Brian Booth State Park
Wildlife Assessment

January 7, 2013

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ABBREVIATIONS AND ACRONYMS

BLM	Bureau of Land Management, U.S. Department of Interior
DFH	Desired future habitat
ESU	Evolutionary Significant Unit
GPS	Global Positioning System
LIDAR	Light Detection and Ranging
ODFW	Oregon Department of Fish and Game
OPRD	Oregon Parks and Recreation Department
ORBIC	Oregon Biodiversity Information Center
USFS	United States Forest Service, U.S. Department of Agriculture
USFWS	United States Fish and Wildlife Service

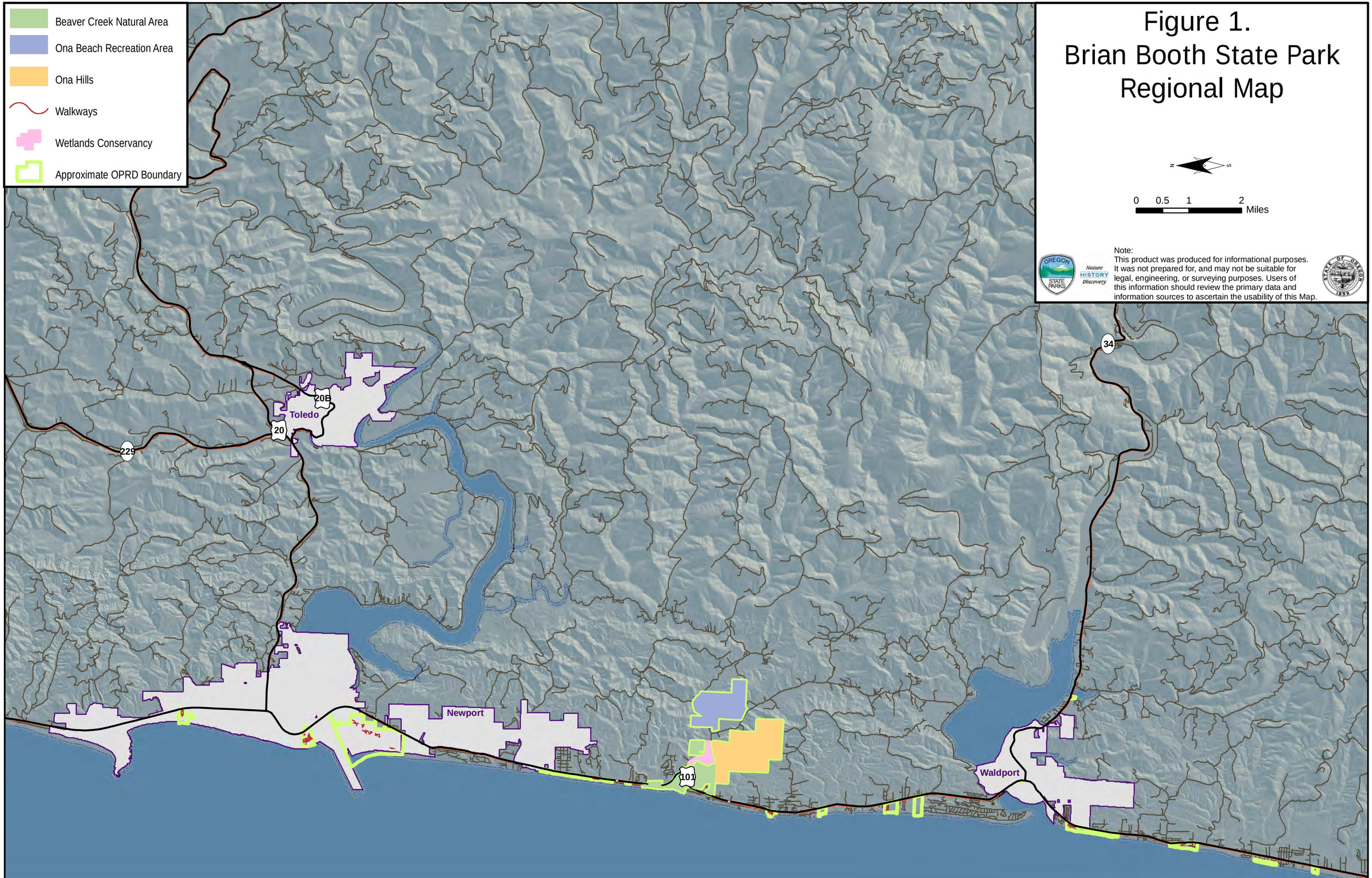
1. INTRODUCTION

This wildlife assessment for Brian Booth State Park is provided for use in the development of an updated Comprehensive Plan for the management of the park. Wildlife assessments for the purposes of Comprehensive Plans typically include:

1) Review of published or archived biological data for the site
2) Identification and mapping of significant habitat based on plant associations
3) Identification and mapping of at-risk wildlife species
4) General presence/absence wildlife surveys
5) Assessment of habitat conditions and conservation ranking of habitat communities present
6) Development of a focal species list, desired future condition for wildlife, and management recommendations

The study area encompasses Brian Booth State Park, which is comprised of Beaver Creek Natural Area, Ona Beach Recreational Area, and Ona Hills (Figure 1). The park is approximately 1,238 acres consisting of forested areas, emergent wetlands, woodlands, scrub-shrub wetlands, shrublands, reed canarygrass meadows, non-native grasslands, and submerged and aquatic plant communities. The study area is located along Beaver Creek in Lincoln County, Oregon. The legal location of the property is Township 12S, Range 11W, Sections 18,19,20,21,29, and 30. The study area is centered on a low and relatively flat estuary and floodplain bottomlands flanked by hilly/low-mountainous uplands of ridge and canyon systems. Elevation within the study area ranges from 9 to 63 feet above sea level. Existing infrastructure includes parking areas, a trail system, restroom facilities, park maintenance areas, visitor center, boat ramp, and a day use picnic area. Recreational activities at Beaver Creek include bird watching, hiking, picnicking, dog walking, and boating via kayak or canoe. Recreational activities at Ona Beach include beach access, picnicking, dog walking, and boating via kayak or canoe. Ona Hills does not currently have any official recreation uses, although some casual hiking, horseback riding, mountain biking, and off-road driving take place.

Figure 1.
Brian Booth State Park Regional Map



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2. HABITAT

2.1 EXISTING HABITAT TYPES

The place where an animal lives is defined as a habitat type, and includes the physical and biotic conditions of the environment. Habitat types are usually defined by the dominant vegetation or a physical feature. The habitat types for the study area have been categorized into seven broad-level habitat groups following the Wildlife Habitat Relationships of Oregon and Washington (WHRO, Johnson and O'Neil 2001) and more specific habitat types adapted from Oregon GAP Analysis (Figure 2, Kagan et al. 1998). This level of habitat typing allows for more specific vegetation components valuable in wildlife management strategies. Additional vegetation information is available in the Vegetation Inventory and Botanical Resource Assessment for the Beaver Creek Natural Area and Ona Beach State Park Complex of Properties (Bacheller 2012). Habitats that are listed in ODFW's Conservation Strategy (2005) are specified to highlight their importance. The Conservation Strategy determined what habitats have experienced the most loss compared to historic levels, and then selected habitats based on their historic importance, ecological similarity, remaining habitat managed for conservation, limiting factors, and importance to declining wildlife species. Preserving and enhancing Conservation Strategy habitats is a way to conserve a large number of species and maintain wildlife diversity and healthy wildlife communities (ODFW, 2005). The study area is located in the Coast Range ecoregion.

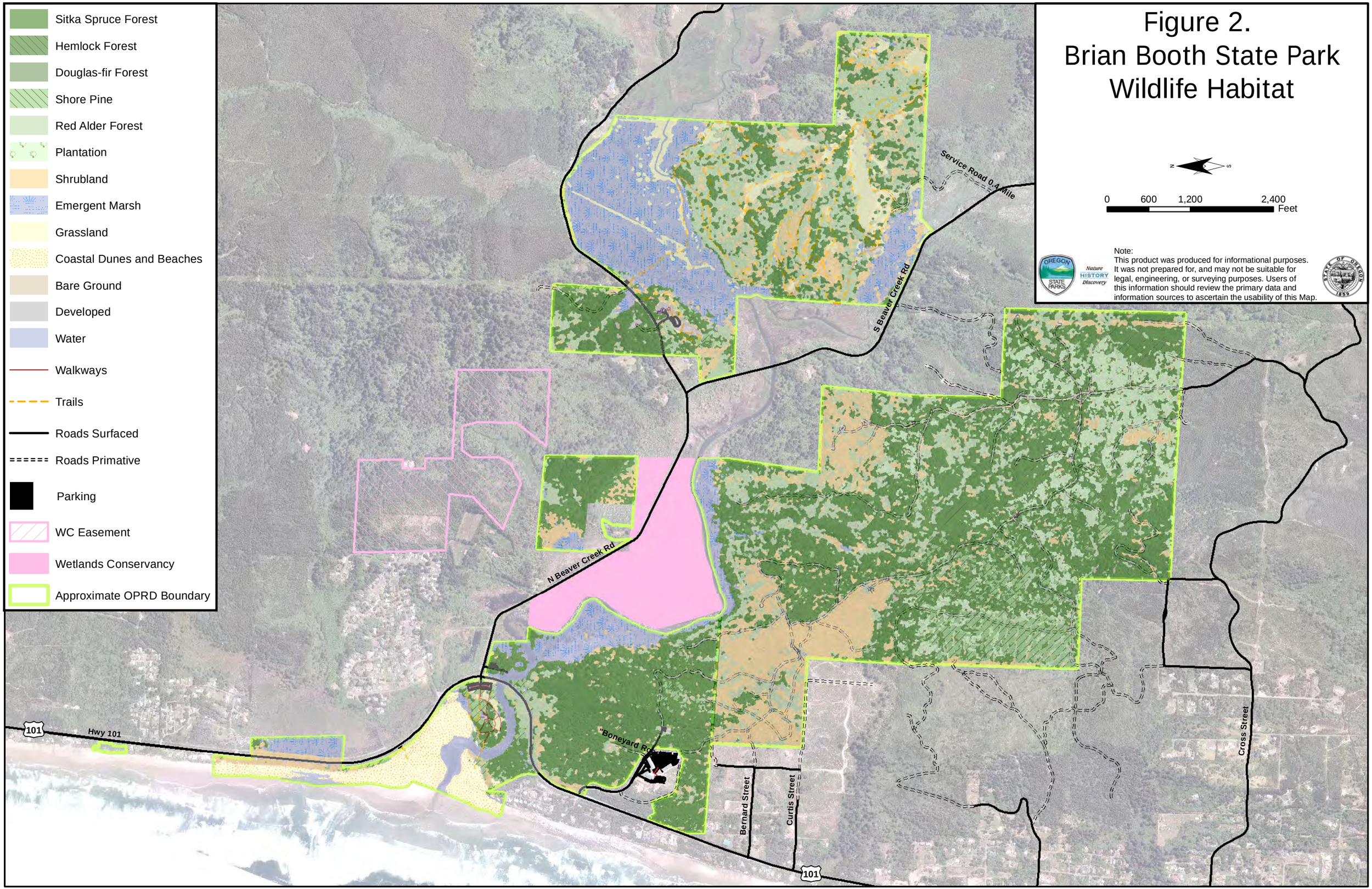
2.1.1 DISTURBED HABITATS: DEVELOPED

Disturbed habitats have experienced severe impacts to natural communities such that natural function is not sustainable; vegetation is usually non-native. Disturbed habitats contain developed areas such as paved roads and structures and may or may not contain existing facilities. Beaver Creek NA and Ona Beach have developed facilities, roads, and trails that are lumped into this category. Ona Hills contains a network of existing dirt roads, and a building complex that houses OPRD's Coast Region Office and Oregon Department of Transportation (ODOT) maintenance facilities. Disturbed habitats can sometimes provide limited foraging opportunities for small mammals, reptiles, deer, and, elk as well as nesting opportunities for ground-nesting songbirds; however, few native species are associated with disturbed habitats.

2.1.2 HERBACEOUS WETLANDS

Herbaceous wetlands possess saturated soils with floating or rooting aquatic vegetation, grasses, sedges, and other plants. When connected to stream systems, herbaceous wetlands can provide fish rearing habitat; amphibians and macroinvertebrates also utilize herbaceous wetlands. For some wildlife species, the structure in herbaceous wetlands can provide functions similar to grasslands, while a whole suite of species are reliant specifically on herbaceous wetlands. Wetlands are a Conservation Strategy habitat (ODFW 2005).

Figure 2.
Brian Booth State Park Wildlife Habitat



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2.1.2.1 Emergent Wetlands

Emergent wetlands are areas of standing or slow-moving water with erect, rooted vegetation present for most of the growing season. Brian Booth contains numerous seasonal wetlands as well as a large expanse of marsh in the north. This marsh is a registered State Natural Area Reserve by the Natural Areas program, and many stakeholders are interested in the health of the marsh, including the Wetlands Conservancy. The wetland is moist year round and crossed by Beaver Creek, with a remarkably high diversity of native vegetation in spite of historical land use as grazing land. Dikes from previous ownership alter the hydrology and allow seasonal passage across the marsh in the dry months. Many species utilize the marsh, including juvenile salmonids, waterfowl, herons, elk, and songbirds like marsh wren; the marsh also likely provides breeding habitat for lentic amphibians such as red-legged frog, rough-skinned newt, and pacific chorus frog. The marsh experiences some tidal influence, and provides foraging and likely a sheltering place for juvenile salmonids adjusting to higher salinity levels. Additional seasonal wetlands were identified by the vegetation model; however, these wetlands have not been confirmed in the field and the conservative model may over-represent the amount of seasonal wetlands present.

2.1.2.2 Wet Meadows

Wet meadows are characterized by seasonally flooded soils that are often saturated for the majority of the growing season. Sedges are the predominant species, with rushes and grasses present depending how moist the soil remains. From a wildlife perspective, deer and elk may browse on new shoots, frogs and salamanders can remain moist during warm days, and wet meadows can provide structure and a prey base for grassland birds similar to grasslands. While not currently known in the area, streaked horned lark may utilize wet meadows with seasonal saturation by breeding in wet meadows that are dry during May through August. At Brian Booth, wet meadows are most likely small and surrounded by forest. Species benefitting from such meadows are primarily amphibians, insects, and forest species using the meadows for a water source.

2.1.3 Coastal Dunes and Beaches

Coastal dunes and beaches are characterized by sands and sandy soils. This habitat group ranges from non-vegetated beaches to dense shrublands. Beaches are non-vegetated or sparsely vegetated with herbaceous plants and forbs. This habitat is of prime importance to wintering shorebirds foraging along the tidal zone. Rare insects like the Oregon plant bug (*Lygus oregonae*) and tiger beetles (*Cicindella* spp.) exclusively live in this habitat. The plant bug is reliant on two host plants: yellow sand-verbena (*Abronia latifolia*) and silver beachweed (*Ambrosia chamissonis,* Schwartz and Foottit 1998). Yellow sand-verbena is present at Brian Booth State Park. Adjacent to the beach are areas of shifting sand with sparse vegetation that could provide habitat for at-risk plants like silvery phacelia (*Phacelia argentea*) and pink sand-verbena (*Abronia umbellata*). Coastal dunes in their original state are now uncommon along the Oregon Coast in the wake of the invasive European beachgrass. Beachgrass stabilizes dunes, holding the shifting sands in place until large dunes densely packed with beachgrass are all that remain.

2.1.4 Scrub-Shrublands

Scrub- shrublands are early successional habitats where the vegetation is dominated by small woody plants such as shrubs and young trees. Scrub- shrublands often occur within a mosaic of forested habitats where mature trees have been removed by disturbance; this habitat also occurs in abandoned fields or disturbed land where pioneer species such as aspens, birches, and cottonwood colonize the area and start the process of succession. Scrub-shrubland communities are often characterized by willows (*Salix* spp.), redosier dogwood (*Cornus sericea*), nootka and multiflora rose (*Rosa* spp.). They are often underlain by moist-site herbs. However, the scrub-shrublands in the study area tend to be non-native. Black-tailed deer and elk will forage in scrub-shrublands, and a suite of songbirds such as yellow warbler, orange-crowned warbler, and willow flycatcher nest within the denser thickets. Songbirds also utilize shrub-scrublands as important foraging and loafing areas during seasonal migration. Early successional habitats are in decline now that federal lands are subject to less timber harvest; while still available on private lands, the structure needed by wildlife may not be present in sufficient quality.

2.1.5 Western Grasslands: Non-native Grasslands

Western grasslands are predominantly low elevation habitats dominated by herbaceous vegetation with less than 30% tree cover. At Brian Booth State Park, the non-native grasslands are remnants of pasture, comprised primarily of blue wildrye. These grasslands are too small to provide much benefit to grassland nesting birds. However, the local elk herd utilizes these areas for calving, loafing, and forage.

2.1.6 Westside Lowland Conifer-Hardwood Forest

Westside lowland conifer-hardwood forest is extensive on the Oregon coast, dominated by evergreen conifers, deciduous broadleaf trees, or both. Late seral stands have an abundance of large diameter trees, multi-layered canopies, large snags, and downed wood. Forest understory is structurally diverse, and composition varies widely. Late-successional coniferous forests are a Conservation Strategy habitat (ODFW, 2005), and are depleted across the landscape. Forest understory is structurally diverse, and composition varies widely. Sensitive wildlife species that rely on late-seral coniferous forests that might occur in Brian Booth State Park are American marten, fisher, Oregon slender salamander, marbled murrelet, and northern spotted owl.

2.1.6.1 Douglas-fir Forest

Douglas-fir forest is an evergreen conifer forest habitat with Douglas-fir (*Pseudotsuga menziesii*) dominating the canopy. Western hemlock (*Tsuga heterophylla*), western red cedar (*Thuja plicata*), and grand fir (*Abies grandis*) are often present and sometimes co-dominant. The deciduous trees red alder (*Alnus rubra*) and big-leaf maple (*Acer macrophyllum*) are common but subordinate, and the understory is often complex with shrubs and herbaceous foliage.

2.1.6.2 Sitka Spruce Forest

Sitka spruce forest occurs in a narrow band along the coast, where fog and salinity preclude other conifers from supplanting their dominance. Western hemlock, western redcedar, Douglas-fir, big leaf maple, and red alder may also be present, with western hemlock be the most common. The understory is full of down wood, ferns, and moss with a thick, complex structure. Late seral sitka spruce forest is of critical importance to marbled murrelet and northern spotted owl nesting, as well as fisher natal dens and resting areas.

2.1.6.3 Hemlock Forest

Similar to Sitka Spruce Forest and Douglas-fir forest, Hemlock forest is dominated by western hemlock. Forest structure, understory, and functions provided for wildlife are similar to Sitka spruce forest.

2.1.6.4 Shore Pine Forest

Shore pine forest tends to be of shorter height than other forested communities, with irregular canopy. This plant community occurs on ancient marine terraces with relatively sandy soils. Evergreen huckleberry is sometimes dominant, and pacific rhododendron is sometimes prominent. Minor depressions and areas with higher soil moisture often have slough sedge in modest amounts, and moist soils are common. Huckleberry, when present, provides ample forage for wildlife. Rodents feed on shore pine seeds, and porcupine will consume the cambium, or inner layer of bark.

2.1.6.5 Plantation

Plantations are areas that have previously been cleared and replanted, typically with douglas-fir. Density is usually high, with trees in similar age classes, a single canopy layer, and a lack of understory structure. Plantations have very little wildlife value compared to forest stands the multiple canopy layers and structural complexity. Quail often utilize young plantations when the short trees with dense canopy mimic shrubland structure. At Brian Booth, some plantation lands have been categorized under native plant communities if the understory structure has regenerated.

2.1.6.6 Red Alder Forest

Red alder forest is comprised of the following vegetation communities: mature alder forest with some emerging young to mid-aged mixed conifers, mid-aged alder forest, and young alder forest. Red alder forest is an early successional habitat type in upland areas, converting to coniferous canopy with a sub-canopy of alder and maple. In riparian and wetland areas, red alder forest is the late successional stage, although some type conversion to Sitka spruce swamp can occur. Red alder forests provide foraging and loafing habitat for many songbirds, red-legged frogs, and many other species.

2.1.7 Westside Riparian-Wetlands

Westside riparian-wetlands are comprised of mesic shrubland and scrub-shrub wetland vegetation communities, with dense shrub cover, woodland, or forest. Characterized by wetland hydrology with periodic flooding or perennial freshwater, riparian-wetlands tend to occur in linear strips across the landscape. Riparian vegetation is very important to aquatic systems and performs several significant functions, including maintaining water quality, providing shade, bank stabilization, and fish and wildlife habitat. Riparian shrublands are a dense floodplain habitat dominated by willow, red alder and other hydrophilic shrub species. Riparian shrublands occur either as an early successional habitat after disturbance to riparian forest, or more permanently where water levels and flooding preclude tree species. Riparian forests at Brian Booth are comprised red alder in the canopy, and the understory is a mosaic of willows and hydrophyllic herbaceous plants, especially skunk cabbage (*Lysichiton americanus*). Large woody debris is common in late seral forests and adjacent streams. Riparian areas are used by a multitude of wildlife species as breeding and wintering habitat as well as movement corridors during migration and dispersal to other locations.

2.2 Habitat Connectivity

Connectivity is the degree to which a landscape helps or disrupts the ability of an animal to move and acquire resources (Fahrig and Merriam, 1985). Assessing habitat connectivity is complex and depends on the needs of individual species. For example, to disperse to a different habitat patch, a songbird may need to visually see the patch while a salamander may require a corridor of appropriate vegetation between the two patches. Without habitat connectivity individuals may be unable to move between patches, and the population is more susceptible to disease, population pressures, predation, and extirpation from natural events like fires. Continuing land-use changes as well as the emerging threat of climate change make the need for habitat connectivity even more critical, as many species will need to adapt to a changing landscape. The ranges of many songbirds have already begun shifting northward, and ensuring wildlife movement corridors maintain habitat connectivity will be paramount to adjust to climate change.

Brian Booth State Park is a key part of the multi-partner Beaver Creek watershed ecosystem management strategy, connecting late seral forests in the upper watershed with beach, coastal dunes, estuary, and marsh habitats downstream. While the park is immediately surrounded by private lands, Siuslaw National Forest and three wilderness areas are within X miles south and east, and X is Habitat connectivity across the greater landscape should be explored through partnerships with both public and private landowners. Maintaining connectivity with Siuslaw National Forest, along with its three wilderness areas.

Many stakeholders are invested in conserving the watershed, and retaining undisturbed wildlife movement corridors through the park is necessary to support this work. Habitat movement corridors should be at minimum 300 feet wide to reduce the negative impacts trail proximity can have upon wildlife behavior and distribution. While this is not always possible due to other limiting factors (soils, slope, etc.), preserving a low disturbance corridor for both terrestrial and aquatic species through Brian

Booth State Park is strongly recommended (Figure 3). The exact boundaries are mutable, provided the width is maintained to the greatest extent possible. While wildlife may choose to move through other areas of the park, such as the Deer Creek riparian corridor, preserving the corridors shown in Figure 3 will ensure a low disturbance pathway for species with higher disturbance sensitivities. Wildlife crossings at HWY 101 are also of concern; any crossings for park visitors should incorporate wildlife crossing design as well to provide the most benefit. The terrestrial movement corridor shows this connection to allow wildlife (predominantly mammals like elk and deer) to move from the beach areas to the forest. This area will likely experience high disturbance levels due to recreation activities. See Section 3.5.2 for more information on disturbance effects.

2.3 Desired Future Habitat

Determining desired future habitat (DFH) is a necessary step in developing a management plan. DFH establishes goals for natural resource management, from which land management prescriptions are derived. To provide greater benefit to wildlife in the next decade and encourage development of rare habitats, OPRD should manage for the following habitats and structure:

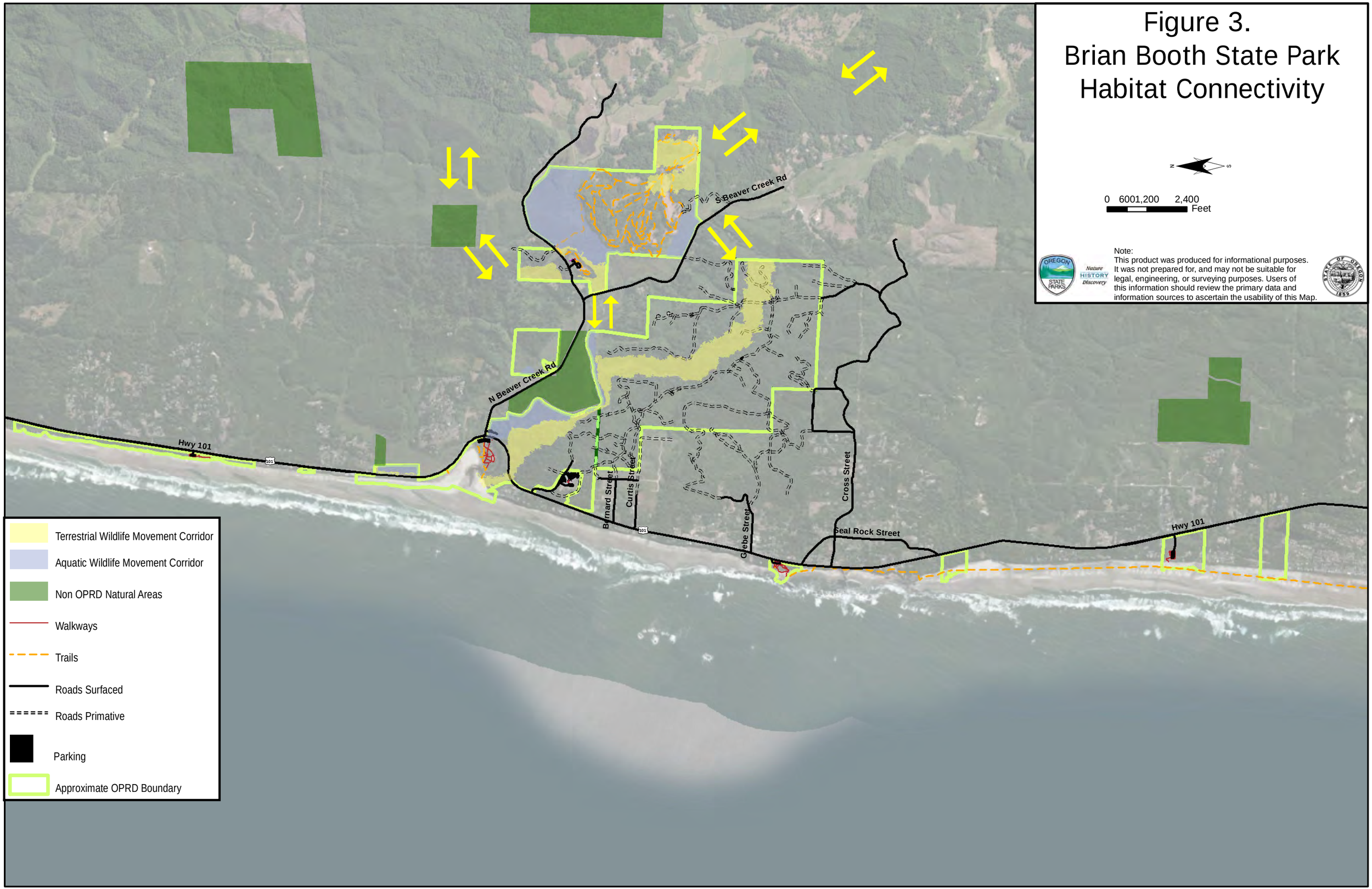
- Late-seral mixed coniferous forest, primarily hemlock and Sitka spruce dominated
- Emergent marsh
- Riparian shrublands and forests

Late-seral forests, an ODFW Conservation Strategy habitat, once extended across most of the Oregon coast, but are now relatively rare and fragmented across the state. The wet climate and rampant vegetative growth makes the coast a popular and productive location for the timber industry. In most cases, preserving late-seral forest on timber lands is contrary to producing timber; while forested acreage is not lacking on the coast, “old growth” forests are exceedingly rare. In addition, there is a diverse mosaic of land ownership and land use, which isolates late-seral forest stands and can often leave them too small to support wildlife.

The emergent marsh provides breeding grounds for sensitive amphibians, rearing grounds for sensitive salmonids, and is an ODFW Conservation Strategy habitat. Large expanses of marsh that are not completely overrun by reed canarygrass (*Phalaris arundinacea*) are uncommon, making Beaver Creek marsh more valuable in the landscape.

Riparian areas, either forest or shrubland, are critical habitats for neotropical migrants, birds that breed north of the Tropic of Cancer (23 °latitude) but winter south of it. These songbirds travel hundreds of miles during migration and heavily utilize riparian corridors, especially habitats with a large canopy and complex understory. Many species of bats rely on riparian areas, although less research has been conducted on bat use and distribution. An ODFW Conservation Strategy habitat, riparian vegetation also provides cooling benefits to streams, a critical function for maintaining salmonids runs.

Figure 3.
Brian Booth State Park
Habitat Connectivity



3. FISH AND WILDLIFE

Potential for wildlife species presence were determined using habitat assessments, historic wildlife data, and field surveys in conjunction with searching existing occurrences in state, federal, and public databases.

3.1 AT-RISK FISH & WILDLIFE

At-risk wildlife species are those experiencing population declines or are otherwise at risk. They include federal endangered, threatened, candidate species and species of concern; state endangered, threatened, and candidate species; and state critical and vulnerable species. Currently, six species listed under the Federal and/or state Endangered Species Acts, and 41 federal and/or state sensitive species have the potential to occur or do occur in Brian Booth State Park (Table 1). Inventories of the property identified one federal or state threatened and endangered species present in the park (bald eagle, Table 1). Assessment timing may not have been appropriate for detecting many of these species; therefore, at-risk species surveys should be performed prior to initiation of development projects.

Table 1. At-risk Species Occurrences at Brian Booth State Park

Common Name	Scientific Name	Federal Listing	State Listing	Occurrence
Oregon silverspot butterfly	*Speyeria zerene Hippolyta*	FE		Unlikely
Coastal cutthroat	*Oncorhynchus clarki clarki*	SOC		Present
Coho salmon (Oregon Coast ESU)	*Oncorhynchus kisutch*	FT	SV	Present
Steelhead (Oregon Coast ESU, winter run)	*Oncorhynchus mykiss*	SOC	SV	Present
Pacific lamprey	*Lampetra tridentate*	SOC	SV	Present
Western brook lamprey	*Lampetra richardsoni*	SOC	SV	Potential
Clouded salamander	*Aneides ferreus*		SV, CS	Potential
Coastal tailed frog	*Ascaphus truei*	SOC	SV	Potential
Northern red-legged frog	*Rana aurora*	SOC	SV	Present
Southern torrent salamander	*Rhyacotriton variegatus*	SOC	SV, CS	Potential
Western toad	*Anaxyrus boreas*		SV, CS	Potential
Western Fence Lizard	*Sceloporus occidentalis*	SOC		Potential
Western Pond Turtle	*Actinemys marmorata marmorata*	SOC	SC, CS	Potential
Bald Eagle	*Haliaeetus leucocephalus*		ST, CS	Present
Band-tailed Pigeon	*Patagioenas fasciata*	SOC	CS	Present
Black-necked Stilt	*Himantopus mexicanus*		CS	Unlikely
Bufflehead	*Bucephala albeola*		CS	Present
Chipping Sparrow	*Spizella passerine*		CS	Present
Common nighthawk	*Chordeiles minor*		SC, CS	Potential
Least Bittern	*Ixobrychus exilis*	SOC		Potential

Common Name	Scientific Name	Federal Listing	State Listing	Occurrence
Marbled murrelet	*Brachyramphus marmoratus*	FT	ST, CS	Vicinity
Mountain quail	*Oreortyx pictus*	SOC	SV, CS	Potential
Northern goshawk	*Accipiter gentilis*	SOC	SV, CS	Potential
Northern spotted owl	*Strix occidentalis caurina*	FT	ST	Potential
Olive-sided flycatcher	*Contopus cooperi*	SOC	SV, CS	Present
Peregrine Falcon	*Falco peregrinus*		SV, CS	Present
Pileated woodpecker	*Dryocopus pileatus*		SV, CS	Present
Purple martin	*Progne subis*	SOC	SC, CS	Present
Red-necked grebe	*Podiceps grisegena*		SC, CS	Present
Short-eared Owl	*Asio flammeus*		CS	Potential
Western bluebird	*Sialia Mexicana*		SV, CS	Present
Willow flycatcher	*Empidonax traillii adastus*	SOC	SV, CS	Present
American marten	*Martes Americana*		SV, CS	Potential
California myotis	*Myotis californicus*		SV, CS	Potential
Fisher	*Martes pennant*	FC	SC, CS	Unlikely
Fringed myotis	*Myotis thysanodes*	SOC	SV, CS	Potential
Hoary bat	*Lasiurus cinereus*		SV, CS	Potential
Long-eared myotis	*Myotis evotis*	SOC		Potential
Long-legged myotis	*Myotis volans*	SOC	SV, CS	Potential
Pallid bat	*Antrozous pallidus*	SOC	SV, CS	Potential
Red tree vole	*Arborimus longicaudus*	FC	SV, CS	Potential
Silver-haired bat	*Lasionycteris noctivagans*	SOC	SV, CS	Potential
Townsend's big-eared bat	*Corynorhinus townsendii*	SOC	SC, CS	Potential
Western gray squirrel	*Sciurus griseus*		SV, CS	Unlikely
White-footed vole	*Arborimus albipes*	SOC		Potential
Yuma myotis	*Myotis yumanensis*	SOC		Potential

FE: Federally endangered
FT: Federally threatened
FC: Federal candidate for listing
SOC: Federal Species of Concern
ST: State threatened
SC: State critical
SV: State vulnerable
CS: Conservation Strategy

3.1.1 OREGON SILVERSPOT BUTTERFLY

The federally threatened Oregon silverspot butterfly (*Speyeria zerene hippolyta*) is a small orange fritillary with dark markings. Currently this species is known to occur at only four sites in Oregon (USFWS, 2001).The silverspot requires early successional, coastally-influenced grassland that contains the caterpillar host plant early blue violet (*Viola adunca)*, adult nectar sources and courtship areas. The

butterfly is not currently known to occupy the park, and recolonization is unlikely without appropriate habitat and reintroduction efforts.

3.1.2 Coho Salmon

The Oregon Coast Evolutionary Significant Unit (ESU) of Coho salmon (*Oncorhynchus kitsutch*) is a federally threatened and state vulnerable anadramous salmonid that is currently present in the park. Like Chinook, coho spend most of their adult lives at sea and migrate up river and stream channels to spawn in stable gravel substrates. Eggs are laid in a depression in the gravel, called a redd. The Oregon Coast ESU spawn in low gradient streams from November through March; young fry and juveniles feed and grow in streams and wetlands, migrating out to estuaries and ocean in the spring of their second year. Complex stream habitat in the form of overhanging and submerged vegetation, undercut banks, pools, submerged logs and rocks, and connected floodplains provide needed protection to juveniles while they remain in freshwater streams.

Juvenile Coho are present throughout the Beaver Creek complex, including the emergent marsh. The Oregon Coast ESU Coho Conservation Plan (ODFW 2007) cites stream complexity and water quality as the two major limiting factors for coho.

3.1.3 Steelhead

The winter run of the Oregon Coast ESU steelhead (*Oncorhynchus mykiss*) is a federal species of concern and state vulnerable salmonid. Winter steelhead are ocean-maturing and enter freshwater between November and April and spawn shortly thereafter (NMFS November 30, 2009). Steelhead will return to the ocean post-spawning, and some adults will spawn more than once, unlike the majority of *Oncorhynchus* species. Like coho, steelhead require clear, cool streams with suitable gravel size, depth, and current velocity for spawning. Steelhead can enter streams and arrive at spawning grounds weeks or months prior to spawning, making the adults susceptible to disturbance and predation. Summer rearing takes place primarily in faster parts of pools, and in glides and riffles. Winter rearing occurs at lower densities across a wide range of fast and slow habitats. Steelhead juveniles have been observed in Beaver Creek marsh.

3.1.4 Bald Eagle

The bald eagle *(Haliaeetus leucocephalus)* is a striking, large dark brown eagle with white head and tail feathers and a yellow bill. Once federally endangered, the species has recovered to delisting; the bald eagle remains state threatened and federally protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. Bald Eagle nesting territories are associated with lakes, rivers, and reservoirs (Fish and Wildlife Service, 1986), and adults exhibit strong nest-site and mate fidelity (Jenkins and Jackman, 1993). Nests are usually found in large conifers and snags.

A known eagle nest exists on park property, and another nest that produced offspring in 2010 is within 2 miles of Brian Booth State Park (ODFW, unpublished data). Bald eagles are present year-round (Isaacs and Anthony, 2003).

3.1.5 Marbled Murrelet

Marbled murrelet is a federal and state-threatened species that spends most of its time at sea in open water. Approximately the size of a robin, this small seabird nests on large diameter limbs in coastal forests. These limbs, covered in moss, form nesting platforms where the birds will lay a single egg. Nest platforms have been found in old growth forests as well as in large, remnant trees in mature forests and on western hemlock trees infested with dwarf mistletoe. Marbled murrelet are declining rapidly across Oregon, Washington, and California. Threats to this species are habitat loss, predation, and potentially declining food quality. Corvids such as American crow (*Corvus brachyrhynchos*) and Steller's jay (*Cyanocitta stelleri*) depredate murrelet nests, and are often attracted to food waste and trash at recreation areas like campgrounds and trails. Recovery of marbled murrelet requires preservation and creation of habitat supporting nest platforms safe from increasing predator populations.

Marbled murrelet protocol surveys have not been conducted at Brian Booth State Park. In the absence of survey data, OPRD is assuming presence of marbled murrelet. While nesting within the park has not been confirmed, protocol surveys for this species are recommended prior to initiation of development projects. Marbled murrelet is a focal species for the park, associated with open grown large diameter conifers.

Species to benefit: Bald eagle, northern spotted owl, band-tailed pigeon, northern goshawk, pileated woodpecker, American marten, and bats.

3.1.6 Northern Spotted Owl

The federal and state threatened northern spotted owl (*Strix occidentalis caurina*) is a medium sized, dark brown owl with white spots on the breast. Often associated with "old-growth" this owl inhabits forests with structurally complexity most commonly found in mature and late-seral stage stands. Spotted owl pairs tend to occupy the same territory for many years, and invest significantly in parental care. Territory size varies dependent on prey availability, ranging anywhere from 1,000 to 2,000 acres (Zabel et.al, 1995).

Brian Booth State Park does not currently support any known northern spotted owl pairs, and does not have sufficient acreage to support a pair in entirety. However, the park could play a role in juvenile dispersal, and its proximity to occupied owl habitat in the Siuslaw National Forest increases the likelihood re-colonization of Brian Booth State Park provided late seral structure is increased. Nearest owl activity center is approximately 4.8 miles east of the park.

3.1.7 Red tree vole

Red tree vole (*Arborimus longicaudus*) is a federal candidate species for listing, a state vulnerable species and conservation strategy species. Red tree voles live in the upper canopy of late-seral coniferous forests, and are the primary food source for northern spotted owl. Surveys for this species require intensive effort and specialized certifications, including tree climbing. Due to the difficulty in

obtaining survey data, assuming presence and avoiding actions detrimental to red tree vole habitat is more cost-effective.

3.1.8 FISHER

The fisher (*Martes pennanti*) is a federal candidate species for listing, a state critical and conservation strategy species. This large mustelid occupies late-seral forests, hunting for rodents and medium sized birds such as Steller's jay (*Cyanocitta stelleri*), woodpeckers, and game birds. Often confused with marten and mink, fishers are much larger and darker. Males roam widely across the landscape during the breeding season in March and April seeking mates. Males have been documented ranging across 24,858 and 55,858 acres; one make traveled just over 13 miles within 48 hours (Aubry and Raley 2006). After mating, the embryos become dormant and the female does not become actively pregnant until February of the following year (Powell 1993). She gives birth to kits in March, using hollows in live trees as natal dens; natal dens are usually in trees with a 36 inch dbh (diameter at breast height). At about four months old, fisher kits are able to travel with their mothers, and at seven months they appear to be independent of her care (Aubry and Raley 2006). Fishers used to range widely across Oregon, including the coast. However, the populations have decreased and fishers are thought to be extirpated in much of their former range. The nearest confirmed fishers were approximately 39 miles south in the Klamath Mountain range. There are some unconfirmed reports of a fisher along Beaver Creek Road in 2012.

3.2 FOCAL SPECIES

Based on the desired future habitat, a number of key habitat attributes are of management importance. Managing and monitoring all species that utilize these attributes is costly and time-intensive; however, certain species are closely associated with important attributes and can be used as focal species for describing desired conditions. While conservation is directed towards focal species, maintaining habitat attributes favorable for them will benefit a wider group of species with similar requirements. Ideally, the list of focal species would include representatives of all guilds of wildlife; however, due to the difficulty in monitoring some species, this may not be feasible. Note that focal species have not been identified for all habitat conditions, such as the deeper channels of Beaver Creek and its tributaries, due to insufficient information on this system.

Focal species for Brian Booth State Park (Table 2) were selected based on regional conservation plans, conservation status, recreation value, degree of association with important habitat attributes, and detectability. Species accounts are provided in Section 3.2. Focal species may change based on adaptive management strategies, changes in conservation status, and other factors.

Table 2. Focal Species for Brian Booth State Park

Common Name	Scientific Name	Associated Attribute
Northern red-legged frog	*Rana aurora*	Wetlands
Marbled murrelet	*Brachyramphus marmoratus*	Large, open grown conifers
Pacific wren	*Troglodytes pacificus*	Complex forest floor
Downy and hairy woodpecker	*Picoides pubescens, P. villosus*	Soft Snags, cavities
Pileated woodpecker	*Dryocopus pileatus*	Large Snags
Varied thrush	*Ixoreus naevius*	Mid-story tree layers
Yellow warbler	*Dendroica petechial*	Riparian shrub foliage and subcanopy
Roosevelt elk	*Cervis canadensis roosevelti*	Late seral forest with openings

3.2.1 Northern Red-legged Frog

Amphibians are often touted as a prime indicator species of wetland health due to their sensitivity to slight changes in environmental factors, and their role as secondary consumers in the food web. At Brian Booth State Park, amphibian egg mass surveys in 2013 documented Pacific tree frog (*Pseudacris regilla*), and northern red-legged frog (*Rana aurora*) egg masses in the emergent marsh, and rough-skinned newt (*Taricha granulosa*) breeding in isolated wetlands. The red-legged frog is a species of concern, with adults prevalent in the uplands of the park. Some adult frogs will travel over 2 miles to locate a pond in which to breed (Hayes 2008). Adults typically move through forested upland habitat, preferring sword fern (Hayes 2008). The close proximity of suitable breeding habitat and upland foraging habitat makes Brian Booth an ideal location for this species. Due to its sensitivity to changes in the environment, monitoring red-legged frog populations can alert park staff to issues related to water quality before it affects most other species, like juvenile salmonids.

Species to Benefit: Waterfowl, juvenile salmonids, marsh-dependent song birds

3.2.2 Pacific Wren

Pacific wren (*Troglodytes pacificus*) is a fairly common resident of Oregon. With its small size and short tail, the Pacific wren is a pert little songbird. This wren is a ground and understory insectivore associated with forest floor complexity (Altman, 1999), such as down logs, stumps, root wads, litter layer, ferns, and well-developed layer of mosses and bryophytes. The Pacific wren nests inside crevices and cavities in a wide variety of substrates. Nests have been found most commonly in nooks and crannies within downed logs or rock piles (Marshal et al, 2003).

Species to Benefit: Wilson's warbler, orange-crowned warbler, rufous hummingbird; salamanders that require forest floor cover, such as Dunn's and Western red-backed salamander, ensatina, and clouded salamander

3.2.3 Downy and Hairy Woodpeckers

Downy woodpecker (*Picoides pubescens*) is a common bird that utilizes many habitats, including urban areas. A small black and white woodpecker, the males have a little red patch on the nape, and closely resemble another small woodpecker, the hairy woodpecker (*Picoides villosus*). Downy woodpeckers excavate in soft Snags and branches in advanced stages of decay, while hairy woodpeckers with a stouter bill can excavate in harder woods. Both species are associated with the presence of Snags, and their excavations are critical to small secondary cavity nesters such as chickadees, wrens, nuthatches, and small owls.

Species to Benefit: Species that utilize small cavities or snags, such as northern pygmy-owl, northern saw-whet owl, black-capped chickadee, house wren, western bluebird, and northern flying squirrel; salamanders reliant on coarse woody debris; native bees; bats

3.2.4 Pileated Woodpecker

The pileated woodpecker (*Dryocopus pileatus*) is the largest woodpecker found in the United States, noted by its mostly black body, red crest, and ululating call. Pileateds utilize large Snags and decadent live trees for nesting and foraging, and holes excavated by pileated woodpeckers tend to be rectangular in shape. Pileated woodpeckers are associated with large Snags (Altman, 1999). Pileated woodpeckers are one of the few animals that will begin excavating in live trees, providing cavities to many other species. Excavations made by pileated woodpeckers are used by larger species than those that utilize downy or hairy woodpecker excavations; in the Pacific Northwest over 20 species of secondary cavity nesters utilize these excavations. Pileated drilling also speeds the decomposition of trees, which benefits weak excavators like red-breasted nuthatches.

Species to Benefit: Bald eagle, great-horned owl, barn owl; red-breasted nuthatch, vaux's swift, common merganser, wood duck, bufflehead, and other secondary cavity nesting birds; salamanders reliant on coarse woody debris; mammals that utilize snags such as Douglas squirrel, northern flying squirrel, fisher, and American marten; silver-haired bat and other bat species.

3.2.5 Varied Thrush

Varied thrush (*Ixoreus naevius*) is a secretive songbird of densely forested habitat, similar in size to a robin. The varied thrush is a permanent resident of Oregon, and uses a broad range of habitats during the winter. During breeding season, varied thrushes migrate to coastal and montane forests where they nest in shrubs, saplings, and other mid-story vegetation with which the thrush is associated (Altman, 1999).

Species to Benefit: Wood duck, Wilson's warbler, orange-crowned warbler, golden-crowned kinglet, rufous hummingbird, northern pygmy-owl; small mammals including Douglas squirrel

3.2.6 Yellow Warbler

Yellow warbler (*Dendroica petechia*) is well-named, and often spotted as a bright yellow movement amidst green foliage. Yellow warbler populations in Oregon have declined due to habitat loss and fragmentation that supports increased brown-headed cowbirds (*Molothrus ater*), which parasitize the nests. Yellow warbler is associated with tall shrub foliage and subcanopy in riparian woodlands.

Species to Benefit: Neotropical migrants such as warbling vireo, and yellow-breasted chat; black-tailed deer

3.2.7 Roosevelt Elk

Roosevelt elk (*Cervus canadensis roosevelti*) is named for Theodore Roosevelt, and is the largest of the North American elk species with antlers that can span four feet. While elk are not currently a sensitive species in Oregon, visitors love to see them. Whenever these large mammals are visible, there is usually a line of people watching and taking photographs. Elk require late-seral forest with ample understory plants for forage, breaks that allow sunlight to penetrate the forest floor, as well as more open areas where they can calve and rest. Elk cannot be hunted in Brian Booth State Park, providing a safe haven where they can calve, rest, and forage without pressure. Providing elk with habitat ensures suites of other species also have suitable habitat.

Species to Benefit: Ground nesting birds, amphibians, visitor experience

3.3 Locally Important Species

3.3.1 American Beaver

The American beaver (*Castor Canadensis*) is the largest rodent in North America; averaging about 40 pounds and over three feet long, the beaver is semi-aquatic and well known for building dams and lodges. Beaver live along rivers and streams with year-round water flow, and if deep calm water is not available, beaver will create their own habitat by building dams to create the pools they need. These activities often enhance flood control of the watershed and provide habitat for aquatic insects, juvenile fish, amphibians, turtles, big game, and waterfowl. Beaver populations are limited by habitat availability; therefore, efforts to remove beaver from an area where their activities cause conflict with humans tend to be ineffectual. Other methods to incorporate beaver and human uses tend to be more successful, such as employing devices to control the water level of ponds supporting beaver.

Beaver have been documented in Beaver Creek; their presence currently does not interfere with any park activities.

3.3.2 Coastal cutthroat

The coastal cutthroat, Oregon Coast ESU (*Oncorhynchis clarki clarki*) is an anadramous subspecies of coastal cutthroat trout. Most cutthroats spend their entire lives in freshwater, but juvenile coastal

cutthroats migrate to sea similar to salmonids. Coastal cutthroats spawn in small tributaries, often less than two feet wide, and tend to spawn higher than either coho or steelhead. Spawning takes place in shallow riffles only a few inches deep with a gentle grade and pea-sized gravel. The fry remain in shallow streams for their first year, and in their second spring migrate to larger mainstem streams as juveniles. They overwinter in the slower moving streams under cover. Usually in the winter of their third year, smolts migrate out to the ocean. After 4-6 months of foraging close to shore and growing into adults, coastal cutthroat migrate back to their natal streams, spend the summer, and then head back to the ocean. Spawning occurs anywhere from July through September, based on the age of the fish. Females do not usually spawn until they are 4 years old, despite making the migration to salt water and back. These numbers, however, are all generalizations: coastal cutthroat are fascinating in the diversity of their movement timing.

3.4 Beaver Creek Natural Area Wildlife Surveys

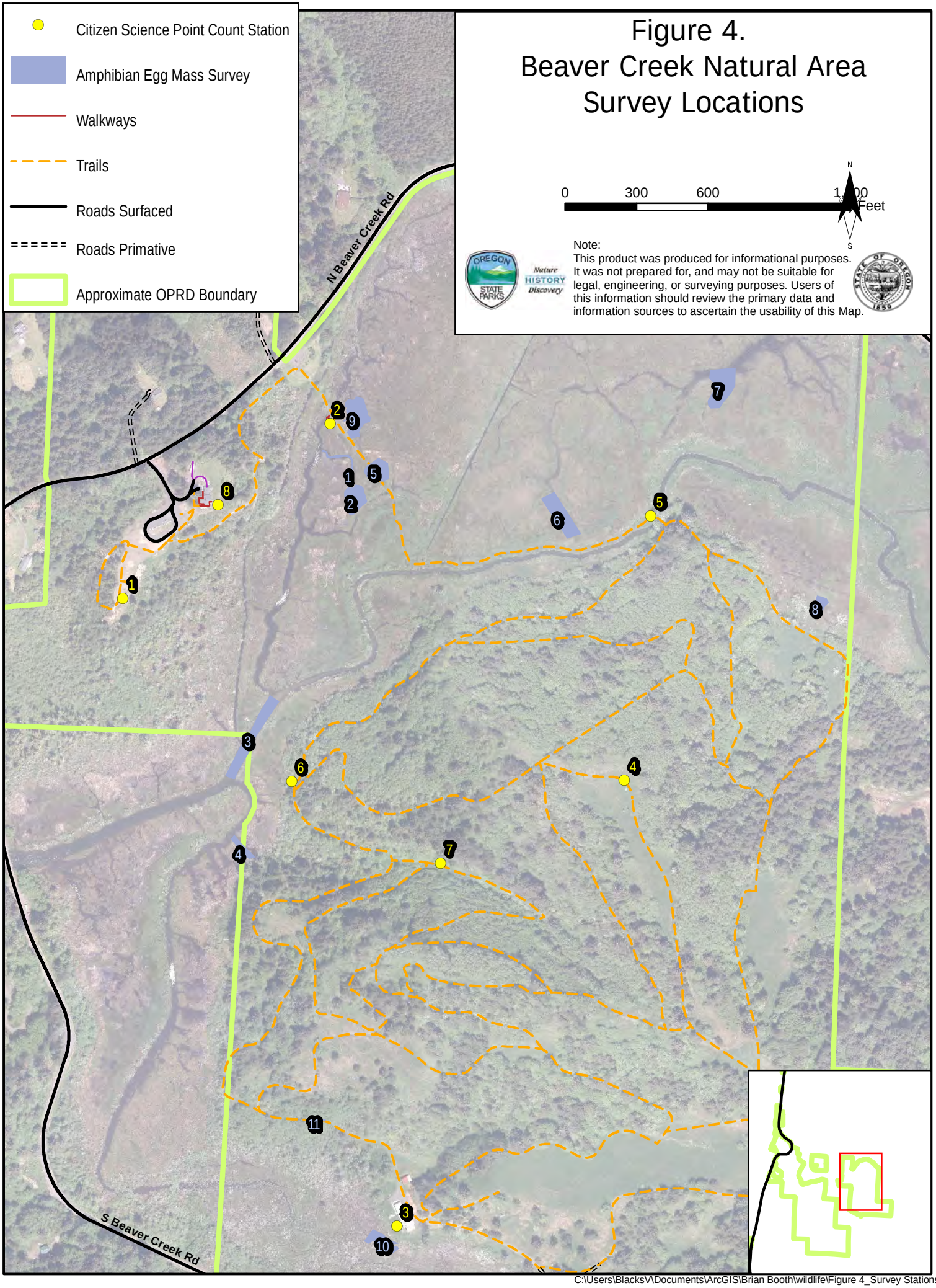
3.4.1 Citizen Science Point Counts

In 2011, Beaver Creek Natural Area began a year-long avian point count interpretive program. The goal of the program was to produce a seasonal checklist of the birds that visitors could observe in the park. Each Saturday, park staff led a morning bird walk to 9 permanent point count stations (Figure 4), where visitors and park staff recorded every bird that was heard or seen. For methodology, see Appendix A - Methodology. The program was popular with novice birders and local birding experts alike, and resulted in an in-depth species presence and seasonal abundance list (Table 1). These data illustrate which areas of the Natural Area with the highest species diversity (Table 3, Figure 5) and greatest numbers of birds (Table 4, Figure 5). Note that these data cannot be extrapolated to indicate best habitat due to methodology not controlling for distance or observability. For example, station 1 had a high viewshed that overlooked Beaver Marsh which greatly increased the birds observed. Even so, reducing or eliminating disturbance in these areas is strongly recommended to preserve the avian fauna in the Natural Area. See Section 4 for management recommendations.

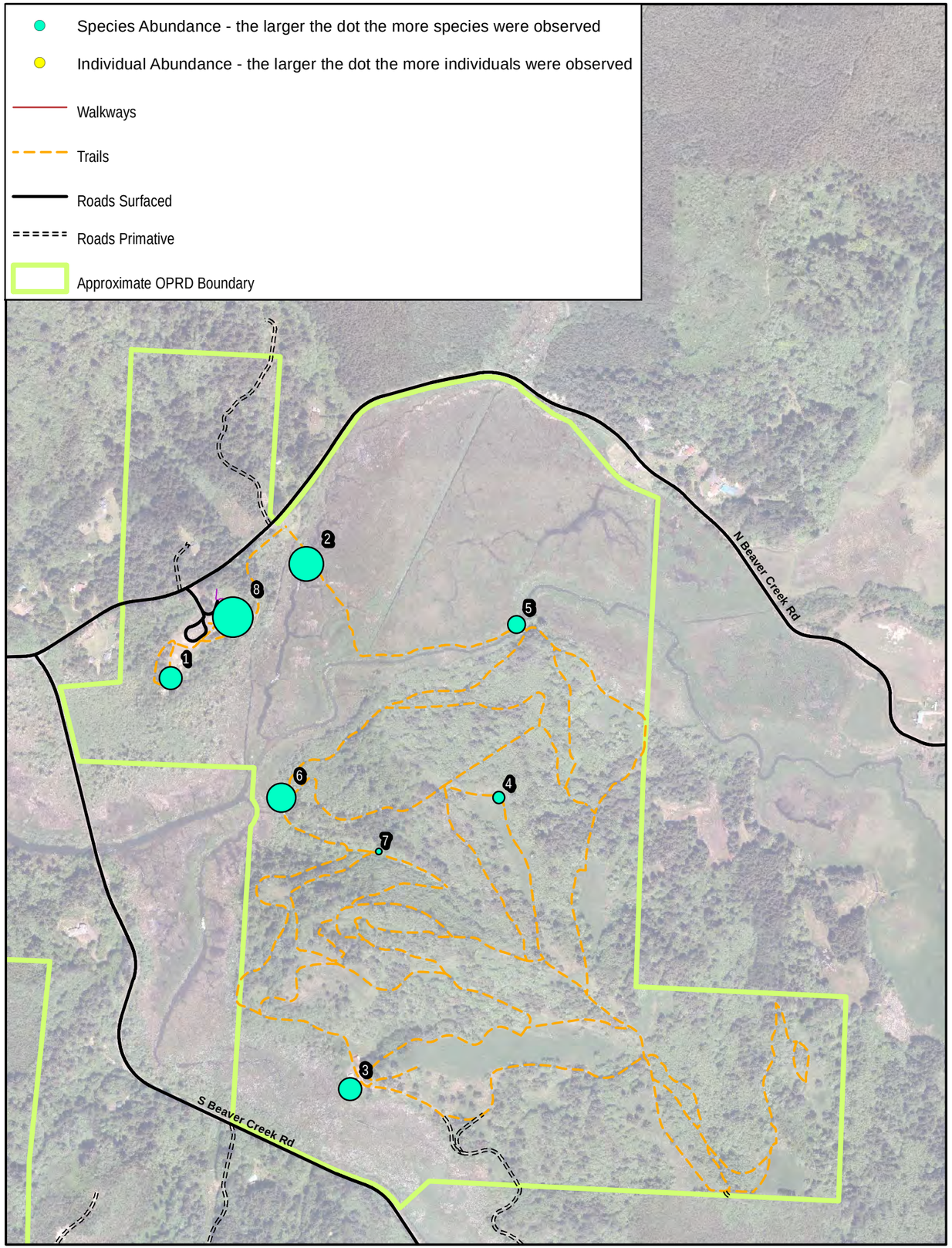
3.4.2 Lentic amphibian Egg Mass Surveys

In February 2013 OPRD conducted surveys for lentic amphibian egg masses in Beaver Creek Natural Area. Lentic amphibians breed in ponds, depositing their eggs in masses clumped onto vegetation. The survey protocol was adapted from Portland Metro Regional Parks and Greenspaces' "Amphibian Egg Mass Monitoring Protocol", utilizing a ***visual encounter*** technique: conduct visual surveys within assigned transects, keeping track of the amount of time spent actively searching for egg masses (e.g., not including time spent writing data as search time). Due to its size, 11 survey areas were established to represent the different vegetation types within the emergent marsh and stream (Figure 4). Since survey areas were of differing sizes, detection rate (egg masses divided by the total search time) provide a standardized way of comparing the surveys to each other. Methodology details are in Appendix A - Methodology. Sites 2, 5, 7, and 9 had the highest detection rates and total numbers of egg masses observed (Figure 6).

Figure 4.
Beaver Creek Natural Area Survey Locations



C:\Users\BlacksV\Documents\ArcGIS\Brian Booth\wildlife\Figure 4_Survey Stations.mxd


Species Abundance - the larger the dot the more species were observed
Individual Abundance - the larger the dot the more individuals were observed
Walkways
Trails
Roads Surfaced
Roads Primative
Approximate OPRD Boundary
N Beaver Creek Rd
S Beaver Creek Rd
1
2
3
4
5
6
7
8

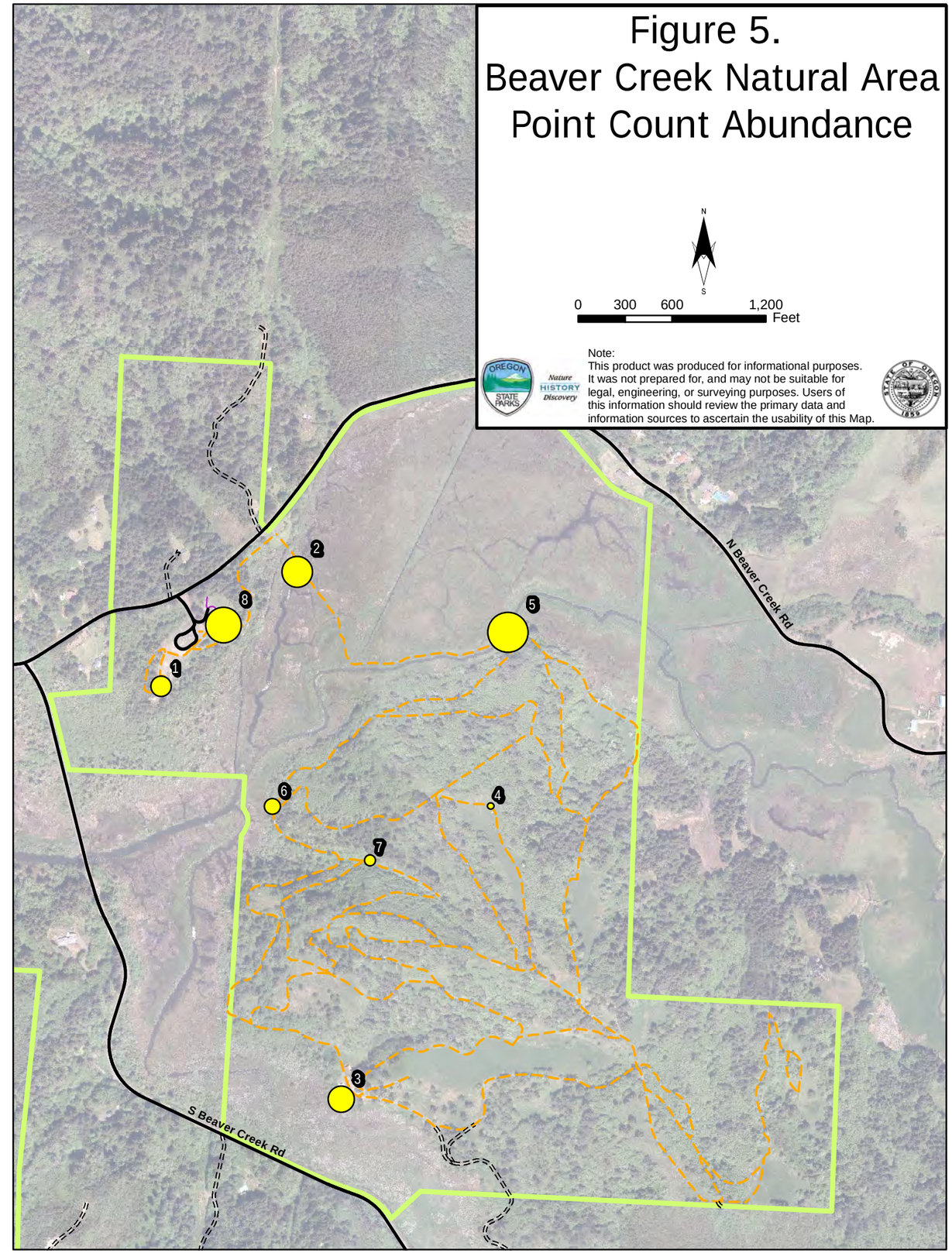


Figure 5.
Beaver Creek Natural Area
Point Count Abundance
N
S
0
300
600
1,200
Feet
Note:
This product was produced for informational purposes. It was not prepared for, and may not be suitable for legal, engineering, or surveying purposes. Users of this information should review the primary data and information sources to ascertain the usability of this Map.
N Beaver Creek Rd
S Beaver Creek Rd
1
2
3
4
5
6
7
8

Table 2. Beaver Creek Natural Area Seasonal Checklist

Species	Fall	Spring	Summer	Winter
American bald eagle	O	U	R	O
American coot	O	U	UD	U
American crow	U	U	U	U
American goldfinch	U	C	A	O
American robin	A	C	A	U
American Wigeon	UD	UD	UD	U
Anna's Hummingbird	UD	R	R	O
Band-tailed pigeon	C	C	A	UD
Barn Swallow	O	C	A	UD
Belted Kingfisher	C	R	U	UD
Bewick's Wren*	UD	C	C	UD
Black-capped Chickadee	U	O	U	O
Black-headed Grosbeak	UD	U	C	UD
Black-throated Gray Warbler	O	UD	UD	UD
Brewer's Blackbird	O	UD	O	UD
Brown Creeper	UD	U	UD	UD
Brown-headed Cowbird	UD	O	U	UD
Bufflehead	R	U	UD	U
Bushtit	UD	UD	O	U
Cackling Canada Goose	R	UD	UD	UD
Canada Goose	O	C	O	C
Cedar Waxwing	A	UD	A	UD
Chestnut-backed Chickadee	A	U	C	C
Cinnamon Teal	UD	R	UD	UD
Clark's Nutcracker	R	UD	UD	UD
Cliff Swallow	UD	O	A	UD
Common Goldeneye	UD	UD	UD	O
Common Raven	U	U	U	U
Common Yellowthroat	U	C	A	UD
Cooper's Hawk	U	UD	UD	R
Dark-eyed Junco	U	U	U	U
Double-crested Cormorant	UD	U	UD	O
Downy Woodpecker	U	O	U	R
European Starling	R	O	O	UD
Evening Grosbeak	O	UD	O	UD
Fox Sparrow	C	O	UD	C
Golden-crowned Kinglet	U	U	O	U
Golden-crowned Sparrow	R	U	UD	UD
Great Blue Heron	U	C	U	C
Great Egret	U	U	O	U

Species	Fall	Spring	Summer	Winter
Greater White-fronted Goose	O	U	UD	O
Greater Yellowlegs	UD	U	O	UD
Green-winged Teal	O	U	UD	U
Hairy Woodpecker	O	O	U	U
Hermit Thrush	R	UD	UD	U
Hooded Merganser	O	U	UD	U
Horned Grebe	UD	UD	UD	O
House Finch	UD	R	O	UD
Hutton's Vireo	R	U	O	UD
Lincoln's Sparrow	UD	UD	UD	O
Mallard	U	A	U	A
Marbled Murrelet	UD	UD	UD	UD
Marsh Wren	A	A	A	C
Mew Gull	R	UD	UD	UD
Mourning Dove	O	U	C	O
Northern Flicker	C	U	U	U
Northern Harrier	U	R	UD	U
Northern Pintail	R	O	UD	U
Northern Pygmy-owl	R	U	UD	UD
Northern Rough-winged Swallow	UD	UD	R	UD
Northern Shoveler	UD	UD	UD	U
Olive-sided flycatcher	O	O	U	UD
Orange-crowned Warbler	R	U	U	UD
Osprey	R	C	C	UD
Other Gulls:	UD	O	UD	R
Pacific Wren	C	C	C	C
Pacific-slope Flycatcher	UD	R	U	UD
Peregrine Falcon	UD	R	UD	UD
Pied-billed Grebe	O	U	UD	U
Pileated woodpecker	O	R	O	UD
Pine Siskin	O	O	R	O
Purple Finch	U	U	A	UD
Purple martin	O	UD	UD	UD
Red Crossbill	O	O	C	U
Red-breasted Nuthatch	UD	R	UD	UD
Red-breasted Sapsucker	R	UD	UD	R
Red-necked Phalarope	UD	R	UD	UD
Red-shouldered Hawk	U	UD	R	UD
Red-tailed Hawk	U	U	O	U
Red-winged Blackbird	U	A	C	C
Ring-necked Duck	UD	O	UD	U
Ruby-crowned Kinglet	U	U	UD	U

Species	Fall	Spring	Summer	Winter
Ruffed Grouse	R	UD	UD	UD
Rufous Hummingbird	UD	U	C	R
Savannah Sparrow	UD	R	UD	UD
Scaup	UD	O	UD	UD
Sharp-shinned Hawk	R	R	UD	UD
Song Sparrow	A	A	A	A
Sora	R	R	UD	UD
Spotted Towhee	U	U	C	R
Steller's Jay	A	A	A	A
Swainson's Thrush	O	O	A	UD
Townsend's Warbler	U	R	UD	O
Tree Swallow	UD	A	A	UD
Turkey Vulture	O	U	C	UD
Varied Thrush	U	O	R	U
Vaux's Swift	O	R	R	UD
Violet-green Swallow	U	A	C	UD
Virginia Rail	C	C	U	A
Warbling Vireo	UD	O	U	UD
Western bluebird	O	UD	UD	UD
Western Scrub-Jay	UD	UD	R	UD
Western Tanager	O	O	O	UD
Western Wood-pewee	UD	O	C	UD
White-crowned Sparrow	U	U	O	UD
Willow flycatcher	UD	UD	R	O
Wilson's Snipe	R	UD	UD	UD
Wilson's Warbler	O	C	C	UD
Wood Duck	O	U	UD	UD
Wrentit	C	U	C	U
Yellow Warbler	UD	UD	R	U
Yellow-rumped Warbler	UD	U	UD	UD

A = Abundant, **C** = Common, **U** = Uncommon, **O**= Occasional, **R** = Rare, **UD** = Undocumented in this season

* = observed outside of the surveys

Table 3. Species Diversity by Call Station

Station	Spring	Summer	Fall	Winter	Total
1	41	38	31	28	65
2	41	45	34	25	72
3	39	39	38	22	65
4	23	29	21	16	55
5	34	37	29	30	64
6	41	38	31	22	66
7	32	28	24	12	53
8	54	46	37	25	79
Total	**85**	**67**	**78**	**54**	**110**

[1]Station 8 overlooked the marsh complex, and likely double counts birds noted on other stations.

Table 4. Total Individual Birds by Call Station

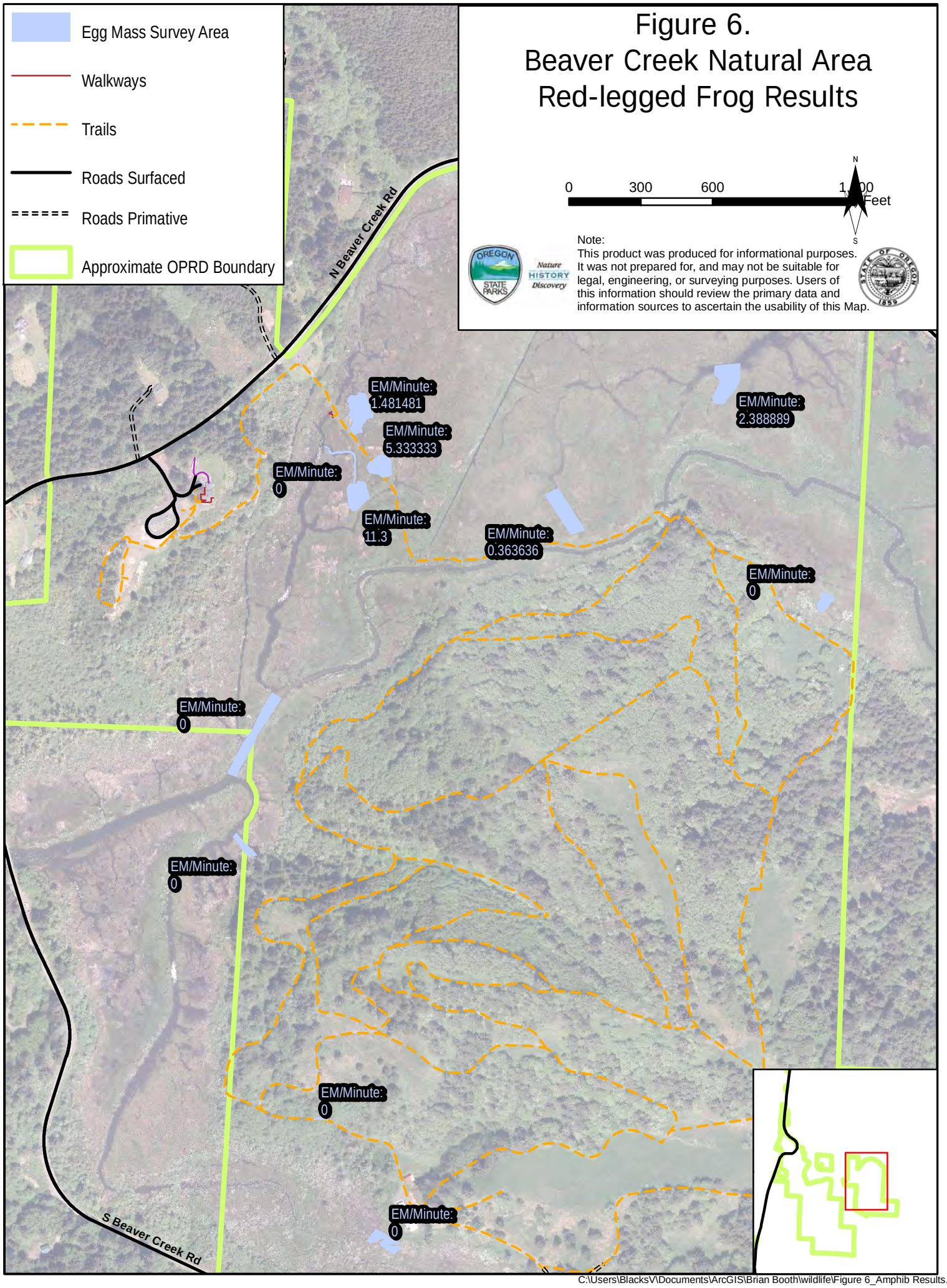
Station	Spring	Summer	Fall	Winter	Total
1	256	229	226	135	846
2	444	369	256	172	1241
3	201	432	324	180	1137
4	80	134	94	132	440
5	342	265	348	677	1632
6	202	224	163	205	794
7	119	205	118	72	514
8	614	397	399	128	1538

[1]Station 8 overlooked the marsh complex, and likely double counts birds noted on other stations.

Table 5. Amphibian Egg Mass Detection Rates

Site	Search Time	Total Red-legged Frog Egg Masses	Egg masses Per Minute
1	8	0	0.00
2	**10**	**113**	**11.30**
3	9	0	0.00
4	10	0	0.00
5	**9**	**48**	**5.33**
6	22	8	0.36
7	**18**	**43**	**2.39**
8	4	0	0.00
9	**27**	**40**	**1.48**
10	26	0	0.00
11	3	0	0.00

Figure 6.
Beaver Creek Natural Area
Red-legged Frog Results



Note:
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C:\Users\BlacksV\Documents\ArcGIS\Brian Booth\wildlife\Figure 6_Amphib Results.mxd

3.5 THREATS TO FISH AND WILDLIFE

OPRD management of the property can pose threats to fish and wildlife species through direct mortality, disturbance effects, habitat loss and degradation. The primary threats are described below.

3.5.1 HABITAT DEGRADATION AND LOSS

Development of new facilities, be they trails, structures, or parking areas, reduces available habitat. If new facilities are developed the existing land-use is altered, and higher concentrations of people will cause increased stress and disturbance to wildlife that currently use any new development areas. Direct mortality of wildlife would be limited to initial construction phases of development projects and is expected to be low; however, indirect mortality may increase due to habitat degradation which changes and fragments plant communities (Knight et al. 1995) and soils (Cole 1993). Indirect mortality may also increase due to increased predation from corvids, coyotes, and other species by providing predators easier access to nesting areas (Miller et al. 1998) and by artificially increasing density of predators associated with humans. Increased visitor use can result in human trampling of vegetation from hiking, camping, fishing and nature viewing while impacts to soils include loss of organic horizons, compaction, and an increase in erosion. These changes in soil characteristics adversely affect the germination, establishment, growth, and reproduction of native plants and favor non-native invasive species (Cole 1993). Fishing from banks can negatively impact shoreline characteristics, increase sedimentation, alter organic matter content, and alter water chemistry. Each project executed in the park should be evaluated for these impacts and appropriate minimization and mitigation actions should be taken. Existing areas of disturbance should be assessed for actions that can be taken to reverse damage to degraded areas.

3.5.2 RECREATIONAL ACTIVITIES

OPRD's mission, to provide and protect outstanding natural, scenic, cultural, historic, and recreational sites for the enjoyment and education of present and future generations, is a balancing act. Providing avenues for recreation often have negative impacts to wildlife. Part of the park planning process involves evaluating and minimizing these impacts in concert with determining facility and trails placement. Section 4 outlines strategies to minimize and mitigate impacts from recreational activities as well as enhancements to existing natural resources. Determining the costs and benefits of each management action can be complex.

Recreational activities that are likely to directly impact wildlife at Brian Booth State Park are hiking, nature viewing, camping, biking, kayaking, and picnicking. Recreational activities can negatively impact wildlife by causing direct mortality (such as hunting, fishing, etc.) or indirectly by disturbing wildlife behavior. Non-consumptive recreation activities such as hiking and picnicking do not seem like an adverse impact; however, disturbance from these uses can reduce species diversity in mammals (Reed and Merenlender 2008), alter species composition in songbirds (Remacha et al. 2011), negatively affect

nest placement in songbirds, and increase the risk of songbird nest predation (Miller et al. 1998). In Eastern Oregon, a hunted population of elk fled when people were within 500 m (1,640 feet) and the number of elk observed was much lower than the herd total (Rocky Mount Elk Foundation, Starkey Day, June 22 2012). Constant disturbance results in elk avoidance of the area. Therefore, consistent visitor use of trails and facilities could mean elk will be seen less and less frequently. In dense forests these impacts may be reduced, and some elk habituate in populations that are not hunted but hard to predict. Nature viewing has a great potential to negatively impact wildlife and repeatedly disturb rare species (Boyle and Samson 1985). Avid wildlife viewers intentionally seek out rare or spectacular species. Because these activities may occur during sensitive times of the year, and because they often involve close approaches to wildlife for the purpose of identification or photography, the potential for negative impacts are large (Knight et al. 1995).

Special events that attract large crowds are also disruptive to wildlife. Loud concerts, fireworks, and other events can even cause mass death. USFWS has documented that fireworks at Depoe Bay caused nest abandonment at the Pirate Cove seabird colony on the Oregon coast, and hundreds of blackbirds have been found dead after firework events celebrating July 4th and New Years Eve. Large crowds can cause direct mortality by causing wildlife to flee from their territories into hazards, and indirectly by causing nest abandonment, disrupted foraging, and disrupted behaviors that make the individual more susceptible to predation. Before hosting these events, park managers should carefully consider the benefits of the event weighed with the negative impacts to wildlife.

3.5.2.1 Trails and Wildlife

People come to state parks to recreate, and often that includes walking the trail system. Demand for trails through a variety of plant communities, scenic views, and with multiple difficulty levels is a consistent pressure on natural areas, including state parks. At the same time, hiking trails can foster a sense of appreciation for natural resources in the public that is critical to conservation efforts. John Muir said “In every walk with nature one receives far more than he seeks,” and this can be said for state parks.

Healthy wildlife populations enrich the visitor experience, and ultimately benefit the operation of the park. Trails can negatively impact wildlife, however, and care must be taken during trail route planning to reduce or mitigate impacts. Trails alter competitive, symbiotic, and predator-prey relationships (Gutzwiller 1995) among wildlife; Gutzwiller et al. (1994) found that trail proximity decreased bird singing during the breeding season, which directly affects productivity. Birds may be reluctant to establish breeding territories near trails with frequent human use. Proximity to trails has been shown to reduce avian nest success, and nest survival increases with distance from trail (162 nests, Miller 1998). Trail proximity also affects where songbirds place their nests (Smith-Castro 2008, Miller 1998) and nest defense behaviors (Knight and Temple 1986, Keller 1989). Any changes in what a breeding bird is doing has a negative effect on its young – more time chasing things away from its nest means less time finding food for young.

Trails also alter avian species abundances (Hickman 1990, Van de Zande 1984) within 75 meters (250 feet) of a trail (Miller 1998), due to both habitat changes as well as disturbance. Even trail width can

affect species abundance (Holmes and Geupel 2005). For example, spotted towhee, wrentit, and Bewick's wren were less common around wide trails (greater than 2 m or 6.5 feet) than thin trails (less than 2m or 6.5 feet). Species that can tolerate higher disturbance levels will be more prevalent (crows, ravens, robins, etc). To meet conservation goals, Brian Booth should provide areas for the species that are not tolerant as well as the ones that are. These wildlife reserves will benefit many wildlife species within the park, including those sensitive to disturbance (see Section 4.1). For recreation purposes, ensuring the less tolerant species remain present in the park increases the likelihood visitors may see them when trail use is low.

Indirect mortality may also increase due to increased predation from corvids, coyotes, and other species that are attracted to refuse and other human-related disturbance (Gotmark 1992). Predators often use trails as "grocery aisles", walking along them and depredating all the nests (and adults) within relatively easy reach. Avian nest predators are attracted to open, narrow corridors (Hickman 1990, Rich et al 1994). This means bird pairs nesting near trails are unlikely to raise any young. In parks with high trail density, this creates a "sink" situation where birds are attracted to the area by what seems high quality habitat, and then fail to fledge any young. When the adults die, there are no young to replace them, and the population of the species decreases. Reserve areas away from trails helps increase reproductive success in the park and can produce a "source" population where adults produce more than 2 young in their lifetimes. These young disperse out from the park and colonize new areas as they establish territories, ultimately increasing the species population.

Restoring new and existing habitat, siting facilities away from important wildlife areas, developing wildlife viewing blinds, and establishing reserve areas that are kept distant from trails will help mitigate for these negative impacts and provide a positive effect on wildlife populations.

3.5.3 Invasive Fish and Wildlife Species

Invasive species are considered to be one of the primary causes of species becoming threatened and endangered, next to habitat loss (ODFW, 2006). Non-native plants are addressed in the Vegetation Inventory and Botanical Resource Assessment for the Beaver Creek Natural Area and Ona Beach State Park Complex of Properties (Bacheller 2012). Non-native and invasive wildlife pose a threat to native species by predation and outcompeting for valuable resources. In the Coast Ecoregion there are 29 documented invasive, non-native fish and wildlife species and another 20 non-native, potentially invasive species that have not yet been observed but have the potential to pose a serious threat to native species should they establish populations (Table 6). While not all the species in Table 6 are present in Brian Booth State Park, a few are already problematic. Nutria (*Myocastor coypus*) are increasing in density, damaging native vegetation and even showing aggressive behavior to kayak recreationists (B. Fowler, personal communication). OPRD has implemented management actions to control nutria populations in 2010 and 2011; this is a costly and time-intensive process, and was halted when results did not appear to have any effect. In addition, Brian Booth has boat access, kayaking put ins, and fishing areas on Beaver Creek. The creek access can serve as a gateway for aquatic invasive species, such as Quagga mussels, New Zealand mudsnil, and parrotfeather. These system-altering species are hard to control, and prevention is the best form of management.

Table 6. Invasive Species for the Coast Range

Common Name	Scientific Name	Threat level
Asian clam	*Corbicula fluminea*	Documented
Bluegill	*Lepomis macrochirus*	Documented
Brook trout	*Salvelinus fontinalis*	Documented
Brown Bullhead	*Ameiurus nebulosus*	Documented
Bullfrog	*Lithobates catesbeianus*	Documented
Carp	*Cyprinus carpio*	Documented
Channel catfish	*Ictalurus punctatus*	Documented
Crappie	*Pomoxis* spp.	Documented
Eastern snapping turtle	*Chelydra serpentina serpentina*	Documented
European green crab	*Carcinus maenas*	Documented
European Starling	*Sturnus vulgarus*	Documented
Fathead minnow	*Pimephales promelas*	Documented
Feral Swine	*Sus scrofa*	Documented
Goldfish	*Carassius auratus auratus*	Documented
Grass carp	*Ctenopharyngodon idella*	Documented
Griffen's isopod	*Orthione griffensis2*	Documented
House Sparrow	*Passer domesticus*	Documented
Japanese mitten crab	*Eriocheir japonicus*	Documented
Largemouth Bass	*Micropterus salmoides*	Documented
Mosquito fish	*Gambusia*spp.	Documented
New Zealand mudsnail	*Potamopyrgus antipodarum*	Documented
Norway Rat	*Rattus norvegicus*	Documented
Nutria	*Myocastor coypus*	Documented
Smallmouth bass	*Micropterus dolomieu*	Documented
Striped bass	*Morone saxatilis*	Documented
Virginia Opossum	*Didelphis virginiana*	Documented
Wiper	*Morone saxatilis x chrysops*	Documented
Yellow Perch	*Perca flavescens*	Documented
Walleye	*Sander vitreus*	Documented
Asian Carp (bighead, Silver)	*Hypophthalmichthys nobilis, H. molitrix*	Potential
Banded killfish	*Fundulus diaphanus*	Potential
Black Carp	*Mylopharyngodon piceus*	Potential
Fishhook Waterflea	*Cercopagis pengoi*	Potential
Chinese mitten crab	*Eriocher sinensis*	Potential
Japanese oyster drill	*Ocinebrellus inornatus*	Potential
Leidy's comb jelly	*Mnemiopsis leidyi*	Potential
Muskelluge and Northen Pike	*Esox spp.*	Potential
Quagga mussel	*Dreissena rostriformis*	Potential
Rainwater killfish	*Lucania parva*	Potential
Round Goby	*Neogobius melanostomas*	Potential

Common Name	Scientific Name	Threat level
Ruffe	*Gymocephalus cernuus*	Potential
Rusty Crayfish	*Orconectes rusticus*	Potential
Sea Squirt	*Didemnum vexillum*	Potential
Shimofuri goby	*Tridentiger bifasciatus*	Potential
Snakehead	*Channa spp.*	Potential
Spiny waterflea	*Bythotrephes cederstroemi*	Potential
Threadfin Shad	*Dorosoma petenense*	Potential
Veined rapa whelk	*Rapana venosa*	Potential
Zebra mussel	*Dreissena polymorpha*	Potential

4. MANAGEMENT STRATEGIES

Management strategies should be periodically reviewed and updated in a Natural Resources Management Plan throughout the duration of the Park's use. Management should involve protection of high suitability habitat, enhancement of medium suitability habitat, and restoration of degraded habitat (Figure 7) Monitoring will be important to assess threats and adaptively react to them in order to protect these resources over the long term. Surveys for focal species (See Section 3.2) will act as indicators for successful habitat management. Many species within Brian Booth State Park are regulated by ODFW, and OPRD will utilize ODFW management plans and regulations for ODFW-managed species, such as salmonids, elk, deer, beaver, and bear. OPRD will also maintain habitat connectivity within the park as well as to surrounding parcels to the greatest extent possible (Figure 3). The following strategies provide a starting point for adaptive management.

4.1 RESERVE RECOMMENDATIONS

Recreation can negatively impact wildlife due to human disturbance effects (Reed and Merenlender, 2008; Miller et al, 1998; see Section 3.5.2). Establishing reserve areas could reduce the impacts caused by such disturbance. These reserve areas would give wildlife a safe place to retreat and raise young where disturbance from recreating visitors is lowest in the park. As discussed in Section 3.5.2, reserve areas away from trails and other sources of disturbance helps increase reproductive success in the park for many species and can produce a "source" population where adults produce more than 2 young in their lifetimes. These young disperse out from the park and colonize new areas as they establish territories, ultimately increasing the species population within the park as well as in the greater landscape.

Using the potential disturbance index (Appendix A), and habitat types six areas emerge as potential reserves (Figure 6). Note that boundaries are not fixed, and some adjustments can be made to accommodate management needs.

Late Seral Forest: These two reserves contain some of the oldest and largest trees within the park. A multi-level understory and complex forest floor makes the habitat suitable for many late-seral species. Undisturbed late-seral forest is rare across the Coast and an ODFW Conservation Strategy habitat. Federal and state threatened marbled murrelet may nest in these reserves, as well as red tree vole and many other species. Should fisher repopulate the coast, these reserves could offer denning and resting areas for this candidate species.

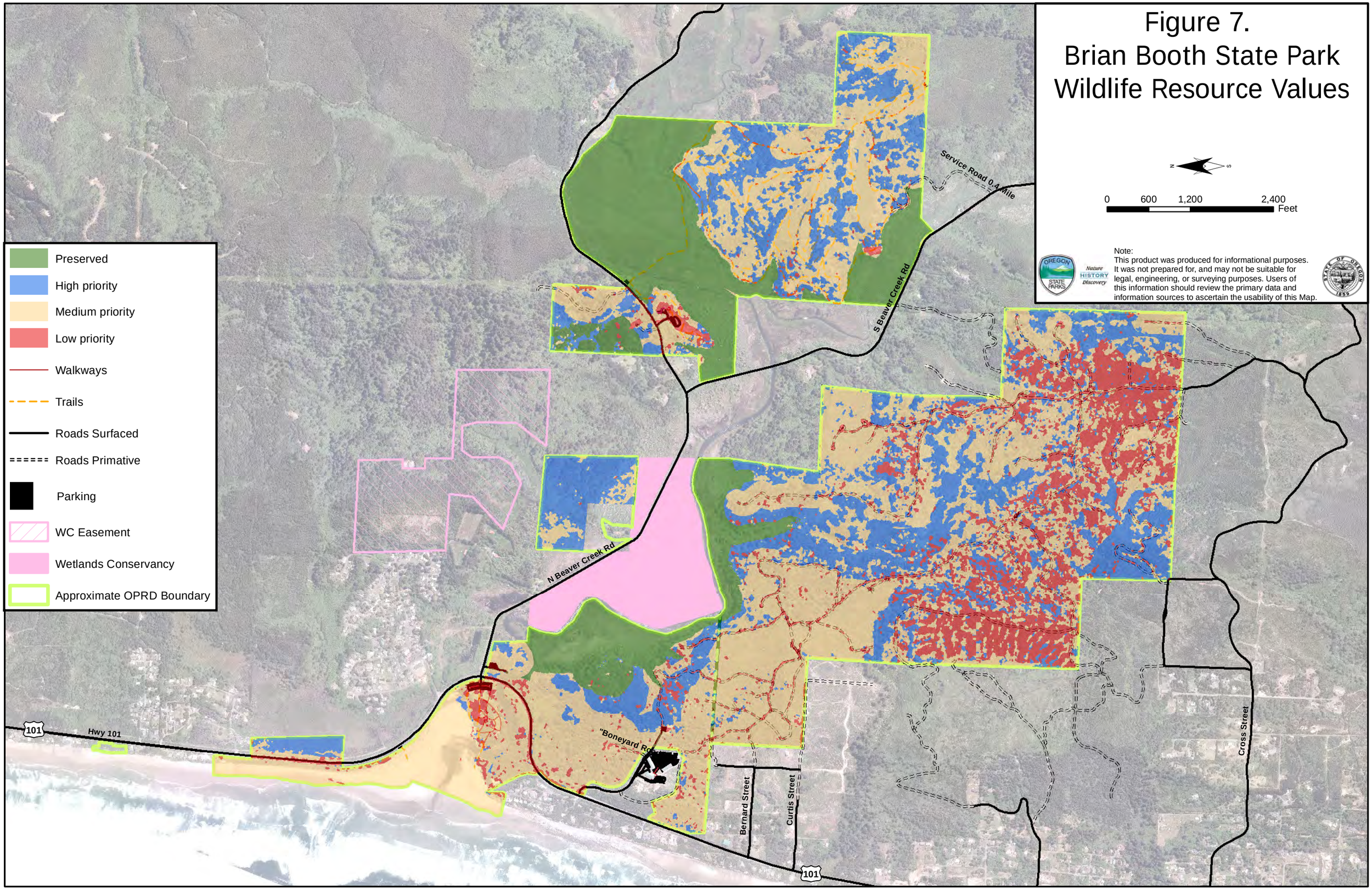
Rana Range: Adjacent to the marsh, this reserve transitions from floodplain to upland forest. It provides habitat for adult red-legged frogs and numerous other wildlife species. Currently, elk often shelter from strong winds and storms close to the floodplain downslope from proposed developments.

Elk Meadows: While some elk herds habituate to human activities, research has shown that what a visitor observes is a small percentage of the total herd (Rocky Mount Elk Foundation, Starkey Day, June 22 2012). During the study, observers walked a trail and documented how many head of elk they observed. Through GPS and radio tracking, USFS researchers could follow the movements of the herd: the unobserved members of the herd changed their behavior and moved away from what they perceived as a potential threat far in advance of the observers. This reserve will provide elk an area with minimal disturbance, allowing them to calve, forage, and rest without negative impacts caused by recreation actions. The reserve will encourage elk to remain present in the park, ultimately increasing the chances of visitors observing these large mammals as they move from between the reserves and their foraging areas.

Deer Valley: This shrubby upland forest is currently a young forest with an ample shrub layer and developing canopy. As it matures, this area will provide low disturbance upland forest habitat for songbirds, deer, elk, bear, and a myriad of other wildlife species.

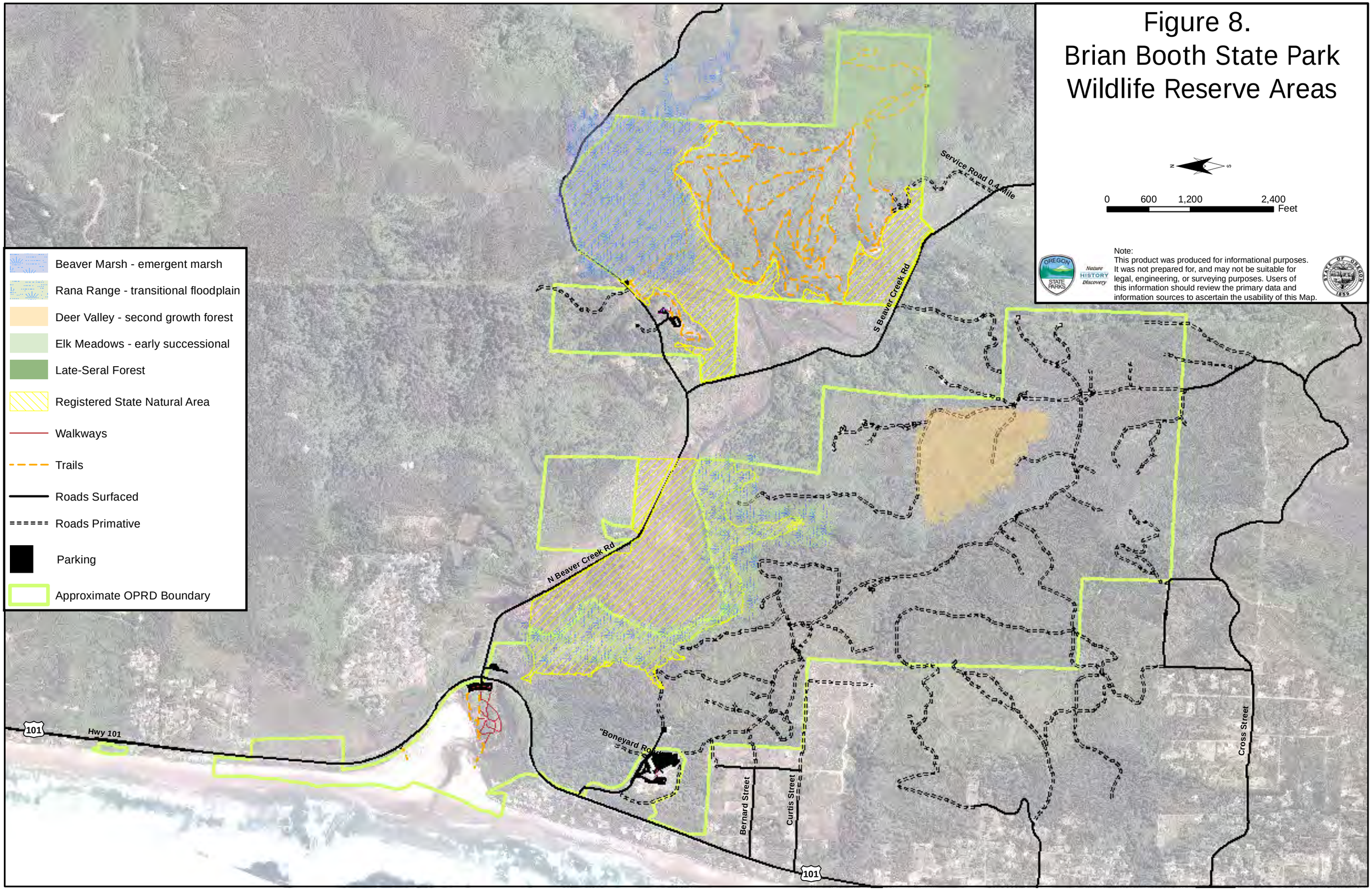
Beaver Creek Marsh: The marsh is home to plethora of waterfowl, amphibians, and rearing ground for juvenile salmonids. During the fall and winter when water levels rise, hundreds of waterfowl take refuge in the marsh. When water levels are lower, elk cross through and forage on the emergent vegetation. It is strongly recommended to keep any developments outside of this area. By keeping recreation activities at the edge of the marsh and using creative screening, visitors will be able to enjoy observing the waterfowl and other wildlife without flushing them away from the marsh. The entirety of the marsh is a registered State Natural Area, trails and other educational recreation activities are compatible with the NA designation. Setting aside this portion of the marsh to remain undisturbed by developed trails will benefit wintering and migrating waterfowl, juvenile salmonids, and many other marsh-dependent species.

Figure 7.
Brian Booth State Park
Wildlife Resource Values



Note:
This product was produced for informational purposes. It was not prepared for, and may not be suitable for legal, engineering, or surveying purposes. Users of this information should review the primary data and information sources to ascertain the usability of this Map.

Figure 8.
Brian Booth State Park Wildlife Reserve Areas



Note:
This product was produced for informational purposes. It was not prepared for, and may not be suitable for legal, engineering, or surveying purposes. Users of this information should review the primary data and information sources to ascertain the usability of this Map.

4.2 Specific Actions

4.2.1 Manage for Late- Seral Forest for Marbled Murrelet

Marbled murrelet populations are in sharp decline, with a majority of breeding habitat in state and private ownership where federal protections have less effect. Unlike private landowners and other state agencies, OPRD is in a unique position where conservation efforts for marbled murrelet have little impact on our mission, and avoiding impacts to murrelet is more feasible than for some other agencies. Therefore, providing as much habitat for this species as possible to offset the habitat loss across Oregon is recommended. For details on what constitutes marbled murrelet habitat, see 3.1.5.

- Protect potential marbled murrelet nesting habitat by siting recreation areas outside of potential habitat (Figure 5). Short spans of trails or spur trails to bring visitors into murrelet habitat for educational purposes would complement ORPD's mission and aid in murrelet recovery through outreach; however, trails for transit or other recreational experiences should not intrude into potential murrelet nesting habitat.
- Encourage forest structure that will result in marbled murrelet nesting habitat. Trees with platforms should be left unless they pose an imminent hazard.
- Utilize forestry techniques to create late seral structure.
- Work with partners and USFWS to provide additional platform trees. Potential ideas include inoculating western hemlock with dwarf mistletoe, targeted forest thinning to generate large trees with healthy crowns, and installing artificial nest platforms.

4.2.2 Retain early successional areas open for elk forage

Early successional forest is declining across the landscape. By definition a transient habitat type, disturbances to forests are needed to maintain early successional forest across the landscape. Historically this occurred through wind throws, fire, and other natural events. Timber practices can create some early successional forest, however the lack of diversity in plantings and the vast acreage reduce the benefits of this habitat to wildlife species. Elk in particular utilize early successional forest for forage. Maintaining this habitat is more complicated than a late seral forest stand. Techniques will need to be developed in conjunction with OPRD's forestry group.

4.2.3 Improve habitat for wildlife connectivity

Habitat connectivity is a primary goal for wildlife in Brian Booth State Park. The area is part of a larger effort to improve the natural resources across the watershed, and with 1,238 acres Brian Booth can play a major role in assisting wildlife disperse across the watershed. Section 2.2 discusses habitat connectivity in greater depth.

- Establish wildlife movement corridors at least 300 feet wide to allow disturbance-free passage among prime habitat areas within the park and to adjacent habitat under other ownership. It is recommended to keep facilities and trails outside of movement corridors
- Establish conservation easements with neighboring properties to increase connectivity

- Assess wildlife movement across Beaver Creek Road during common migration periods for turtles, amphibians, elk, and deer to determine if road strike is a limiting factor
- Investigate options for assisting wildlife movement across Beaver Creek Road
- Investigate options for assisting wildlife movement across paved roads or well-used trails. Small animals like salamanders are greatly impacted by the change in substrate, and may not cross at all. Others that do attempt to cross can become victim to trampling or vehicles

4.2.4 Assess trail system for disturbance effects

During the comprehensive planning process and prior to construction of trails during later phases of build out, assessments of the trail impacts should be conducted. Assessments should determine if the following actions are needed based on the trail alignment and any new data since the development of the Comprehensive Plan:

- Investigate feasibility of a boardwalk connecting the Visitor Center with the upland hiking trail system across the marsh. Trails across the marsh are disturbing to wildlife, especially migrating waterfowl, breeding amphibians, and juvenile salmonids either as part of construction or by visitor use. Any trail alignment across the marsh should minimize visual disturbance to wildlife to the greatest extent possible.
- Seasonal trail closure for elk calving and marbled murrelet nesting season
- Consider trail realignment for continued threat to targeted species, if needed
- Trail closure and decommissioning of under-utilized or unmaintained trails

4.2.5 Assess Streams and Culverts for Fish and Amphibian Use

Juvenile salmonids are known to utilize Beaver Creek Marsh; however, native fish use of streams that feed into the marsh is not currently well described. Distributary channels close to wetland edges are important foraging and refuge areas for small juvenile salmonids (Bottom et al. 2005). Further upstream, other native fishes and stream amphibians depend on clear waters for their life cycles. A priority would be determining if coastal cutthroat spawn in the higher stream reaches. Species diversity surveys in these streams will help determine what, if any, actions are needed for reducing impacts to the species using the streams.

The presence of culverts on Beaver Creek Road may also affect fish use of the marsh and streams. An assessment of fish passage, as well as potential for wildlife crossings, would better inform hydrological management decisions related to the marsh complex.

4.2.6 Develop Management Strategy for Nutria

OPRD has implemented management actions to control nutria populations; however the techniques did not appear to have any effect. While no lasting eradication is feasible given the prevalence of nutria throughout the watershed, OPRD should develop a plan that best maximizes time and funding to achieve an acceptable level of nutria population control.

4.2.7 Address Aquatic Invasive Species Control

The Oregon Marine Board and ODFW have developed a program to help protect Oregon's waterways from contamination by aquatic invasive species. OPRD should work with the Oregon Marine Board and ODFW to determine the best options for prevention at Brian Booth State Park. Some options include:

- Provide boat cleaning tools and facilities in close proximity to boat launches
- Provide outreach and interpretive materials on aquatic invasive species, including directions to the nearest boat cleaning location. The Oregon Marine Board has materials developed that could be utilized.
- Train OPRD staff to recognize signs of likely infestation and how to address visitors that need to clean their items

4.2.8 Mow with Wildlife in Mind

In many state parks, some areas planted in turf are not currently utilized for recreation and are kept as ornamental lawns out of habit or for aesthetics. The creation and maintenance of these areas should be done to reduce impacts to wildlife using the following techniques:

- Reduce the size of ornamental lawns; if the lawn serves no recreational purpose convert the area to native vegetation such as shrubland that can be maintained with annual mowing
- Avoid vegetation mowing and removal of grasses and shrubs, including invasive species like Scotch broom and blackberry, during avian nesting season and flowering season, April 1 through July 31
- When mowing tall vegetation, use a flushing bar to reduce direct mortality of wildlife. Flushing bars encourage small mammals, reptiles, and birds to flee away from the mower.
- Mow slowly (<8mph) to allow animals to move out of the mowing path. When mowing a large area, mow in a circular pattern beginning at the center and moving concentrically outward to allow animals to escape into adjacent habitats.
- Prior to the winter season, maintain a high minimum cutting height (12-16") to leave overwinter vegetation for pollinators *except where in conflict with invasive plant removal, such as blackberry.* Mow areas of flowering plants in phases, no more than 1/3 of the area at a time, ensuring floral resources are available for native bees *except where in conflict with invasive plant removal, such as blackberry.*

4.2.9 Conserve and Enhance Native Pollinators

Pollinators are declining across the country due to pesticides and indirect effects of agricultural practices. Providing habitat and safe, non-contaminated food sources for this guild of insects is simple, yet has far-reaching benefits to the surrounding community. To better aid pollinators,

- Group plants of the same species together into foraging areas for efficiency. Planting species in odd-numbered groupings tends to be a good rule of thumb, and is often aesthetically pleasing.

- Install pollinator foraging areas 500 feet apart or less to allow for the needs of the smallest bees.
- Use a diversity of species, 10 or more, with different heights, flower color, and bloom periods. Select plants with a range of bloom periods (early spring through late fall).
- Avoid removing bee nests until bees emerge in the spring.
- Create/enhance overwinter and nesting sites away from public use areas.
- Revitalize existing overwinter sites with rotted logs during the summer.
- Leave ssnags for nesting sites.
- Leave untilled and partially bare ground or woody vegetation for ground nesting bees in areas away from visitor day use areas.
- Leave abandoned rodent burrows and bird houses to serve as nesting areas.
- Place rocks in the vicinity of nests to provide basking sites.
- Retain leaf litter, root balls of wind-blown trees, and grass tussocks for overwinter shelter.
- Tunnel nesting bees (mason bees) utilize snags, bee nest blocks, and stems from elderberry. A bundle of bamboo stems can provide an inexpensive tunnel nest.

4.2.10 Naturescape Park Entrances and Unused Space

By creating aesthetically pleasing landscaping with native plants and wildlife use in mind, OPRD can increase awareness of these less invasive methods of landscaping to a wide audience by providing living examples of naturescaping in an intensively used area. Plantings between camping sites, around program, parking, and day use areas are excellent locations for naturescaping.

- Utilize native shrubs and trees to provide screening and natural hedges between camp sites, parking areas, and other facilities. Examples that also provide wildlife forage and shelter include cascara (*Rhamnus purshiana*), bitter cherry (*Prunus emarginata*), Pacific crabapple (*Malus fusca*), and Indian plum (*Oemleria cerasiformis*).
- Choose native flowering plants with an eye toward providing a wide range of bloom times, and providing food for birds (berries and seeds).

4.2.11 Additional Actions

- Increase the population of yellow sand-verbena to provide habitat for Oregon plant bug.
- Utilize citizen-science based volunteer groups to monitor avian diversity and abundance; baseline data for Beaver Creek Natural Area has already been collected. Data from Ona Beach and adjacent parcels would build a better understanding of existing conditions. Continued monitoring of established points will illustrate how restoration efforts are affecting songbird populations.
- Utilize citizen-science based volunteer groups to monitor amphibian breeding populations in emergent marsh habitats; integrate with the interpretive program.
- Install woodland bird species nest boxes to supplement cavity nesting species where Snags are not common.

- Preserve Snags, especially large Snags, unless they pose an imminent hazard.
- Increase forest floor complexity by retaining downed limbs and Snags.
- Avoid trails in riparian areas; design or relocate trails so they do not run parallel to water areas. Utilize spur trails or small diversions to provide river and marsh views.
- Work with partners to establish conservation easements with neighboring properties to increase connectivity and reserve area and parcels.

4.3 Recommended Work Periods

Recommended Work Periods	**Avoid Disturbance**
Ground Vegetation Removal *September – February*	Songbird nesting season: April – July Pollinator nesting: March – August
Tree and snag removal *August – January*	Raptor and owl nesting season January – August
In-water Work Period *July 15-August 31*	Salmonid spawning and migration

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APPENDIX A - METHODOLOGY

Data and analyses for this document were conducted by using remote sensing, existing databases, interviews with park staff, and field assessments. After potential wildlife species, habitat types, and surrounding landscape data were collected, the site was evaluated for desired future habitat. This was determined based on rarity of present wildlife species, rarity of wildlife habitat types in the landscape, likelihood of attracting at-risk species, feasibility of restoring habitats, existing site conditions, and locally important management goals. Desired future habitat conditions were then used to develop wildlife value ratings for use in the natural resource comprehensive map that directly feeds into the Comprehensive Plan for Beaver Creek Natural Area, Ona Beach State Park, and the associated parcels.

Existing data provide a loose framework to determine wildlife management strategies; however, development of specific wildlife management actions will require additional surveys. Survey needs will be determined based on adaptive management strategies, focal wildlife species, and consultation with United States Fish and Wildlife Service (USFWS), ODFW, and other local groups. Restoration projects should conduct baseline surveys for focal species prior to project initiation as well as after the project is completed to assess how the project affected the functioning ecosystem.

EXISTING INFORMATION

Historic and current wildlife data was retrieved from the Oregon Biodiversity Information Center (ORBIC) Natural Heritage Database (ORBIC 2011), Rare, Threatened and Endangered Species of Oregon (ORBIC, 2010), eBird (eBird 2011), Oregon Department of Fish and Game (ODFW) Oregon Conservation Strategy (ODWF 2006). In addition, OPRD biologists collected vegetation data, described in the Vegetation Inventory and Botanical Resource Assessment for the Beaver Creek (Bacheller 2011).

GENERAL ASSESSMENT

Data collection consisted of walking the existing trail system; however an assessment of the entire Recreation Area has not been conducted. Wildlife observations and sign were noted. Vanessa Blackstone (OPRD Wildlife Biologist) conducted site visit on July 11 and 20, September 23 2011; August 28, October 9, November 14, 2012; January 10, 15, and 20, February 3, 17, and 18 2013. Additional wildlife observations were collected from park staff.

DETERMINING DESIRED FUTURE HABITAT

After potential wildlife species, habitat types, and surrounding landscape data were collected, the site was evaluated for desired future habitat. This was determined based on rarity of present wildlife species, rarity of wildlife habitat types in the landscape, likelihood of attracting at-risk species, feasibility of restoring habitats, existing site conditions, and locally important management goals.

WILDLIFE VALUE RATINGS

Wildlife value ratings were developed for use in the composite natural resources map utilized in the Comprehensive Plan process. Wildlife values were generated based on the wildlife condition, defined by the desired future habitat condition (see Section 2.3), and a potential disturbance index. Each vegetation community was assessed for current and future conditions and assigned a value:

1 – High wildlife value, avoid disturbance and preserve
2 – Medium wildlife value, restoration actions recommended
3 – Marginal wildlife value, restoration actions possible
4 – Low wildlife value

Generally speaking, the higher the wildlife value, the compatible the area is for development of facilities. Lower wildlife values correlate with increased importance to wildlife. Special designations, such as a State Natural Area, were captured in the botanical suitability analysis, and are represented in the Vegetation Inventory and Botanical Resource Assessment for the Beaver Creek Natural Area Property (Bacheller, 2012).

Wildlife condition designations were derived by ranking each wildlife habitat community for desired future condition, the quality of the habitat based on the botanical resource assessment, and seral stage. Wildlife condition designations are as follows:

- Condition D (Desired): Habitat type represents the Desired Future Habitat
- Condition F (Feasible): Habitat type will achieve the Desired Future Habitat without management actions within 10 years
- Condition M (Marginal): Feasible restoration efforts would change the habitat to the Desired Future Habitat within 10 years
- Condition Other (O): Other habitats in good quality that are not a management target
- Condition Poor (P): Desired Future Habitat will not be met within 10 years

Table 7. Wildlife condition values based on botanical assessment and desired future conditions

	Botanical Quality	
Habitat	**Excellent, Good** ***E, G***	**Marginal, Poor** ***M, P, U***
Bare ground, Developed, Plantation, Shore pine	Poor	Poor
Beach, Cascara, Dunes, Foredune, Shrubland	Other	Other
Emergent Marsh	Desired	Feasible
Douglas-fir Forest *Young to Mid-aged*	Marginal	Marginal
Grassland	Feasible	Marginal
Hemlock forest	Desired	Marginal
Red alder forest	Feasible	Marginal
Riparian shrubland	Desired	Desired
Sitka spruce forest *Late seral*	Desired	Desired
Sitka spruce forest *Mature to young*	Feasible	Marginal

Potential disturbance index was generated using GIS spatial analysis and land use patterns. GIS analysis was utilized to rank habitat areas based on density of travel systems, such as trails, roads, and parking areas. While species have different tolerances to disturbances based on the type of activity, duration, etc., this basic ranking indicates areas furthest from potential sources of disturbance. The resulting output was manually assessed for vegetation and topographical adjustments as well as land use patterns adjacent to the park; for example, an agricultural field would constitute a higher disturbance than a wildlife refuge.

Final wildlife values were determined by inputting desired future condition ratings and according to the following matrix:

	Density Index		
Condition	**Low**	**Intermediate**	**High**
Desired (D)	2	2	2
Feasible (F)	2	2	3
Marginal (M)	2	3	3
Other (O)	3	3	3
Poor (P)	4	4	4

Some deviations from the matrix were made due to known wildlife needs. Grassland habitats in Beaver Creek Natural Area were scored as 3 rather than 4 due to current use by elk herds in the area for calving and browse. Potential marbled murrelet habitat was assessed via LiDAR, and scored as 1 given the needs of this threatened species. Some areas were downgraded after field visit assessments to verify the vegetation modeling.

Determining Wildlife Reserves

Recreation can negatively impact wildlife due to human disturbance effects (Reed and Merenlender 2008, Miller et al. 1998l see Section 3.5.2). Establishing a reserve area where disturbance is reduced relative to the surrounding areas would give wildlife a safe place to retreat where disturbance from recreating visitors is lowest in the park. Areas with potential to act as wildlife reserves were evaluated for potential disturbance index, habitat quality, and current wildlife use. Areas with the lowest potential disturbance index were selected as possible reserve areas; habitat quality and current wildlife use were used to refine and prioritize reserve areas.

Wildlife Survey Methodology

Citizen Science Point Count Methods

Each count began around 8:00 AM on Saturdays from January 2011 through December 2011. The park ranger leading the event signed in volunteers, explained the protocol, and shared identification tips in a short interpretive program. The group then walked to each point. Upon arrival, all birds heard or seen were documented for a total of 6 minutes. Weather information was also documented. Any bird species observed in between surveys were listed only if they had not been documented during a survey. This was done to build as complete of a species presence list as possible. Even so, some fairly common species such as Bewick's wren, were not observed during the surveys. This error could be due to the wide range in observer training and skill. Therefore, undocumented species should not be interpreted as complete absence.

The checklist resulting from these surveys was derived from the raw counts of birds observed during each season, basing methodology on USGS, but based more on how many times a species was seen rather than specific numbers. Seasons were defined by month, as follows:

- Fall: September, October, November
- Winter: December, January, February
- Spring: March, April, May
- Summer: June, July, August

Abundance categories are defined as follows:

- **A** = Abundant: "Very numerous"
    - More than 5 individuals observed/day in appropriate habitat OR
    - Observed more than 24 times
- **C** = Common: "Certain to see in suitable habitat"
    - Between 2-5 individuals observed/day OR
    - Observed 12 times
- **U** = Uncommon: "Present"
    - Between 1-2 individuals observed; can be seen daily, but may be secretive OR
    - Observed between 3-11 times (seen often but not always)
- **O**= Occasional: "Seen a few times during the season" Seen a few times during the season, even in great numbers, but not always present
- **R** = Rare: "every 2-5 years". Once per season
- **UD** = Undocumented in this season

After assigning categories, the data was "common sense checked" by local birders and park staff. The following adjustments were made:

- Bufflehead: downgraded to uncommon (winter) due to irregularity
- Green-winged teal: downgraded to uncommon (winter) due to irregularity
- Northern shoveler: downgraded to uncommon (winter) due to irregularity
- American wigeon: downgraded to uncommon (winter) due to irregularity
- Northern pintail: downgraded to uncommon (winter) due to irregularity
- Osprey: upgraded to common (spring)
- Belted kingfisher: upgraded to common (fall)
- Bushtit: downgraded to uncommon (winter) due to irregularity
- Bewick's wren: added to the checklist as common (spring and summer); this categorization is based on anecdotal information
- Spotted towhee: upgraded to common (fall)

LENTIC AMPHIBIAN METHODS

The survey protocol was adapted from Portland Metro Regional Parks and Greenspaces' "Amphibian Egg Mass Monitoring Protocol", utilizing a ***visual encounter*** technique: conduct visual surveys within assigned transects, keeping track of the amount of time spent actively searching for egg masses (e.g., not including time spent writing data as search time). Due to its size, 11 survey areas were established to represent the different vegetation types within the emergent marsh and stream (Figure 4). Data collected included habitat variables (emergent and submergent vegetation cover, weather, subsurface water visibility), egg mass species, stage, attachment vegetation, and depth of egg mass from both the surface and substrate.

Survey Protocol was as follows:

1. **Two observers will survey each transect**
2. Visit your assigned transect. Each transect end is marked with flagging and noted on the map.
3. Write date of survey, monitors' initials, and the transect ID on the data form.
4. Pick one transect end to begin the survey; conditions such as wind direction, precipitation, and lighting may help you determine which side is best to start.
5. **Determine who will be Observer 1 and who will be Observer 2**. Observer 2 records data. Observer 2 should also look for egg masses around Observer 1 and mark them down in the Obs2 column of the data sheet. These methods are from "Double-observer approach to estimating egg mass abundance of pool-breeding amphibians" in Wetlands Ecology and Management (2005)13:305-320
6. **Start stopwatch/chronometer function on watch**, record Start Search Time on datasheet.
7. Move slowly and methodically through study area, walking from one end of the unit to the other. Do not pass back through the transect area; once disturbed, the bottom sediment clouds visibility.
8. Move slowly enough to prevent stepping on egg masses and to avoid stirring sediment.
9. **If an egg mass is encountered, stop the clock** and document stage, attachment, water depth from the bottom and surface, approximate percent vegetation coverage within a meter, take GPS coordinate if needed, and any comments
10. **Restart stopwatch when search resumes.**
11. Once the transect is complete:
    - Mark the end time (equal to total search time) showing on your stop watch in the box entitled "Total Search Time".
    - Mark the real time (AM/PM time) in the box entitled "End Time".
12. Rate Subsurface visibility as : Poor=less than one foot down, Fair=less than two feet, Excellent=greater than two feet
13. Record transect variables. Circle if forest, shrubs, or aquatic vegetation is present in the transect, record the maximum depth, and estimate the percent of the transect covered in emergent vegetation
14. Record any weather, disturbance, sheen, or other information in field notes.