Conflict
Concerns Matrix**

Marine Bird and Mammal - Human Use Concerns

Site Type: S = shoreline; O = offshore; B = both

Colony Size: S = 0-100; M = 100-1000; L = 1000-10000; XL = over 10000

Haulout Size: S = 0-100; M = 100-300; L = 300-1000; XL = over 1000

T&E Species: S = Stellers sea lion; P = brown pelican; E = bald eagle; PF = peregrine falcon; G = Aleutian Canada goose

Level of Concern: L = low; M = medium; H = high

Access Restrictions: B = proposed buffer zone areas in Ocean Plan

Rocky Shores Site #	Site Type	Location	Resource Affected			Type of Disturbance				Suggested Solution			#on cell map
			Bird Colonies: No.-Size	Mammal Haulouts: No.-Size	T&E Species	Foot Traffic	Vessel	Aircraft	Level of Concern	Education	Signage	Access Restriction	
1.1	B	Till. Head Cliffs, Adj. Rocks	3-S; 5-M		PE			X	H	X		B	1,2,3
1.1	S	Till. Head Cliffs Beach		1-S; 2-M				X	L	X			2,3
1.1	O	Tillamook Rock	1-L		P		X	X	H	X		B	
1.2	S	Indian Beach Cliffs	1-S		E	X			M	X	X		4
1.2	S	Submarine Rock	1-S			X			M	X	X		4
1.2	S	Indian Beach Nearshore rocks	1-S			X			M	X	X		4
1.3	S	Ecola Pt. cliffs & Adj. rocks	5-S; 1-M; 1-L		P	X	X		H	X	X	BX	5
1.3	B	Ecola Pt. Adj. rocks		2-S	S	X	X		H	X	X	BX	5
1.3	S	Chapman Pt. cliffs & Rock	1-S; 1-M		PE	X		X	H	X	X		6
1.3	O	Chapman Pt. Bird Rocks	2-L; 1-XL		PE		X	X	H	X		B	6
2.1	S	Haystack Rock	2-S; 1-L			X		X	H	X	X		1,2
2.2	S	Arcadia Shoreline & Cliff sites	6-S			X			M	X	X		4
2.2	O	Jockey Cap	1-M						L	X			3
3.1	S	Arch Cape accessible rock	1-S			X			L	X			2
3.2	B	Cape Falcon Cliff/Rocks	3-S; 1-M		E		X	X	H	X		B	4
3.2	B	Cape Falcon Cliff/Rocks		2-S				X	L	X			4
3.3	S	Smuggler's Cove Cliff - N. side	2-S		E			X	L	X			5
3.3	B	Devil's Cauldron Cliff/Rocks	4-S		EPF			X	L	X			6
3.3	S	S. of Devils Cauldron	3-S; 1M			X		X	M	X	X	X	7,8
3.9	O	Castle and Gull Rocks	1-S; 2-L		P	X	X	X	H	X		B	1,3
4.1	O	Pyramid Rock	1-L		PE		X	X	H	X	X	B	1
4.1	O	Pillar Rock	1-L		E		X	X	H	X	X	B	2
4.2	S	Cape Meares Cliffs	6-S; 2-M		EPF			X	L	X	X	X	3
4.3	O	Three Arch Rocks	1-S; 3-XL		E,P,PF,G		X	X	H	X	X	B	5
4.3	O	Three Arch Rocks		1-M	S		X	X	H	X	X	B	5
4.4	B	Rocks at Maxwell Pt.	2-S; 1-M			X		X	M	X	X		4
5.9	B	Cape Lookout - N. Cliff	3-S; 1-M; 1-L		E,PF		X	X	L	X	X		1,2,3,4
5.9	S	Cape Lookout - N.		2-S			X	X	L	X	X		3,4
5.2	S	Cape Lookout South Cliff	1-M; 1-L		E,PF	X	X	X	H	X	X	BX	5,6
6.1	S	N. of Kiwanda			G	X			H	X	X	X	

Marine Bird and Mammal - Human Use Concerns

Site Type: S = shoreline; O = offshore; B = both

Colony Size: S = 0-100; M = 100-1000; L = 1000-10000; XL = over 10000

Haulout Size: S = 0-100; M = 100-300; L = 300-1000; XL = over 1000

T&E Species: S = Stellers sea lion; P = brown pelican; E = bald eagle; PF = peregrine falcon; G = Aleutian Canada goose

Level of Concern: L = low; M = medium; H = high

Access Restrictions: B = proposed buffer zone areas in Ocean Plan

Rocky Shores Site #	Site Type	Location	Resource Affected			Type of Disturbance				Suggested Solution			#on cell map
			Bird Colonies: No.-Size	Mammal Haulouts: No.-Size	T&E Species	Foot Traffic	Vessel	Aircraft	Level of Concern	Education	Signage	Access Restriction	
6.2	O	Haystack Rock	1-L		P,E,PF,G		X	X	H	X	X	B	1
7.1	B	Cascade Head Cliff and Rocks	.1-S;3-M;1-L		E,PF	X	X	X	M	X		X	3,4,5
7.1	S	Harts & Cliff Creek Coves		2-S;1-M;1-XL	S	X		X	M	X		B,X	4
7.2	S	S. Cascade Head Cliff	1-M		E		X	X	M				7
7.2	O	3 Rocks	3-M		P		X	X	M				8
7.3	B	Roads End Cliff/Rocks	5-S		E,PF	X			M	X	X		9
7.9	B	N. Cascade Cliff/Rock	4-S; 2-M		P,PF	X		X	L	X		X	1,2
7.9	B	Tow Arches Rock	1-S;2-L;1-XL		E		X	X	H	X		B	6
9.1	B	Fogarty Creek Rock		1-S		X			H	X	X	X	2
9.1	S	Fogarty Creek Platform		1-S		X			H	X	X	X	2
9.2	S	Boiler Bay Cliffs	1-S			X			L				3
9.2	S	Boiler Bay Rocks		1-S		X			M	X	X		2
9.3	S	Pirate Cove Cliffs	2-S; 1-M			X	X		M	X	X	X	4,5
9.4	S	Depoe Bay Cliffs	1-S			X			L	X			5
9.4	S	Depoe Bay	1-S			X				X			6
9.5	S	Whale Cove Cliffs	3-S		E	X			L				8
9.5	S	Whale Cove Platform		1-M		X			L				8
9.9	S	N. of Fishing Rock	1-S			X				X			1
9.9	S	Depoe Bay Cliffs	1-S			X				X			7
10.2	O	Gull Rock	1-XL		P		X	X	H	X		B	3
10.2	O	Gull Rock & adjacent rocks		3-S			X	X	M	X		B	3,4
10.2	O	Otter Rock	1-S						L				5
10.3	S	Otter Crest Cliffs	3-S			X		X	L	X			6,7
10.9	B	Cape Foulweather Cliffs/Rock	4-S; 1-L				X	X	L	X			1,2
11.1	B	Yaquina Head Cliffs/Rocks	7-S; 3-M		P,PF	X	X	X	M	X	X	X	1,3,4
11.1	O	Yaquina Head Colony Rock	1-XL		P		X	X	M	X	X		2
11.1	B	Yaquina Seal Rock		1-S		X	X		M	X	X	X	5
11.2	S	South Yaquina Cliff	1-M			X		X	M	X	X	X	6
11.3	S	BLM Tidepool Cliff	1-M			X		X	M	X	X	X	6
12.1	B	Seal Rock Cliff/Rocks	7-S		P	X		X	H	X	X	X	2,3,4,6

Marine Bird and Mammal - Human Use Concerns

Site Type: S = shoreline; O = offshore; B = both

Colony Size: S = 0-100; M = 100-1000; L = 1000-10000; XL = over 10000

Haulout Size: S = 0-100; M = 100-300; L = 300-1000; XL = over 1000

T&E Species: S = Stellers sea lion; P = brown pelican; E = bald eagle; PF = peregrine falcon; G = Aleutian Canada goose

Level of Concern: L = low; M = medium; H = high

Access Restrictions: B = proposed buffer zone areas in Ocean Plan

Rocky Shores Site #	Site Type	Location	Resource Affected			Type of Disturbance				Suggested Solution			#on cell map
			Bird Colonies: No.-Size	Mammal Haulouts: No.-Size	T&E Species	Foot Traffic	Vessel	Aircraft	Level of Concern	Education	Signage	Access Restriction	
12.1	B	Seal Rock Rocks		1-S		X		X	H	X	X	X	5
12.1	O	Seal Rock North Rock		1-S	S		X		L				1
13.3	S	Yachats Rock	1-M			X			L	X	X		1
13.3	S	Yachats Rock		1-S		X			L	X	X		2
14.9	S	Cape Perpetua Cliff	1-M		P,PF	X		X	L				1
14.2	S	Strawberry Hill Rock & south		2-S		X			H	X	X		2,3
14.4	S	Gwynn Knoll Cliff	1-S			X			L				4
14.5	S	Stonefield Beach Cliff	1-S			X			M				5
14.5	S	Mill Creek Beach		1-S		X			L				6
15.1	B	Heceta Cliff and Rocks	1-S; 4-M; 2-L			X		X	H	X	X		1,3
15.1	B	Parrot Rock	1-M			X		X	H	X	X		2
15.2	S	Sea Lion Point Cliffs & Rocks	1-S; 1-M; 1-L					X	M	X			4
15.2	S	Sea Lion Caves Platforms		1-M;1-L	S	X	X	X	M	X	X	X	4
15.9	B	Sea Lion Pt. So. End Cliffs/Rks	1-S; 1-L			X		X	M	X	X		5,6
16.1	B	Gregory Pt. Cliff/Rocks	1-L		P	X	X	X	H	X	X	X	1
16.1	S	Squaw Island	3-S			X	X		L	X	X		2
16.1	S	Squaw Island Rocks		1-S		X	X		L	X	X		3
16.2	B	Sunset Bay Cliffs/Rocks	4-S			X	X		H	X	X		4
16.3	S	Shore Acres Cliffs	2-S			X			L	X	X		5
16.4	S	North Cove Cliff	1-S		FF	X	X	X	L	X	X	X	8
16.4	B	Shell Island and rock	2-S		FF	X	X	X	L	X	X	X	7
16.4	B	Shell Island		1-S;1-M;2-L	S	X	X	X	H	X	X	B,X	9
16.4	O	Simpson Reef		2-S;1-L	S		X	X	H	X	X	X	6
16.5	S	South Cove Platform		1-S		X			L				10
16.9	S	South Arago Cliffs	2-S; 2-M					X	L				11,12,13
17.1	B	Five Mile Point Rocks		1-S					L				1
18.1	B	Coquille Pt. Nearshore Rks.	4-S; 3-M; 1-L		P,G	X	X	X	H	X	X	B,X	1,2,3,4
18.1	B	Coquille Pt. Rocks		1-S		X	X	X	H	X	X	B	4
18.1	O	Cat and Kittens Rocks	1-XL				X	X	H	X	X	B	5
18.1	O	Cat and Kittens Rocks		1-M			X	X	H	X	X	B	5

Marine Bird and Mammal - Human Use Concerns

Site Type: S = shoreline; O = offshore; B = both

Colony Size: S = 0-100; M = 100-1000; L = 1000-10000; XL = over 10000

Haulout Size: S = 0-100; M = 100-300; L = 300-1000; XL = over 1000

T&E Species: S = Stellers sea lion; P = brown pelican; E = bald eagle; PF = peregrine falcon; G = Aleutian Canada goose

Level of Concern: L = low; M = medium; H = high

Access Restrictions: B = proposed buffer zone areas in Ocean Plan

Rocky Shores Site #	Site Type	Location	Resource Affected			Type of Disturbance				Suggested Solution			#on cell map
			Bird Colonies: No.-Size	Mammal Haulouts: No.-Size	T&E Species	Foot Traffic	Vessel	Aircraft	Level of Concern	Education	Signage	Access Restriction	
18.1	B	Grave Pt. Nearshore Rocks	3-S; 1-L		G, PF	X	X	X	H	X	X	B	6,7
18.2	B	Haystack Rock	2-S; 1-M		G	X	X	X	M	X	X		8
19.1	B	Blacklock Point Rocks & Cliff	2-S			X	X	X	L				2
19.1	O	Tower Rocks	1-S; 1-L				X	X	L				1,3
19.2	B	Castle Rock	1-S; 1-M; 1-L		P	X	X	X	H	X	X	B,X	5
19.2	B	Castle Rock		1-S		X	X	X	M	X	X	B,X	4
19.2	O	Gull Rock	1-XL		P		X	X	H			B	6
19.2	O	Gull Rock		1-M			X	X	L	X		B	6
19.3	B	Cape Blanco Cliff/Rocks	5-S		P, PF	X	X		L	X	X		7,9
19.3	S	Needle Rock	1-M		P, PF	X			M	X	X		9
19.3	S	Cape Blanco		1-M		X			L	X	X		8
19.4	O	Blanco Reef		1-L	S		X	X	L	X			10
20.1	O	Orford Reef	3-S;1-M;3-L;1-XL		P		X	X	H	X	X	B	1thru7
20.1	O	Orford Reef		1-S;9-M;1-L	S		X	X	H	X	X	B	1thru7
21.1	O	Klocqueh Rock	1-S				X		L				1
21.1	B	Heads cliff and rocks	5-S		P, PF		X		L				2,3
21.1	O	The Heads Rocks		1-M			X		L				2
21.2	B	Nellies & Tichnor cliff & rks	2-S				X		L				3
21.3	B	Battle Rock cliffs & rock	2-S		P	X			M	X	X		4
21.9	O	Rocks south of Battle Rock	3-S		P		X		L				5
22.2	O	Redfish Rocks	1-M; 4-L		P		X	X	H	X		B	1
22.2	O	Island Rock	1-L; 1-XL		P, G		X	X	H	X		B	2
22.3	B	Humbug Cliff & Rocks	3-S		FF		X		L				3
22.3	S	Humbug Cliff		1-S			X		L				3
23.1	B	Rocks north of Lookout	5-S				X	X	L				1
23.1	S	Lookout rock cliffs	1-S			X	X		L				2
23.2	S	Arizona - south and cliff	1-S (no id)			X			L				3
23.3	S	Frankport cliffs	3-S				X		L				4
23.3	O	Sisters Rock	1-M		P, PF		X	X	M	X	X		5
23.3	B	Frankport nearshore rocks	1-S			X	X		L				6

Marine Bird and Mammal - Human Use Concerns

Site Type: S = shoreline; O = offshore; B = both

Colony Size: S = 0-100; M = 100-1000; L = 1000-10000; XL = over 10000

Haulout Size: S = 0-100; M = 100-300; L = 300-1000; XL = over 1000

T&E Species: S = Stellers sea lion; P = brown pelican; E = bald eagle; PF = peregrine falcon; G = Aleutian Canada goose

Level of Concern: L = low; M = medium; H = high

Access Restrictions: B = proposed buffer zone areas in Ocean Plan

Rocky Shores Site #	Site Type	Location	Resource Affected			Type of Disturbance				Suggested Solution			#on cell map
			Bird Colonies: No.-Size	Mammal Haulouts: No.-Size	T&E Species	Foot Traffic	Vessel	Aircraft	Level of Concern	Education	Signage	Access Restriction	
23.4	S	Devil's Backbone	1-S			X			L				7
24.1	B	North Nesika cliff and rocks	2-S; 1-M			X			L				1
24.1	B	Hubbard Mound cliff and rks	1-S; 1-M			X			L				4
24.2	O	Hubbard Rocks	1-L; 1-XL		P		X	X	H	X		B	2,3
24.2	O	Hubbard Mound reef/Dog Rock		1-M			X	X	M	X		B	3
24.3	B	Otter Point cliff & rocks	3-S			X			H	X	X	X	5,6
25.1	O	Rogue Reef	1-S; 1-M; 1-L		FF		X	X	H	X	X	B	1,2,3,4
25.1	O	Rogue Reef		2-S;3-M;1-L	S		X	X	H	X	X	B	1,2,3,4,5
26.1	S	Cape Sebastian Cliffs	3-S; 1-M				X	X	L				1,2,3,4
26.1	O	Hunters Island	1-XL		P, G		X	X	H	X	X	B	5
26.1	O	Hunters Island		1-M			X	X	M			B	5
26.2	B	Meyer's Creek Rocks	1-S; 2-M			X	X		H	X	X		6,7,8
27.1	B	Crook Point sm. rks. & cliff	5-S; 1-M		P, PF	X	X		M	X	X		1
27.1	B	Lg. rock N. of Crook Point	1-XL		P, PF	X			M	X	X	X	1
27.1	B	Saddle Rock	1-XL		P, PF	X			H	X	X	X	1
27.1	B	Crook Point Rocks		1-M		X		X	M	X	X		1
27.2	O	Mack Reef and Arch Rocks	3-S; 2-M; 1-XL				X	X	H	X		B	2
27.4	B	Burnt Hill	2-S			X			L				3
27.5	B	Mid Boardman Rocks & Cliffs	16-S			X	X		M	X	X		5,6,7,8
27.5	O	Deer Point Rock		1-S			X		L				9
27.9	O	Yellow Rock	1-M				X	X	H	X			4
28.1	B	Thomas Creek Rocks & Spruce	8-S; 1-M			X	X		M				1,2
28.2	B	Indian Sands Cliffs & Rocks	4-S			X	X		M				3,4
28.2	B	Rock N. of Whaleshead	1-XL			X	X		M				5
28.2	S	Whaleshead Cliffs	3-S			X	X		M				6
28.3	B	Whaleshead Rocks	1-M; 2-XL		P, G	X	X	X	H	X	X	B	7,9
28.3	B	Whaleshead Rocks		1-S		X	X	X	M	X	X	B	8
28.4	S	North Ferrelo Cliff & Rocks	1-S			X			M	X	X		10
28.4	B	House Rock Creek -sm. rocks	1-S			X			M	X	X		11
28.4	B	Cape Ferrelo Rocks	1-S			X			M	X	X		14

Marine Bird and Mammal - Human Use Concerns

Site Type: S = shoreline; O = offshore; B = both

Colony Size: S = 0-100; M = 100-1000; L = 1000-10000; XL = over 10000

Haulout Size: S = 0-100; M = 100-300; L = 300-1000; XL = over 1000

T&E Species: S = Stellers sea lion; P = brown pelican; E = bald eagle; PF = peregrine falcon; G = Aleutian Canada goose

Level of Concern: L = low; M = medium; H = high

Access Restrictions: B = proposed buffer zone areas in Ocean Plan

		Resource Affected			Type of Disturbance			Suggested Solution					
Rocky Shores Site #	Site Type	Location	Bird Colonies: No.-Size	Mammal Haulouts: No.-Size	T&E Species	Foot Traffic	Vessel	Aircraft	Level of Concern	Education	Sinage	Access Restriction	#on cell map
28.4	B	Cape Ferrelo Rocks		1-S		X	X		L				13
28.5	O	House Rock	1-S		P		X	X	H	X	X		12
28.5	O	Twin Rocks & adjacent rocks	3-L		P		X	X	H	X	X	B	15
28.5	O	Adjacent Rocks	1-S	1-S		X	X		L				16
28.5	O	Rainbow Rock	1-M		P		X	X	H	X	X		17
28.6	B	S. Boardman Nearshore Rocks				X	X		L	X	X		18
29.1	O	Goat Island	1-XL		P,PF,G		X	X	H	X	X	B	4
29.1	O	Goat Island		1-S			X		H	X	X	B	4
29.2	O	White Rock	1-S				X	X	H	X	X		1
29.2	B	Harris Beach rks near Goat Is.	4-S; 1-M			X	X		H	X	X		2,3,5
29.2	B	S. Harris Beach cliff & rocks	3-S			X	X		H	X	X		6

APPENDIX 3: Explanation of Data Tabulated on Rocky Shores Cell Maps

This appendix describes the information presented in tables on the rocky shores cell maps.

Upland Use and Access Maps

ID No. - numeric identifier that associates mapped features with data presented in the table below each map.

Rocky Shore Access - name of an access trail, park, or other facility shown on each map.

1992 Visitor Count - total day-use visitor count associated with each access. In many cases, the visitor count applies to more than one access point. These are footnoted in each table.

Parking Spaces - number of parking spaces associated with each access. In some cases, the parking space count applies to more than one access point. These are footnoted in each table.

Trail Type/Difficulty - Trail Type describes the type of trail surface. Categories include:

- paved (asphalt or concrete)
- gravel
- chips (wood chips)
- steps (stairs)
- beach (access is along a beach)
- primitive (improved or unimproved trail, with no added surface covering)

Trails are rated as easy, moderate, or difficult. Easy trails are relatively level, short, and often paved. Difficult trails have sections that require some climbing (use of hands for stability) or are very long or steep. All intermediate trail types are rated as moderate.

Trail Length - the estimate length of each trail in feet from the access point to the rocky shore.

Natural Resource Maps

ID No. - numeric identifier that associates mapped features with data presented in the table below each map.

Colony Type - type of animal that uses the nesting colony or haulout. Categories include seabird, harbor seal, Steller sea lion, and California sea lion.

Colony no./size - Colony no. is the number of individual seabird nesting colonies or pinniped haulout sites at the locality indicated on the map. Colony size represents the number of birds or pinnipeds in individual colonies. Size categories are as follows:

Seabirds:

Very High	more than 10,000 birds
High	1,000 - 10,000 birds
Medium	100 - 1,000 birds
Low	0 - 100 birds

Pinnipeds:

Very High	more than 1,000 animals
High	300 - 1,000 animals
Medium	100 - 300 animals
Low	0 - 100 animals

Location - major habitat type at nesting colony or pinniped haulout site. Types include:

- cliff
- rocks (nearshore or offshore rocks)
- platform (rocky intertidal shelf-like bench)

Foot Access to Rocks - indicates whether or not there is foot access to rocks.

Source of Potential Disturbance - lists the sources of potential disturbance to the seabird nesting colonies or pinniped haulouts. Sources listed include:

- foot (hikers, etc. can get close enough to cause disturbance)
- vessel
- aircraft

Sources included on the list were derived from biologists and resource managers familiar with the area and resource in question. The magnitude of impacts (if any) related to each potential disturbance have not necessarily been documented with scientific study. This column was left blank where there was little or no concern about potential disturbance.