

RESOURCE INVENTORY

ECOLOGY
BIG BASIN REDWOODS STATE PARK
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INTRODUCTION

Big Basin Redwoods State Park occurs within a portion of the Redwood Ecological Region (PRC 5019.53). The park is characterized by moderate climatic conditions, with wet, cool winters and dry, warm summers moderated by the Pacific Ocean. For much of the park, fog is an important source of precipitation, especially in the summer.

This state park, an 18,000 plus acre unit of notable biological diversity, possesses significant natural resources. Foremost are the ancient redwood forests for which the park was originally established.

The principal stream system in the park is Waddell Creek and its tributaries, which drain most of the park. Nearly 80% of this drainage is within the boundaries of the park, providing vital wildlife habitat.

A 5000-acre portion of the Waddell Creek drainage has been subclassified as West Waddell Creek State Wilderness.

METHODS

The Ecology Section results from a compilation of other available inventory sections for Big Basin Redwoods State Park, particularly Plant Life, Animal Life, Hydrology, and Soils.

The approach for defining ecosystems at Big Basin Redwoods State Park involved identifying critical physical and biological elements and processes. Resource management directives of the Department of Parks and Recreation were used to clarify political aspects of ecosystem unit (ecological management units) boundaries.

Criteria for the delineation of ecological units follows Swezy and Didion (1990):

There are many different definitions of the term “ecosystem” available in ecology textbooks. “Ecosystem” and “ecological units” are equivalent as used in this section. The working definition for ecological units (EUs) is as follows: any part of a state park unit chosen as an area of interest, with the line around that area being the ecosystem boundary and anything crossing the line being input or output. This definition encompasses more specific areas, geologic, biologic, legal, and social components (after Agee and Johnson 1989)

There can be no prescribed rules for drawing boundaries because each area will have its own natural characteristics and management concerns. Further, accurate modeling of ecological processes requires levels of complexity beyond

what can be shown in two dimensions (i.e., on a map). Generic elements to be evaluated in the process of delineating EU boundaries include:

1. soils and landforms
2. geology
3. hydrology/watershed boundaries
4. vegetation
5. wildlife
6. sensitive species (flora and fauna)
7. landscape level processes (fire, ungulate grazing, etc.)
8. human use patterns

Drawing boundaries around areas with similar environmental conditions and similar management concerns provides the framework for evaluating management alternatives, because EU boundaries act as a point to monitor system inputs and outputs. EUs serve as components of a larger system and interactions between units can be evaluated. This methodology also allows the identification of ecological processes that may cross state park unit boundaries. Finally, the models developed assist in highlighting the need for specific information on ecosystem components, natural disturbance processes, and rates of change. Monitoring efforts can then be focused on management priorities as organized in a well-defined system.

ECOLOGICAL UNITS (EUs)

Big Basin Redwoods State Park is divided into twelve EUs primarily on the basis of landforms, i.e. watersheds (Map E-1: Ecological Units, on file at the Northern Service Center, Department of Parks and Recreation). The EUs are mostly named after geographic features, and are listed below.

Wilson Gulch/Intermittent Coastal Streams Complex EU
Elliot Creek Watershed EU
Finney Creek Watershed EU
Año Nuevo Creek Watershed EU
Green Oaks Creek Watershed EU
Cascade Creek Watershed EU
Whitehouse Creek Watershed EU
Gazos Creek Watershed EU
Boulder Creek Watershed EU
Mill Creek Watershed EU
Scott Creek Watershed EU
Waddell Creek Watershed EU

Each EU is discussed separately; a summary of salient biological and physical features is provided. Sensitive components are identified. Internal and external natural disturbance processes affecting each EU are noted as well as threats, resource management concerns, and recommendations for future management direction.

EU Name: Wilson Gulch/Intermittent Coastal Streams Complex

Criteria for Delineation: Most of this EU is composed of a triangular piece of coastal property disconnected from the main body of the park and situated between Waddell and Año Nuevo Creeks. The EU includes parts of two tiny, intermittent drainages immediately upcoast from the mouth of Waddell Creek and a portion of the Wilson Gulch watershed. About 42% of the Wilson Gulch watershed is within park boundaries.

EU Area: 142 acres (approximation)

Percent of Total Area of Unit: <1%

Plant Communities: (in descending order of % cover)

Northern Coastal Scrub
Monterey Pine Forest
Mixed Evergreen Forest/Upland Redwood Forest

Exotic Species: No significant problems.

Plant Communities of Special Interest: Monterey Pine Forest and Upland Redwood Forest.

Sensitive Plant Species: Monterey pine (*Pinus radiata*), a California Native Plant Society (CNPS) List 1B tree and federal species of concern, occurs on lower coastal slopes between Northern Coastal Scrub and Mixed Evergreen Forest/Upland Redwood Forest. There is a potential occurrence of Monterey Indian paintbrush (*Castilleja latifolia*), a CNPS List 4 perennial herb, in the Northern Coastal Scrub community of this EU.

Wildlife Habitat: Coastal scrub is important habitat for reptile species; sizeable populations can occur in areas that have a well-developed duff and debris layer, as well as more open sandy areas. Monterey pine forest is important foraging and nesting habitat for numerous bird species. Redwood forest habitat is limited, although there is connectivity with equivalent habitat in other park locations and on nearby private lands.

Aquatic Life: Wilson Gulch is the largest drainage in this EU, but of minor importance as wildlife habitat. It has an intermittent flow and a paucity of riparian vegetation.

Sensitive Animals: In the mixed evergreen forest plant community within this EU, there is potential habitat for sharp-shinned hawk and Cooper's hawk, both DFG Species of Special Concern (CSC). Within the northern coastal scrub in this EU, there is potential habitat for the coast horned lizard, and

western mastiff bat (all CSC). The upland redwood forest in this EU may provide habitat for California spotted owl, Vaux's swift, purple martin, and pallid bat (all CSC). The Monterey pine forest community may provide suitable perching and nest sites for golden eagles (DFG Fully Protected) and other sensitive raptor species.

Processes: This EU is strongly influenced by its hydrology and steep slopes. The EU is subject to land/mud slides from seismic and meteorological events. The Loma Prieta Earthquake in 1992 caused a landslide that covered a portion of State Highway 1.

Fire is a natural process in the Monterey Pine Forest.

Management Concerns: The steep, unstable slopes on a portion of this EU will be subject to future slides that can adversely affect the adjacent highway and create vegetation gaps.

Monterey pines are not dependent on fire for opening of their cones, but optimum reproduction occurs following fire events, especially ground fires of a light to moderate intensity. Fire suppression activities since the early part of this century have virtually eliminated fire as a component of the ecosystem, producing unhealthy changes. The continued absence of fire will lead to increased fuel loading in this EU as stands age and begin to die off; this increases the likelihood of a future catastrophic fire.

EU Name: Elliot Creek Watershed

Criteria for Delineation: All of the Elliot Creek drainage within park boundaries is encompassed by this EU. About 19% of the lowest part of the drainage is on adjacent private property.

EU Area: 522 acres (approximation)

Percent of Total Area of Unit: About 3%

Plant Communities: (in descending order of % cover)

Knobcone Pine Forest/Northern Mixed Chaparral
Upland Redwood Forest

Exotic Species: No significant problems.

Plant Communities of Special Interest: Knobcone Pine Forest and Upland Redwood Forest.

Sensitive Plant Species: None known, although potential habitat for Schreiber's manzanita (*Arctostaphylos glutinosa*), a CNPS List 1B plant, exists in the highest elevations of the EU on soils formed from diatomaceous shale.

Wildlife Habitat: Chaparral and Knobcone pine areas are good habitat for reptiles and numerous species of birds. Redwood forest habitat is limited, although there is connectivity with equivalent habitat in other park locations and on nearby private lands.

Aquatic Life: This small stream system provides valuable riparian habitat for birds, mammals, reptiles, and especially amphibians. There is permanent surface flow where the stream leaves park property, but it is not known how far upstream this permanent flow persists.

Sensitive Animals: There is potential habitat for the California red-legged frog, listed as federal threatened (FT). The knobcone pine forest/northern mixed chaparral community may provide suitable habitat for the California horned lizard, western mastiff bat, and pallid bat, all DFG Species of Special Concern (CSC), and the mountain lion. In this EU, the upland redwood forest may provide habitat for California spotted owl, Vaux's swift, purple martin, and pallid bat (all CSC).

Processes: This EU is strongly influenced by its hydrology, steep slopes, and thin, easily erodible ridgetop soils. Fire is a natural process in the Northern Mixed Chaparral and Knobcone Pine Forest communities.

Management Concerns: The continued absence of fire in chaparral and knobcone pine forests will impact recruitment of new pines and lead to increased fuel loading in this EU, increasing the likelihood of a future catastrophic fire.

EU Name: Finney Creek Watershed

Criteria for Delineation: All of the Finney Creek drainage within park boundaries is encompassed by this EU. About 40% of the lowest part of the drainage is on adjacent private property.

EU Area: 137 acres (approximation)

Percent of Total Area of Unit: <1%

Plant Communities: (in descending order of % cover)

Knobcone Pine Forest/Northern Mixed Chaparral
Mixed Evergreen Forest/Upland Redwood Forest

Exotic Species: No significant problems.

Plant Communities of Special Interest: Knobcone Pine Forest and Upland Redwood Forest.

Sensitive Plant Species: None known, although there is potential habitat for Schreiber's manzanita on soils formed from diatomaceous shale.

Wildlife Habitat: Chaparral and Knobcone pine areas are good habitat for reptiles and numerous species of birds. Redwood forest habitat is mostly limited to moist areas near stream channels and lower canyon slopes. Although limited, there is connectivity with equivalent habitat in other park locations and on nearby private lands.

Aquatic Life: This small perennial stream system provides valuable riparian habitat for birds, mammals, reptiles, and especially amphibians.

Sensitive Animals: The mixed evergreen forest/upland redwood forest plant community may provide suitable habitat for sharp-shinned hawk, Cooper's hawk, California spotted owl, Vaux's swift, purple martin, and pallid bat, all DFG Species of Special Concern (CSC). The knobcone pine forest/northern mixed chaparral community may provide suitable habitat for the California horned lizard, western mastiff bat, and pallid bat (all CSC), and the mountain lion.

Processes: This EU is strongly influenced by its hydrology, steep slopes, and thin, easily erodible ridgetop soils. Fire is a natural process in the Northern Mixed Chaparral and Knobcone Pine Forest communities.

Management Concerns: The continued absence of fire in chaparral and knobcone pine forests will impact recruitment of new pines and lead to

increased fuel loading in this EU, increasing the likelihood of a future catastrophic fire.

EU Name: Año Nuevo Creek Watershed

Criteria for Delineation: All of the Año Nuevo Creek drainage within park boundaries is encompassed by this EU. This includes an unnamed seasonal tributary. More than 60% of the watershed is on adjacent private property.

EU Area: 636 acres (approximation)

Percent of Total Area of Unit: about 4%

Plant Communities: (in descending order of % cover)

Knobcone Pine Forest/Northern Mixed Chaparral
Mixed Evergreen Forest/Upland Redwood Forest

Exotic Species: No significant problems.

Plant Communities of Special Interest: Knobcone Pine Forest and Upland Redwood Forest.

Sensitive Plant Species: None known, although there is potential habitat for Schreiber's manzanita on soils formed from diatomaceous shale.

Wildlife Habitat: Closed-cone pine and chaparral habitats are the most dominant types in this EU, which provide good habitat for reptiles and numerous species of birds. Redwood forest habitat is mostly limited to moist areas near stream channels and lower canyon slopes. Although limited, there is connectivity with equivalent redwood habitat in other park locations and on nearby private lands.

Aquatic Life: Drainage flows are seasonal, with permanent flows beginning at or just downstream from the park boundary. This small stream system provides riparian habitat for birds, mammals, reptiles, and especially amphibians.

Sensitive Animals: The mixed evergreen forest/upland redwood forest plant community may provide suitable habitat for sharp-shinned hawk and Cooper's hawk, California spotted owl, Vaux's swift, purple martin, and pallid bat, all DFG Species of Special Concern (CSC). The knobcone pine forest/northern mixed chaparral community may provide suitable habitat for the California horned lizard, western mastiff bat, and pallid bat (all CSC), and the mountain lion.

Processes: This EU is strongly influenced by its hydrology and steep slopes, and thin, easily erodible ridgetop soils. Fire is a natural process in the Northern Mixed Chaparral and Knobcone Pine Forest communities.

Management Concerns: The continued absence of fire in chaparral and knobcone pine forests will impact recruitment of new pines and lead to increased fuel loading in this EU, increasing the likelihood of a future catastrophic fire.

EU Name: Green Oaks Creek Watershed

Criteria for Delineation: All of the Green Oaks Creek watershed within park boundaries is encompassed by this EU. More than 90% of the watershed is on adjacent private property.

EU Area: 57 acres (approximation)

Percent of Total Area of Unit: <1%

Plant Communities: (in descending order of % cover)

Knobcone Pine Forest/Northern Mixed Chaparral
Mixed Evergreen Forest/Upland Redwood Forest

Exotic Species: No significant problems.

Plant Communities of Special Interest: Knobcone Pine Forest and Upland Redwood Forest.

Sensitive Plant Species: None known, although there is potential habitat for Schreiber's manzanita on soils formed from diatomaceous shale.

Wildlife Habitat: Closed-cone pine and chaparral habitats are the most dominant types in this EU, which provide good habitat for reptiles and numerous species of birds. Redwood forest habitat is mostly limited to moist areas near the stream channel. Although limited, there is connectivity with equivalent habitat in other park locations and on nearby private lands.

Aquatic Life: Drainage flows are seasonal, with limited riparian habitat.

Sensitive Animals: The knobcone pine forest/northern mixed chaparral community may provide suitable habitat for the California horned lizard, western mastiff bat, and pallid bat, all DFG Species of Special Concern (CSC), and the mountain lion. The mixed evergreen forest/upland redwood forest plant community may provide suitable habitat for sharp-shinned hawk, Cooper's hawk, California spotted owl, Vaux's swift, purple martin, and pallid bat (all CSC).

Processes: This EU is strongly influenced by its hydrology, steep slopes, and thin, easily erodible ridgetop soils. Fire is a natural process in the Northern Mixed Chaparral and Knobcone Pine Forest communities.

Management Concerns: The continued absence of fire in chaparral and knobcone pine forests will impact recruitment of new pines and lead to

increased fuel loading in this EU, increasing the likelihood of a future catastrophic fire.

EU Name: Cascade Creek Watershed

Criteria for Delineation: All of the Cascade Creek watershed within park boundaries is encompassed by this EU. About 86% of the watershed is on adjacent private property.

EU Area: 274 acres (approximation)

Percent of Total Area of Unit: about 2%

Plant Communities: (in descending order of % cover)

Knobcone Pine Forest/Northern Mixed Chaparral
Mixed Evergreen Forest/Upland Redwood Forest

Exotic Species: No significant problems.

Plant Communities of Special Interest: Knobcone Pine Forest and Upland Redwood Forest.

Sensitive Plant Species: None known, although there is potential habitat for Schreiber's manzanita on soils formed from diatomaceous shale.

Wildlife Habitat: Closed-cone pine and chaparral habitats are the most dominant types in this EU, which provide good habitat for reptiles and numerous species of birds. Redwood forest habitat is mostly limited to moist areas near the stream channel.

Aquatic Life: Drainage flows are seasonal, with limited riparian habitat.

Sensitive Animals: The knobcone pine forest/northern mixed chaparral community may provide suitable habitat for the California horned lizard, western mastiff bat, and pallid bat, all DFG Species of Special Concern (CSC), and the mountain lion. The mixed evergreen forest/upland redwood forest plant community may provide suitable habitat for sharp-shinned hawk, Cooper's hawk, California spotted owl, Vaux's swift, purple martin, and pallid bat (all CSC).

Processes: This EU is strongly influenced by its hydrology, steep slopes, and thin, easily erodible ridgetop soils. Fire is a natural process in the Northern Mixed Chaparral and Knobcone Pine Forest communities.

Management Concerns: The continued absence of fire in chaparral and knobcone pine forests will impact recruitment of new pines and lead to increased fuel loading in this EU, increasing the likelihood of a future catastrophic fire.

EU Name: Whitehouse Creek Watershed

Criteria for Delineation: All of the Whitehouse Creek watershed within park boundaries is encompassed by this EU. It encompasses the highest elevations of this watershed. About 78% of the watershed is on adjacent state park (Cascade Ranch) or private property.

EU Area: 547 acres (approximation)

Percent of Total Area of Unit: about 3%

Plant Communities: (in descending order of % cover)

Knobcone Pine Forest/Northern Mixed Chaparral
Mixed Evergreen Forest/Upland Redwood Forest

Exotic Species: No significant problems.

Plant Communities of Special Interest: Knobcone Pine Forest and Upland Redwood Forest.

Sensitive Plant Species: None known, although there is potential habitat for Schreiber's manzanita on soils formed from diatomaceous shale.

Wildlife Habitat: Closed-cone pine and chaparral habitats are the most dominant types in this EU, which provide good habitat for reptiles and numerous species of birds. Redwood forest habitat is primarily limited to moist areas near the stream channel.

Aquatic Life: Drainage flows are seasonal, with very limited riparian habitat.

Sensitive Animals: The knobcone pine forest/northern mixed chaparral community may provide suitable habitat for the California horned lizard, western mastiff bat, and pallid bat, all DFG Species of Special Concern (CSC), and the mountain lion. The mixed evergreen forest/upland redwood forest plant community may provide suitable habitat for sharp-shinned hawk, Cooper's hawk, California spotted owl, Vaux's swift, purple martin, and pallid bat (all CSC).

Processes: This EU is strongly influenced by its hydrology, steep slopes, and thin, easily erodible ridgetop soils. Fire is a natural process in the Northern Mixed Chaparral and Knobcone Pine Forest communities.

Management Concerns: The continued absence of fire in chaparral and knobcone pine forests will impact recruitment of new pines and lead to increased fuel loading in this EU, increasing the likelihood of a future

catastrophic fire.

EU Name: Gazos Creek Watershed

Criteria for Delineation: All of the Gazos Creek watershed within park boundaries is encompassed by this EU. This includes a major tributary, Old Womans Creek.

EU Area: 326 acres (approximation)

Percent of Total Area of Unit: about 2%

Plant Communities: (in descending order of % cover)

Knobcone Pine Forest/Northern Mixed Chaparral
Mixed Evergreen Forest/Upland Redwood Forest

Exotic Species: No significant problems.

Plant Communities of Special Interest: Knobcone Pine Forest and Upland Redwood Forest.

Sensitive Plant Species: None known, although there is potential habitat for Schreiber's manzanita on soils formed from diatomaceous shale.

Wildlife Habitat: Closed-cone pine and chaparral habitats are the most dominant types in this EU, which provide good habitat for reptiles and numerous species of birds. Redwood forest habitat is mostly limited to moist areas near the stream channel.

Aquatic Life: Drainage flows are seasonal, with limited riparian habitat.

Sensitive Animals: The knobcone pine forest/northern mixed chaparral community may provide suitable habitat for the California horned lizard, western mastiff bat, and pallid bat, all DFG Species of Special Concern (CSC), and the mountain lion. The mixed evergreen forest/upland redwood forest plant community may provide suitable habitat for sharp-shinned hawk, Cooper's hawk, California spotted owl, Vaux's swift, purple martin, and pallid bat (all CSC).

Processes: This EU is strongly influenced by its hydrology, steep slopes, and thin, easily erodible ridgetop soils. Fire is a natural process in the Northern Mixed Chaparral and Knobcone Pine Forest communities.

Management Concerns: The continued absence of fire in chaparral and knobcone pine forests will impact recruitment of new pines and lead to increased fuel loading in this EU, increasing the likelihood of a future

catastrophic fire.

EU Name: Boulder Creek Watershed

Criteria for Delineation: All of the Boulder Creek watershed within park boundaries is encompassed by this EU. This includes a major tributary, Jamison Creek.

EU Area: 683 acres (approximation)

Percent of Total Area of Unit: about 4%

Plant Communities: (in descending order of % cover)

Northern Mixed Chaparral/Knobcone Pine Forest
Mixed Evergreen Forest/Upland Redwood Forest
Interior Live Oak Woodland
Northern Interior Cypress Forest

Exotic Species: No significant problems.

Plant Communities of Special Interest: Northern Interior Cypress Forest, Knobcone Pine Forest, and Upland Redwood Forest.

Sensitive Plant Species: Three small groves of Santa Cruz cypress (*Cupressus abramsiana*), a CNPS List 1B tree, occur in the Eagle Rock portion of Big Basin Redwoods State Park. It is listed as endangered by both the state of California and the federal government. The CNPS List 1B Santa Cruz Mountains manzanita (*Arctostaphylos andersonii*) is found in the vicinity of Eagle Rock. It is a federal species of concern. White-rayed pentachaeta (*Pentachaeta bellidiflora*), an associate of Santa Cruz cypress, is known from a location on state park lands just north of Eagle Rock. This CNPS List 1B is listed as endangered by both the state of California and the federal government.

Wildlife Habitat: Chaparral and Knobcone pine areas provide good habitat for reptiles and numerous species of birds. Redwood forest habitat is limited, although there is connectivity with equivalent habitat in other park locations and on nearby private lands.

Rock outcrops at Eagle Rock are potential nesting habitat for various species of bats and raptors.

Aquatic Life: Unknown.

Sensitive Animals: The interior live oak woodland within this EU may provide suitable habitat for Cooper's and sharp-shinned hawks, both DFG Species

of Special Concern (CSC). The northern mixed chaparral/knobcone pine forest community may provide suitable habitat for the California horned lizard, western mastiff bat, and pallid bat (all CSC), and the mountain lion. The mixed evergreen forest/upland redwood forest plant community may provide suitable habitat for sharp-shinned hawk, Cooper's hawk, California spotted owl, Vaux's swift, purple martin, and pallid bat (all CSC). Within the northern interior cypress forest, there could potentially be suitable foraging habitat for a number of sensitive raptor and bat species.

Processes: Fire is a natural process in the Northern Mixed Chaparral and Knobcone Pine Forest communities.

Management Concerns: The continued absence of fire in chaparral and knobcone pine forests will impact recruitment of new pines and lead to increased fuel loading in this EU, increasing the likelihood of a future catastrophic fire.

EU Name: Mill Creek Watershed

Criteria for Delineation: All of the Mill Creek watershed within park boundaries is encompassed by this EU.

EU Area: 39 acres (approximation)

Percent of Total Area of Unit: <1%

Plant Communities: (in descending order of % cover)

Northern Mixed Chaparral/Knobcone Pine Forest

Exotic Species: No significant problems.

Plant Communities of Special Interest: Knobcone Pine Forest

Sensitive Plant Species: None known, although there is potential habitat for Schreiber's manzanita on soils formed from diatomaceous shale.

Wildlife Habitat: Chaparral and Knobcone pine areas are good habitat for reptiles and numerous species of birds.

Aquatic Life: None

Sensitive Animals: Within this relatively small EU, the northern mixed chaparral/knobcone pine forest community may provide suitable habitat for the California horned lizard, western mastiff bat, and pallid bat, all DFG Species of Special Concern (CSC), and the mountain lion.

Processes: Fire is a natural process in the Northern Mixed Chaparral and Knobcone Pine Forest communities.

Management Concerns: The continued absence of fire in chaparral and knobcone pine forests will impact recruitment of new pines and lead to increased fuel loading in this EU, increasing the likelihood of a future catastrophic fire.

EU Name: Scott Creek Watershed

Criteria for Delineation: All of the Scott Creek watershed within park boundaries is encompassed by this EU.

EU Area: 546 acres (approximation)

Percent of Total Area of Unit: about 3%

Plant Communities: (in descending order of % cover)

Northern Mixed Chaparral/Knobcone Pine Forest
Mixed Evergreen Forest/Upland Redwood Forest

Exotic Species: No significant problems.

Plant Communities of Special Interest: Knobcone Pine Forest and Upland Redwood Forest.

Sensitive Plant Species: Schreiber's manzanita is known to occur in this EU on mostly ridgetop locations on soils formed from diatomaceous shale.

Wildlife Habitat: Chaparral and Knobcone pine areas provide good habitat for reptiles and numerous species of birds. Redwood forest habitat is limited, although there is connectivity with equivalent habitat in other park locations and on nearby private lands.

Aquatic Life: Unknown.

Sensitive Animals: The northern mixed chaparral/knobcone pine forest community may provide suitable habitat for the California horned lizard, western mastiff bat, and pallid bat, all DFG Species of Special Concern (CSC), and the mountain lion. The mixed evergreen forest/upland redwood forest plant community may provide suitable habitat for sharp-shinned hawk and Cooper's hawk, California spotted owl, Vaux's swift, purple martin, and pallid bat (all CSC).

Processes: Fire is a natural process in the Northern Mixed Chaparral and Knobcone Pine Forest communities.

Management Concerns: The continued absence of fire in chaparral and knobcone pine forests will impact recruitment of new pines and lead to increased fuel loading in this EU, increasing the likelihood of a future catastrophic fire.

EU Name: Waddell Creek Watershed

Criteria for Delineation: All of the Waddell Creek watershed within park boundaries is encompassed by this EU. About 84% of the Waddell Creek watershed is within park boundaries.

EU Area: 14,139 acres (approximation)

Percent of Total Area of Unit: about 78%

Plant Communities: (in descending order of % cover)

Mixed Evergreen Forest/Upland Redwood Forest
Northern Mixed Chaparral/Knobcone Pine Forest
Red Alder Riparian Forest
Interior Live Oak Woodland
Monterey Pine Forest
Northern Coastal Scrub
Arroyo Willow Series (from Sawyer and Keeler-Wolf, 1995)
Coastal Brackish Marsh/Coastal and Valley Freshwater Marsh

Exotic Plants: Periwinkle is a concern at scattered locations in forest situations between the mouth and the forks of Waddell Creek. Previous infestations of other noxious exotic species have been eliminated.

Plant Communities of Special Interest: Red Alder Riparian Forest, Monterey Pine Forest, Knobcone Pine Forest, Arroyo Willow Series (=the Central Coast Arroyo Willow Riparian Forest), Coastal Brackish Marsh/Coastal and Valley Freshwater Marsh and Upland and Alluvial Redwood Forests.

Sensitive Plant Species: Several confirmed species, as well as a few suspected species. Monterey pines occupy lower canyon slopes near the mouth of Waddell Creek. Santa Cruz Mountains manzanita is found at the junction of Highway 236 and the China Grade Road and at other locations in this watershed. Brewer's calandrinia (*Calandrinia breweri*), a CNPS List 1B plant, has been reported in the park along the Skyline-to-the Sea trail. Monterey Indian paintbrush grows on slopes at the mouth of Waddell Creek. Ben Lomond spineflower (*Chorizanthe pungens* var. *hartwegiana*) is known only from the Slippery Rock area near Sempervirens Falls. This CNPS List 1B plant is listed as endangered by the federal government. A small population of San Francisco collinsia (*Collinsia multicolor*), a CNPS List 4 plant, occurs alongside the trail between Rancho Del Oso and the Alder Trail Camp. A single occurrence of branching beach aster (*Corethrogyne leucophylla*), a CNPS List 4 plant, has been recorded at an elevation of 600 feet near the mouth of Waddell Creek. CNPS List 4 White-flowered rein orchid (*Piperia candida*) can be found along the Pine

Mountain Trail. A small population of San Francisco campion (*Silene verecunda* ssp. *verecunda*) occupies steep eroding slopes alongside the trail between Rancho Del Oso and the Alder Trail Camp. This CNPS List 1B perennial herb is also a federal species of concern.

Other sensitive species suspected to occur in this EU are Schreiber's manzanita, Santa Cruz microseris (*Stebbinsoseris decipiens*), Gairdner's yampah (*Perideridia gairdneri* ssp. *gairdneri*), Santa Cruz Mountains beardtongue (*Penstemon rattanii* var. *kleei*), and San Francisco wallflower (*Erysimum franciscanum*). The latter species has been reported as occurring on the coastal strand at the mouth of Waddell Creek by researchers from UC Santa Cruz, but was not relocated in more recent field surveys. Blasdale's bent grass (*Agrostis blasdalei*), a CNPS List 1B plant, has the potential to occur near the mouth of Waddell Creek in the coastal scrub habitat.

Wildlife Habitat: Waddell Creek possesses significant wildlife resources. The largest, most structurally-complex riparian area in the park is found in lower Waddell Creek. Red Alder Riparian Forest and the Arroyo Willow Series communities, in conjunction with Coastal Brackish Marsh/Coastal and Valley Freshwater Marsh vegetation, provide outstanding habitat for numerous wildlife species. Waterfowl species such as mallards, common mergansers, and pied-billed grebes are common in the open water. Riparian areas are important for nesting and/or migrating songbirds and raptors. The presence of available water is of critical importance to maintenance of wildlife populations. These areas also provide excellent habitat for amphibians such as the Pacific giant salamander, western toad, and Pacific treefrog.

About 4400 acres of ancient redwood forest and several thousand acres of older second growth forest provide habitat for many species of birds, including nesting for marbled murrelets. Several species of insectivorous birds, such as the hermit warbler, golden-crowned kinglet, pileated woodpecker, hairy woodpecker, and Wilson's warbler, live and forage in redwood forest. Reptiles are uncommon, but two species that may be seen are the mountain kingsnake and the common garter snake. Amphibians such as ensatinas and slender salamanders are common in the moist duff layer.

The rich insect fauna of the Mixed Hardwood-Conifer habitat is able to support a wide variety of birds.

Chaparral and Knobcone pine areas are good habitat for reptiles and numerous species of birds.

Aquatic Life: Steelhead, resident rainbow trout, and coho salmon occupy the Waddell Creek drainage. Tidewater goby obtained from nearby Scott Creek have been reintroduced to the lowest part of Waddell Creek.

Sensitive Animals: Big Basin Redwoods State Park is located within an area of critical habitat for the marbled murrelet, as designated by the USFWS. The marbled murrelet is a federally listed Threatened (FE) and state listed Endangered (CE) species. The California Department of Fish and Game must be consulted prior to changes in land use, including the location of new trails.

Significant rock outcrops are known to support nesting peregrine falcons, a state endangered species (CE). Black swifts (California Department of Fish and Game Species of Special Concern, CSC) nest at Berry Creek Falls. This EU includes former nesting habitat for golden eagles (CSC). The mouth of Waddell Creek provides nesting habitat for the western snowy plover (federal listed threatened, FT, CSC). The Coastal Brackish Marsh/Coastal and Valley Freshwater Marsh plant communities of the Theodore J. Hoover Natural Preserve at the mouth of Waddell Creek provide habitat for the saltmarsh common yellowthroat (CSC) and California black rail (CT), as well as potentially other sensitive water birds.

California red-legged frogs (FE) are known from Sempervirens reservoir, while the San Francisco garter snake (FE) and western pond turtle (CSC) have been identified from the lower end of Waddell Creek.

Waddell Creek supports spawning populations of steelhead (FE) and might support coho salmon (CE, FT). The riparian habitat of Waddell Creek (Arroyo willow series and red alder riparian forest) could provide suitable habitat for the willow flycatcher (CE) and yellow warbler (CSC) as well.

Processes: Fire is a natural process in the Monterey Pine Forest, Northern Mixed Chaparral, and Knobcone Pine Forest communities. This EU is strongly influenced by its hydrology, with periodic flooding along the lower reaches of Waddell Creek.

Management Concerns: Facilities developed at park headquarters are located in ancient redwood forest that provides nesting habitat for an unknown number of marbled murrelets, as determined by California Department of Fish and Game. More information is needed to determine the potential adverse effects on this species by the presence of humans and human activities. The creation of edge habitat and human food sources in these areas has allowed for increased populations of predatory species such as ravens and Stellers jays. At the time of preparation of this inventory, nuisance species-proof garbage containers had not been installed in the

headquarters area.

BIOCONNECTIVITY

The model (concept) of bioconnectivity is directly related to the conservation of biodiversity, i.e. the variety of species occurring in any given area. Biocorridors provide a linkage between natural habitats through and across lands that have been degraded to some degree and are no longer able to sustain or support most species of plants and animals. This is especially true for sensitive species that have very narrow or specialized habitat requirements.

As described by Wilson (1988) and others, the exchange of plants and animals between habitat areas is critical to the maintenance of healthy ecosystems for several reasons. These include the maintenance of genetic variation, the ability of species to shift their ranges over time in response to environmental change, and as a repopulation source after a natural catastrophe. According to Beier and Loe (1992), the effectiveness of biocorridors for wildlife movement is determined by their ability to serve these and other related functions, not by physical traits like size or particular vegetation type. A five step methodology developed by these authors provides a critical tool for evaluating the effectiveness of biocorridors for wildlife movement. As described in this methodology, most species of wildlife can be categorized into one of two types of corridor users. Passage species need corridors to pass directly between two areas in an event of short duration. They typically include such species as large herbivores (e.g. deer) and medium to large carnivores (e.g. mountain lions). Corridor dwellers require several days to generations in order to pass through a corridor. These species include reptiles, amphibians, insects, small mammals, birds with limited dispersal ability, and most plants.

Habitat alteration and destruction in the Santa Cruz Mountains since the beginning of the Euroamerican period has led to a decline in the native biodiversity of the region. Most of the lands originally containing ancient redwood forests have been logged, with operations continuing on private lands possessing small stands of old growth or more extensive second growth forests. These lands are in various states of vegetative succession. The south and north ends of the range and its eastern flank have undergone the greatest change due to extensive land conversions for agricultural, business, and housing developments. However, much of the interior of the mountain range is protected, in varying degrees, by numerous public parks and preserves. Most of the remaining stands of old growth redwood are located in these parks. These protected lands vary in the value they offer as natural habitat, but they all serve as refuges for native plant and animal life.

The largest of these refugia, and arguably the most important, is Big Basin Redwoods State Park. It provides core habitat for a host of common as well as sensitive flora and fauna. Additionally, this park protects nearly the entire Waddell Creek drainage, one of the largest coastal streams of the Santa Cruz Mountains. The park is directly linked by common boundaries with Año Nuevo

State Park and Castle Rock State Park, although the latter linkage is a narrow corridor of state park property bordered by a state highway and private property, some of which is currently being logged. Linkages with other preserved areas is less certain, since these biocorridors consist of private lands that are subject to consumptive uses or potential development. With some park lands being separated by degraded private property, habitat linkages are vitally important for the biological survival of native flora and fauna and continued viability of the core parks and preserves. Without appropriate habitat linkages or biocorridors, many species populations in the Santa Cruz Mountains will not be able to perpetuate and will eventually die off.

RECOMMENDATIONS

Limited time and staffing, densely vegetated terrain on steep slopes, and the large size of the park has precluded any in-depth assessment of plant and animal populations and habitats. Several areas of the park are very difficult to access because of a lack of trails or roads. Other locations, such as the “Chalks” and portions of East Waddell Creek, are accessible and need to be more thoroughly investigated.

Additional information needs to be gathered on state and/or federally listed species, as well as other sensitive species that may occur in the unit. With the exception of the “Chalks”, locations for known and suspected sensitive plant species have been extensively researched. More information should be compiled for sensitive animal species. Baseline information may include presence or absence data, species distribution, den and nest sites, critical habitat areas, and other natural history parameters. Focused inventories for these species should be prioritized according to the likelihood and relative significance of a species occurrence and the acreage and quality of its habitat in the park. These inventories should utilize sampling protocols prescribed by the U.S. Fish and Wildlife Service and the California Department of Fish and Game, if available.

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