BELLEVUE CRITICAL AREAS UPDATE
BEST AVAILABLE SCIENCE PAPER: WILDLIFE

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I. INTRODUCTION

In 1995, Washington State's legislature added a new section to the state's Growth Management Act (GMA) to ensure that reliable scientific information is considered when adopting policies and regulations to designate and manage critical areas. The new section, RCW 36.70A.172, requires all cities and counties in the state to include "best available science" in developing policies and regulations to protect the functions and values of critical areas. In addition, WAC 365-190-080 states that cities may consider protecting riparian habitat, creating habitat linkages, and establishing buffer zones to protect habitat and manage the effects of human activities on fish and wildlife habitat.

In 2000, the state's Office of Community Development (OCD) adopted procedural criteria to implement changes to the GMA and provide guidance for identifying best available science. This report has been prepared to comply with these procedural criteria and includes a review of available peer-reviewed research, inventory reports, assessments, and other sources of scientific information relevant to wildlife habitat in Bellevue. The purpose of this report is to summarize and discuss the best available science relating to the functions and values of wildlife habitat, including habitat for "special status" species (see Chapter 6.0 of the preceding Wildlife Inventory). Streams and habitat for anadromous fish are addressed in a separate report. This report also discusses both the opportunities and constraints of managing wildlife in urban environments such as Bellevue. This review supplements the inventory of Bellevue's wildlife habitat included in the preceding section. Together, the City of Bellevue and its citizen advisory committee will consider these reports and findings when developing policy recommendations for the stewardship of wildlife habitat conservation areas in the City.

II. WILDLIFE HABITAT TYPES AND SPECIES REQUIREMENTS

As discussed in the inventory report, wildlife habitat types in Bellevue include the following general categories:

- Westside riparian wetlands;
- Westside lowland conifer/hardwood forest;
- Herbaceous wetlands and open water; and
- Agriculture and urban environs (agriculture, pasture, and mixed environs; and urban and mixed environs).

Outside of vegetated habitat patches and linkages, Bellevue's current landscape matrix is urban in character, comprised primarily of residential development, both single-family and multi-family, and secondarily of commercial development. Within this matrix, a few large blocks of westside lowland forest remain; habitat linkages between these blocks, where they exist, are predominantly comprised of westside riparian-wetland habitat. Open water and herbaceous wetland habitats in the City are mostly associated with lakes. Agricultural habitats consist of scattered berry farms and pastures.

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In general, wildlife species require adequate **forage**, **water**, **structure,** and **space** for breeding/nesting, roosting, and for cover (Johnson and O'Neil, 2001; Link, 1999). Urban development can affect these basic requirements by causing:

- Habitat loss and fragmentation;
- Loss of habitat connectivity necessary for dispersal;
- A substantial increase in impervious surface, which affects surface water runoff;
- Increased human activity; and
- Other potential effects listed in Chapter 3.0 of the inventory (Ferguson et. al 2001; May and Horner, 2000; Arnold and Gibbons, 1996).

Like all urban areas in the Puget Sound region, roads are a significant feature of Bellevue's landscape matrix. Road systems are an important feature that influence wildlife species distribution on the landscape (Ferguson et al., 2001). Roads can create barriers to wildlife movement, fragmenting habitat, and facilitating the spread of non-native plant and animal species (Ferguson et al., 2001).

Due to the high level of disturbance to soil and vegetation in agricultural and urban habitats, habitats in urban areas like Bellevue support more "generalist" species and are more prone to invasion by non-native, invasive plant and animal species (Edge, 2001; Ferguson et al., 2001). This is unlike species adapted to particular habitat types ("specialist" species). Generalist species can use a variety of vegetation cover types for breeding and foraging and include both native and non-native species tolerant of human disturbance. In contrast, many specialist species require specific habitat characteristics that are either limited or no longer present in developed landscapes.

While Bellevue's urban character limits habitat for several specialist species, the City does provide habitat for several "special status" species as discussed in the inventory report. The potential effects of urban development on these "special status" species in Bellevue and management considerations for these species are discussed below.

III. SPECIAL STATUS SPECIES

Overview

As discussed in the inventory report, up to 19 special status wildlife species-- including endangered, threatened, proposed, candidate, sensitive, and monitor species-- may live in Bellevue during one or multiple life stages (WDFW, 2002; Smith et al., 1997; Leonard et al., 1993; Hunn, 1982; Christy and West, 1993; City of Bellevue, 1990; Johnson and O'Neil, 2001; Brookshire, personal communication, 2002; Jennings, e-mail communications, 2000-2002; Thompson, personal communication, 2002; Tirhi, personal communication, 2002). Of these 19 species, breeders or resident species include 9 birds. The other 10 species are migrants, are rare, or have likely been extirpated from the City and include three birds, four mammals (bats), two

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amphibians, and one reptile. The discussion below focuses on management recommendations for the 9 bird species that occur or are most likely to live in Bellevue.

Habitat Elements/Values Supporting Special Status Species

Like all wildlife species, each of these 9 special status wildlife species requires adequate forage, water, structure, and space for breeding/nesting, roosting, and cover (see Table 1 in the inventory). Their ability to survive in the remaining fragmented habitat areas in Bellevue depends on the presence of and their specific requirements for forage, water, and structure. The regular nesting and roosting sites of special status species are considered priority habitat by the Washington Department of Fish and Wildlife (WDFW), and the agency has published recommendations for managing breeding and foraging habitats for all of these species except for martin and green heron (Watson and Rodrick, 2002; Rodrick and Milner, 1991; Quinn and Milner, 1999; WDFW, undated). These recommendations are included in Appendix BAS-WL-1 and summarized in Table 1 below.

As discussed in Table 1, most of the special status bird species likely live in Bellevue require large, mature trees or other replacement structures (i.e., platforms for osprey, boxes for purple martins) for nesting and roosting. Other findings include the following:

- Pileated woodpecker, Vaux's swift, merlin, and purple martin nest in cavities and require standing dead or partially dead trees, or artificial structures.
- Bald eagle, peregrine falcon, great blue heron, red-tailed hawk, and osprey nest in the canopy of large trees, on cliffs, or on tall platforms.
- Bald eagle, great blue heron, osprey, purple martin, and green heron nest near open water.

Other special status species not listed in Table 1 that may occur in Bellevue but have not been documented as present also require certain structural habitat elements and the presence of open water for breeding, foraging, and cover. These include the following:

- Bat species (western big-eared, Keen's myotis, long-legged, and long-eared bats) use structures such as large trees, buildings, caves, and abandoned mines for roosting and breeding (Christy and West, 1993).
- The common loon and western grebe breed and forage in herbaceous wetland and open water habitat.
- Special status amphibians (Oregon spotted frog and western toad) require open water and herbaceous wetlands for breeding.
- The western pond turtle requires undeveloped land near open water for nesting (Leonard et al., 1993).

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Table 1. Special Status Species Likely to Occur as Residents or Breeders in Bellevue: Summary of Breeding and Foraging Habitat and Management Recommendations

Species	Breeding Habitat and Protection Recommendations	Foraging and Cover Requirements and Protection Recommendations	Presence in Bellevue
Bald eagle	Breeding Habitat: Tall (85-145 feet) trees within 0.25 mile of major water bodies Recommendations: Maintain mature trees near water bodies for nesting and roosting habitat, limit human disturbances such as urban development and tree removal along shorelines, limit human activities near known nest sites during the breeding season.	Forage/Cover: Forage primarily on fish, waterfowl, and seabirds; require tall trees for perching near open water foraging sites. Recommendations: Maintain large trees near open water foraging sites for perching, protect patches of shoreline forest including both live and dead trees.	Recent nest site near Chism Park adjacent to Lake Washington. Other nest territories in the vicinity of the Lake Washington and Lake Sammamish shorelines.
Pileated woodpecker	Breeding Habitat: Nest trees are mostly tall (> 87 feet) standing dead trees (snags) > 27 inches diameter at breast height. Recommendations: Retain large snags in forest habitat areas; where snags are lacking, top live trees or inoculate them with fungus above nest height.	Forage/cover: Forage for insects on large snags, logs, and stumps. Recommendations: Retain large snags, logs, and stumps in various stages of decay in forest habitats. Limit insecticide use and promote biological insect control.	Pileated woodpeckers and their foraging signs have been observed in forested habitats in Bellevue.
Vaux's swift	Habitat: Nests and roosts in cavities of large hollow snags or broken tops of live trees in forest habitats. Recommendations: Retain mature forest patches, large snags, and large, partially dead trees in younger forest habitats.	Forage/cover: Forage on flying insects in forest habitats. Recommendations: Retain mature forest patches.	Most likely to occur in larger tracts of forest habitat such as those in the Lewis Creek and Small Lake Sammamish Tributary basins.
Purple martin	Breeding Habitat: Nest natural and human-made cavities, usually in colonies Recommendations: Retain snags and old pilings in lakes, in forest openings, and along forest edges. Locate nest boxes near water or wetlands within 10 miles of existing colonies.	Forage/cover: Forage on flying insects in open areas. Recommendations: Avoid applying insecticides within 7.5 miles of martin nesting colonies.	The closest known nesting martins are located at the north end of Lake Sammamish. There are opportunities to attract purple martins to the Mercer Slough area by installing and monitoring next boxes.
Merlin	Breeding habitat: Nests in tree cavities and in old nests of crow, raven, hawk, etc. Recommendations: No specific WDFW management recommendations available.	Forage/cover: Forage on a variety of bird, mammal, reptile, amphibian, and insect species. Recommendations: No specific WDFW management recommendations available.	Rare in Washington State, although they have been sighted in the Bellevue area.

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Table 1. Continued

Species	Breeding Habitat and Protection Recommendations	Foraging and Cover Requirements and Protection Recommendations	Presence in Bellevue
Great blue heron	Breeding habitat: Nests in colonies in tall trees near open water and wetland habitats. Recommendations: Site-specific management plans are recommended for known nesting colonies. In the absence of such a plan a permanent, year-round minimum protective buffer of 820 to 984 feet around a colony is recommended. Protecting alternative forest nesting habitat at least 10 acres in size is also recommended.	Forage/cover: Forage on a variety of animals in shallow water and on insects, mice, and voles on land. Recommendations: Avoid the use of insecticides and herbicides in nesting or foraging habitat unless it has been shown to have no effect on great blue herons or their forage.	An active great blue heron colony is located in Mercer Slough.
Green heron	Breeding habitat: Nests in colonies in trees or shrubs near open water and wetland habitats. Recommendations: No specific WDFW management recommendations available.	Forage/cover: Forages on small fish and invertebrates in shallow water. Recommendations: No specific WDFW management recommendations available.	Breeding and foraging habitat present in Mercer Slough, where they have been observed.
Osprey	Breeding habitat: Usually nest near large water bodies in tall live or dead trees, or on constructed platforms. Recommendations: Restrict human activities within 660 feet of any active osprey nest from April 1 to October 1. Retain trees within 200 feet of a nest. Retain alternate nesting trees within 660 feet of active nest sites. Artificial platforms may be useful as mitigation for loss of a naturally occurring nest site.	Forage/cover: Forages on live fish captured at or near the water's surface. Recommendations: Avoid use of pesticides such as organochlorines or other chemicals such as rotenone in watersheds used by ospreys.	Active nest site at Meydenbauer Marina.
Red-tailed hawk	Breeding habitat: Nest in tall trees in forest habitats. Recommendations: Preserve the nest tree and other tall trees in at least one acre of the forest patch. Restrict activities such as clearing, grading, or construction within 650 feet and less intrusive activities such as walking and driving within 325 feet of a nest site from February 1 through July 31.	Forage/cover: Forage mainly on small mammals and snakes in open areas. Recommendations: Preserve fields for foraging and tall perch trees adjacent to forests with known nests or potential nesting habitat.	Foraging and nesting habitat present in Bellevue. Red-tailed hawks have nested in Kelsey Creek Park and near Phantom Lake.

Source: (Watson and Rodrick, 2002; Rodrick and Milner, 1991; Quinn and Milner, 1999; WDFW, undated.; Smith et al., 1997; Terres, 1995; Tirhi, personal communication, 2002; Thompson, personal communication, 2002).

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IV. FUNCTIONS AND VALUES OF HABITAT TYPES IN BELLEVUE

Wildlife Habitat Function of Westside Riparian/Wetlands

As discussed in the best available science paper for streams, riparian areas perform multiple functions by attenuating floodwaters, improving water quality, moderating stream water temperature, contributing to channel complexity, and supplying large woody debris (Spence, 1996; Knutson and Naef, 1997; Castelle and Johnson, 2000; Brazier and Brown, 1973; Ecology, 2001; Naiman et al., 1992; Swales and Levings, 1989).

Riparian areas also function by providing habitat to a large number of different wildlife species. Generally, wildlife species abundance and diversity is higher in riparian-wetland habitat than in other habitat types because these areas generally provide:

- Structural and plant diversity;
- Edge habitat where two or more habitat types adjoin;
- Varied forage; and
- A predictable water source (Kauffman, et al., 2001; O'Connell et al., 2000).

In addition to salmonids, many other special status species also depend on high quality riparian areas for forage and structure. As discussed in the stream best available science paper, high quality riparian areas generally include native vegetation with multi-canopy structure, snags, and down logs provide that habitat for the greatest range of wildlife species (McMillan, 2000). According to Table 1 in the inventory, all of the special status species are closely or generally associated with westside riparian-wetlands or open water habitats, and most are associated with both of these habitat types (Johnson and O'Neil, 2001). Much of the remaining habitat structure for nest and roost sites and productive areas for forage for status species in Bellevue are located in riparian areas. In addition, special status species in Bellevue generally forage on riparian-dependent species such as insects, stream dwelling invertebrates, and juvenile fish.

Salmonid species are often considered to be a "keystone" species in riparian/wetland habitats in that they serve an important role in nutrient cycling in these habitats as well as other habitat areas. As a result, many of the other special status species in Bellevue share food web and nutrient cycling connections with salmonids and the streams they inhabit. Two special status species that live in Bellevue, the bald eagle and the osprey, have a particularly strong, consistent relationship with salmonids because they forage regularly on salmon in riparian/wetland habitats. Great blue heron, western grebe, and common loon forage on juvenile salmon. Several other special status species including bats and purple martin prey on insects that feed on salmon carcasses, while peregrine falcons prey on waterfowl and shorebirds that feed on salmon (Cederholm et al., 2001).

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Wildlife Habitat Function of Westside Lowland Hardwood/Conifer Forest

Prior to agriculture and urban development, westside lowland conifer-hardwood forest was the most common habitat type in the City of Bellevue. Today, some of the most extensive tracts of lowland forest in Bellevue are located on steep slopes and/or in riparian areas. Lowland forest, when it includes large trees and dead tree snags, provides important foraging and breeding habitat for several special status species, most notably for bald eagle, pileated woodpecker, and Vaux's swift (Table 1). In addition, native forest provides habitat for more than 130 other non-special status bird, mammal, amphibian, and reptile species (Johnson and O'Neil, 2001). Several key features in forests are important for wildlife and include large trees, the species composition of trees and shrubs, dead wood, and forest litter layers. These key structures should be managed to provide vertical structure and cavities, food resources, and substrates for cover and for burrowing species (McComb, 2001).

In Bellevue, these areas also provide habitat linkages that connect larger habitat tracts. In addition, as discussed in the Geologically Hazardous Areas inventory and the streams inventory, regulatory and non-regulatory strategies to protect native forest soils and vegetation in steep slope areas can serve multiple functions including but not limited to preventing erosion, protecting public safety, and improving water quality.

Wildlife Habitat Function of Herbaceous Wetlands/Open Water Habitat

Herbaceous wetland and open water habitats in Bellevue are concentrated in the Kelsey Creek basin, and in the vicinity of Lake Washington and Lake Sammamish. Mercer Slough is a regionally significant habitat area in terms of wildlife species diversity and abundance (City of Bellevue, 1990). Herbaceous wetland and open water habitats provide important breeding and foraging opportunities for all of the special status species, some of which are known to occur in Bellevue and others which are rare or may be extirpated (Watson and Rodrick, 2002; Rodrick and Milner, 1991; Quinn and Milner, 1999; Smith et al., 1997; Terres, 1995; Leonard et al., 1993; McAllister and Leonard, 1997). In addition, more than 130 non-status wildlife species forage or breed in herbaceous wetland habitats, while over 70 forage or breed in open water habitats (Johnson and O'Neil, 2001). The characteristics and presence of open water and herbaceous wetland habitats depend upon hydrology, chemical reactions in wetland soils, vegetation community composition, and other factors influenced by human and other animal inputs (Mitsch and Gosselink, 1993). Herbaceous wetlands have decreased in size in this region with less beaver activity, and they are highly susceptible to invasion by non-native invasive species (Johnson and O'Neil, 2001). Surface water hydrology including seasonal flooding and drying (not erratic water level changes) and the presence of relatively undisturbed native plant communities are important for wildlife in open water and herbaceous wetland habitats (Weller, 1994).

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Wildlife Habitat Function of Agricultural and Urban Environs

Bellevue contains remnant patches of agricultural land, including grazed pastures and berry farms. Much of the remaining City outside of forests, riparian areas, and wetlands has been developed for residential or commercial uses. Agricultural and urban habitats in Bellevue are largely occupied by generalist species that are adapted to use a variety of habitats for foraging and breeding (Ferguson et al., 2001; Hunn, 1982; City of Bellevue, 1988; City of Bellevue, 1985). Of the special status species that occupy Bellevue, only the red-tailed hawk is closely associated with agriculture, pasture, and mixed/urban environs due to the preference of this species to forage in open fields (Johnson and O'Neil, 2001; WDFW, undated; Terres, 1995). In general, these habitats types generally do not contain the required structure, forage, and space needed for specialist species (e.g., Swainson's thrush, winter wren, mink, northwest salamander), including special status species, that are adapted to native habitats (Edge, 2001; Ferguson et al., 2001).

V. WILDLIFE HABITAT LINKAGES, ISOLATION AND FRAGMENTATION

Wildlife habitat linkages are linear strips of habitat that link larger habitat areas. These areas provide enough food, structure, and water for some wildlife species to live in the linkage area, while others use these areas to move from one habitat area to another. In urban areas where habitats are fragmented and isolated by development and roads, linkages that connect larger tracts of more diverse habitat are especially important (Adams, 1994; Adams and Dove, 1989; MacClintock et al., 1977). Riparian areas and forested steep slopes, which comprise most of Bellevue's remaining habitat linkages, provide habitat for species moving between foraging areas, breeding areas, and seasonal ranges, and they can provide habitat for the dispersal of young animals (Knutson and Naef, 1997; O'Connell et al., 2000; Spence, 1996).

As discussed in the inventory report, potential and existing habitat linkages in Bellevue encompass riparian areas and forested steep slopes on private and public lands, parks, open space, and trail corridors. Major roads and urban development, however, interrupt even the most substantial (widest) habitat linkages in Bellevue. Roads can be partial or complete barriers to terrestrial wildlife movement, especially to slow moving species such as turtles and salamanders (USDOT, 2000; Ferguson et al., 2001). Primary habitat linkages in Bellevue include the Kelsey Creek, Coal Creek, and Lewis Creek riparian areas—these areas connect to habitat along Lake Washington and Lake Sammamish, and to the Cougar Mountain Regional Wildland Park. Other smaller linkage areas connecting smaller habitat tracts include the numerous vegetated riparian areas and steep slopes throughout the City.

Linkage Width and Patch Size

Adequate habitat linkage widths and habitat patch sizes depend on many factors including but not limited to:

- The type of animal species using the area;

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- The vegetation type and structure; and
- The surrounding land use patterns (Adams, 1994; Adams and Dove, 1989; Johnson and O'Neil, 2001; Edge, 2001; Ferguson et al., 2001; O'Connell et al., 2000).

Maintaining forested riparian-wetland buffers would benefit many of the special status species and many other native wildlife species in Bellevue, especially amphibians and small mammals (Watson and Rodrick, 2002; Rodrick and Milner, 1991; Quinn and Milner, 1999; Richter and Azous, 2000a, 2000b). Forested steep slopes also provide habitat linkage areas. For example, studies have shown that neotropical bird abundance increases in habitat linkage areas that are at least 100 feet wide. However, larger widths, 100 to 330 feet, are required for sustaining migratory bird breeding habitat and for the movement of larger mammals such as deer and bear (Petit, 1994). In general, recommended riparian buffer widths for sustaining various wildlife species range from 30 to 650 feet depending on species requirements (Spence, 1996; Petersen et al., 1992; Mudd, 1975; Dickson, 1989; Castelle et al., 1992; Rudolph and Dickson, 1990; Allen, 1983; Jones et al., 1988). According to Knutson and Naef (1997), recommended riparian habitat area widths range from 150 feet to 250 feet depending on the stream type and conditions; these recommended widths incorporate the protection of multiple functions, including habitat for a range of wildlife species. A selection of riparian buffer studies and associated recommended buffer widths for wildlife habitat is provided in Appendix BAS-WL-2.

Wildlife species diversity has been shown to increase as habitat patches increase in size (Adams and Dove, 1989; Adams, 1994). Forest dwelling birds may be more vulnerable to predation and nest parasitism within 328 feet of a forest edge (Robbins, 1991). The center of a square 10-acre forest tract would be within 328 feet of the edge on all four sides (Adams, 1994). WDFW recommends that forest stands 10 acres or larger be protected near great blue heron colonies to preserve alternate colony sites near existing colonies and heron foraging areas (Quinn and Milner, 1999). Others have recommended that the optimum minimum area for managing a diversity of land vertebrates in urban habitat areas be no less than 50 acres in size (Vizyova, 1986; Tilghman, 1987).

Habitat Quality in Linkage and Patch Areas

In addition to width or size of the linkage or patches, the habitat quality and human disturbance levels found in linkage areas and in larger habitat patches also determine which species are most likely to use these areas. Human activities that degrade wildlife habitat by altering native vegetation communities and introducing non-native, invasive species include agricultural activities, understory clearing, and urban development (Adams, 1994; Adams and Dove, 1989; Edge, 2001; Ferguson et al., 2001). Human activities such as hiking and bird watching that are limited to trails and that do not alter native vegetation communities are generally less disturbing to native wildlife populations (Ferguson et al., 2001).

In addition to linkage width and patch size, the required types and quality of habitat linkages and patches will vary by species. Even relatively common species in Bellevue can have very different tolerances to human disturbance and different requirements for food, water, and structure. Generalist species such as the common crow, black-capped chickadee, song sparrow, raccoon, and Norway rat thrive in urban landscapes. Other species known as habitat specialists,

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such as the winter wren and the pileated woodpecker, require larger tracts of native forest habitat for adequate forage and nesting sites. Unless habitat linkage areas contain adequate structure and forage for status species (e.g., large snags and logs for foraging pileated woodpeckers), these areas are more likely to be inhabited and used for movement by more common generalist species such as the American robin, Virginia opossum, garter snake, Pacific tree frog, and big and little brown bat. Even if habitat features that are preferred by specialist species are added to an urban landscape, their use might be limited by human disturbance, a lack of native vegetative cover, or a lack of space (Klaus and Azous 2000a, 2000b; Adams and Dove, 1989; Adams, 1994; Watson and Rodrick, 2002; Rodrick and Milner, 1991; Quinn and Milner, 1999).

VI. WILDLIFE HABITAT PROTECTION AND RESTORATION STRATEGIES

Protecting the highest quality habitats in Bellevue, for example the well-established forest habitat on the slopes above Lewis Creek, is one of the most effective strategies for protecting wildlife habitat. Protection efforts can be focused on protecting intact, native forest habitats because these habitats are not easily replaced; for example, it would take at least 50 years to restore the structure and function of a forest such as the one present on the slopes above Lewis Creek.

Changes to forest structure drive the composition of wildlife communities that live in Western Washington habitats (Brown, ed. 1985). In upland and riparian habitats, the goal of enhancement could be to improve forest structure. For long-term success this means planting native trees and shrubs to begin a project, continuing with regular monitoring and maintenance, and then planting shade tolerant ground cover to complete the forest vegetation community. Initially, native grasses are usually seeded as ground cover at restoration sites, until a forest and shrub canopy is established to provide shade for native herbs such as sword fern, deer fern, and youth-on-age. For greater short-term success, upright snags, downed logs, brush piles, and other structural habitat elements can be added where they are lacking to provide habitat structure.

VII. WILDLIFE HABITAT CONSERVATION APPROACH

The City of Redmond has drafted several comprehensive plan policies and regulations contained in the Redmond Community Development Guide (RCDG) designed to protect wildlife and wildlife habitat with a focus on "critical habitat" (Appendix BAS-WL-3). The City proposes to protect critical habitat and habitat linkages using a combination of regulatory and non-regulatory tools. In their sensitive areas regulations, Redmond defines critical habitat as habitat for species that are proposed or listed by the federal government or Washington State as endangered, threatened, sensitive, monitor, or priority species. Critical habitat also includes areas with heron rookeries or raptor nesting trees; Type I wetlands; and Class I streams (RDGC 20D.140.10-070). Although other sensitive areas such as wetlands, streams, and steep slopes were identified on Redmond maps in the early 1990s, critical habitat had not been identified, leading to uncertainties in the development review process.

In 2000, the City of Redmond commissioned a wildlife habitat study to identify potential critical habitat and important habitat linkages for the City. The study was intended to improve future

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planning and to allow the City to become eligible for state grants related to wildlife habitat. The wildlife habitat report includes a list of policy and largely incentive-based conservation recommendations and a map of wildlife habitat recommended for protection. The recommendations and map are currently being used to revise the City's comprehensive plan language regarding wildlife habitat and make changes to development regulations.

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APPENDIX BAS-WL-1. MANAGEMENT RECOMMENDATIONS FOR SPECIAL STATUS SPECIES KNOWN TO OCCUR OR POTENTIALLY PRESENT IN BELLEVUE

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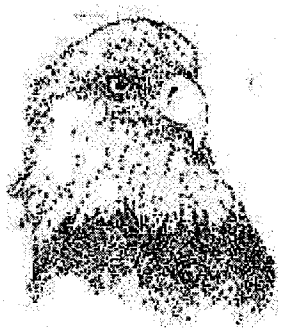
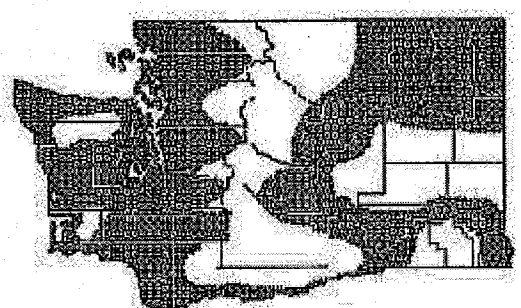


Bald Eagle
Haliaeetus leucocephalus

Prepared by James W. Watson and Elizabeth A. Rodrick

Note: In Washington, landowners who are pursuing land-use changes (e.g., tree-cutting, construction activities) in the vicinity of bald eagle nesting or roosting areas may be required to obtain management plans in order to ensure their new land-use activities comply with bald eagle protection laws. WDFW biologists are available to help landowners develop these management plans. A description of bald eagle management plans and the basic elements they address begins on page 6 of this document.

GENERAL RANGE AND WASHINGTON DISTRIBUTION



General range of the bald eagle, *Haliaeetus leucocephalus*, in Washington (Washington Department of Fish and Wildlife, unpublished data).

Bald eagles breed throughout most of the United States and Canada, with the highest concentrations occurring along the marine shorelines of Alaska and Canada. They winter throughout most of their breeding range, primarily south of southern Alaska and Canada (U.S. Fish and Wildlife Service 1986, Stinson et al. 2000).

In Washington, bald eagles nest primarily west of the Cascade Mountains, with scattered breeding areas along major rivers in the eastern part of the state. Wintering populations are found throughout the Puget Sound region, the San Juan Islands, Hood Canal, the Olympic Peninsula, and the upper and lower Columbia River and its tributaries. Major wintering concentrations are often located along rivers with salmon runs.

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STATUS AND RATIONALE

The bald eagle is a State Threatened species in Washington. It is vulnerable to loss of nesting and winter roost habitat and is sensitive to human disturbance, primarily from development and timber harvest along shorelines. However, bald eagle populations are recovering and have exceeded most target levels established by the Pacific States Bald Eagle Recovery Plan (U.S. Fish and Wildlife Service 1986, Stinson et al. 2001). Because of its recovery nationwide, the bald eagle is under review for removal from the Federal Threatened species list. In the event of Federal delisting, the bald eagle's status as a State Threatened species in Washington will also be reviewed. Stinson et al. (2001) recommends downlisting the bald eagle to State Sensitive if a change in status is warranted. Regardless of the bald eagle's future status, habitat protection will still be needed in areas where human population growth and development continue to reduce quality bald eagle habitat.

Washington's bald eagles are protected under state and federal law. State wildlife laws afford protection for individual birds, and the Washington Shoreline Management Act provides for some tree retention within 61 m (200 ft) of the shorelines of rivers and marine waters. However, the main protection for eagle habitat was authorized by the Washington State Legislature in 1994 (RCW 77.12.655: Habitat buffer zones for bald eagles -Rules). In addition, the Bald Eagle Habitat Protection Rule (WAC 232-12-292) was adopted in 1996 by the Washington Fish and Wildlife Commission. This rule provides for development of a Site Management Plan whenever activities that alter habitat are proposed near a verified nest territory or communal roost. Site Management Plans may be based on general recommendations from current research, or specific knowledge of individual eagles and their habitat, the surrounding land uses, and landowner goals (Stinson et al. 2001).

The U.S. Fish and Wildlife Service Pacific Bald Eagle Recovery Plan (1986) includes recommendations for managing habitat and human disturbance. Federal permits for projects that may affect bald eagle habitat must be reviewed by the U.S. Fish and Wildlife Service. The Service is developing new management guidelines to promote continued conservation of the bald eagle following its removal from the federal List of Endangered and Threatened Species. Contact the nearest U.S. Fish and Wildlife Service office for management consultation on federally-funded projects.

In 1940, concern over decreasing numbers of bald eagles in the contiguous 48 states prompted Congress to pass the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c). This act makes it illegal for persons to take, kill, harass, possess (without a permit), export or import, or sell any part, nest, or egg of a bald or golden eagle. A violation of the Act can result in fines of up to $250,000, imprisonment for up to two years, or both.

Bald eagles are also protected by the Migratory Bird Treaty Act of 1918 (U.S.C. 703-712), and until delisted in the lower 48 states, the Endangered Species Act of 1973, as amended.

HABITAT REQUIREMENTS

Breeding

Breeding Territories

Eagles defend breeding territories that include the active nest, alternate nests, preferred feeding sites, and perch and roost trees (Stalmaster 1987). Within a territory, snags and trees with exposed lateral limbs or dead tops are used as perches, roosts, and defense stations (U.S. Fish and Wildlife Service 1986). In Washington, breeding territories include upland woodlands and lowland riparian stands with a mature conifer or hardwood component (Grubb 1974, Garrett et al.

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1983, Watson and Pierce 1998). Territory size and configuration are influenced by factors such as breeding density (Gerrard and Bortolotti 1988), quality of foraging habitat, and the availability of prey (Watson and Pierce 1998).

Territories sometimes contain alternate nests. Grubb (1980) found that alternate nest trees in territories of Washington eagles were located an average of 350 m (1,050 ft) from occupied nests. Although it is unclear why bald eagles construct alternate nests, they may facilitate successful reproduction if the primary nest is disturbed or destroyed.

The 3 main factors affecting the distribution of nests and territories are: 1) nearness of water and the availability of food; 2) the availability of suitable nesting, perching, and roosting trees; and 3) the number of breeding-age eagles in the area (Stalmaster 1987). An adequate, uncontaminated food source may be the most critical component of breeding habitat for bald eagles (U.S. Fish and Wildlife Service 1980, Stalmaster 1987). Breeding eagles in Washington primarily consume live or dead marine and fresh-water fishes, and also waterfowl and seabirds. Secondary food sources include mammals, molluscs, and crustaceans (Retfalvi 1970, Knight et al. 1990, Watson et al. 1991, Watson and Pierce 1998).

Grubb (1980) found an average territory radius of 2.5 km (1.6 mi.) in western Washington. Home ranges of 50 pairs of bald eagles throughout Puget Sound averaged 6.8 km^2 (4.2 mi^2) (Watson and Pierce 1998). Ranges included areas occupied during occasional excursions beyond defended territories. Core areas of intense use averaged 1.5 km^2 (0.9 mi^2) in size. On the lower Columbia River, the mean home range size and minimum distance between eagle nests was 22 km^2 (13.6 mi^2) and 7.1 km (4.4 mi), respectively (Garrett et al. 1993). The distance eagles maintain between adjacent, occupied territories may be important for maintaining their productivity when food resources are limited (Anthony et al. 1994).

Courtship and Nest Building

In Washington, courtship and nest building activities intensify in January and February. Bald eagles commonly build large stick nests in mature trees, which are used over successive years. Eagles select nest trees for structure rather than tree species (Anthony et al. 1982, Anthony and Isaacs 1989). A typical nest tree is dominant or co-dominant within the overstory. It usually provides an unobstructed view of nearby water and has stout upper branches that form flight windows large enough to accommodate an eagle's large wingspan (Grubb 1976). It is usually live, though it often has a dead or broken top with a limb structure that supports the nest. Bald eagle nests are usually located within the top 7 m (20 ft) of the tree (U.S. Fish and Wildlife Service 1986).

Bald eagles prefer to nest along marine and freshwater shorelines. Approximately ninety-seven percent of Washington's active bald eagle nests are within 914 m (3000 ft) of a lake, river, or marine shoreline (Stinson et al. 2000). The average distance between these nests and open water varies slightly with shore type (marine: 140 m (457 ft), river: 133 m (433 ft), lake: 304 m (997 ft)). In examining 218 bald eagle nests, Grubb (1980) found that their average distance from water was 86 m (282 ft). These distances ranged from 4.6 - 805 m (15 - 2,640 ft). Fifty-five percent were within 46 m (150 ft) and 92% were within 183 m (600 ft) of a shoreline.

Eggs and Eaglets

Egg-laying begins in late February, with most pairs incubating by the third week of March (Watson and Pierce 1998). Eaglets hatch after a 35-day incubation period (Stalmaster 1987). Most eaglets fledge in mid-July but remain in the vicinity of the nest for several weeks prior to dispersal (Anderson et al. 1986, Watson and Pierce 1998). Most juvenile and adult bald eagles that nest in western Washington migrate to British Columbia and southeast Alaska in late summer and early fall. Adults return to their Washington territories by early winter (Watson and Pierce 1998).

Wintering

Migrant eagles from other states and provinces begin arriving at their traditional Washington wintering grounds during late October, and most disperse by March (Biosystems, Inc. 1980, 1981; Fielder and Starkey 1982; Garrett et al. 1988;

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Stalmaster 1989; Watson and Pierce 2001). Wintering bald eagles are attracted to western Washington by abundant prey, particularly salmon carcasses on Puget Sound tributaries.

Food Sources

Because wintering eagles often depend on dead or weakened prey, their diet may vary locally. In Washington, various types of carrion are important food items during fall and winter, including spawned salmon (primarily chum) taken from gravel bars along rivers (Stalmaster et al. 1985, Stalmaster 1987). Cattle carcasses and afterbirths, road-killed deer, and crippled waterfowl are important food sources where salmon carcasses are unavailable (J. Watson, personal observation).

Day Perches and Roosting Habitat

Wintering eagles select day perches according to their proximity to food sources (Steenhof et al. 1980). Perch trees tend to be the tallest available, and eagles will consistently use their preferred branches. A variety of tree species, both alive and dead, are used for perching (Stalmaster 1979).

Bald eagles may roost communally in winter, with 3 or more eagles perching consecutive nights in the same trees. Communal roosting probably enhances food-finding in nearby foraging areas (Knight and Knight 1984). Eagles sometimes gather in staging trees located between feeding grounds and roost trees prior to entering the night roost (Hansen et al. 1980, Anthony et al. 1982, Stalmaster 1987).

Because bald eagles leave little permanent sign of their presence after they depart wintering areas (i.e., no nest), emphasis in Washington state has been given to identifying the locations and describing characteristics of communal roosts during winter (Hansen 1977, Hansen et al. 1980, Keister 1981, Knight et al. 1983, Stalmaster 1987, Watson and Pierce 1998). Key roost components include core roost stands, buffer trees, flight corridors and staging trees, and foraging areas associated with roosts (Stalmaster 1987). Roost tree species vary with geographic area, but communal roost stands are generally uneven-aged with a multi-layered canopy, often on leeward-facing hillsides or in valleys. Such characteristics create favorable microclimates within roosts that promote energy conservation (Hansen et al. 1980, Keister 1981, Stalmaster and Gessaman 1984, Stalmaster 1987). Watson and Pierce (1998) documented twenty-six roosts on major tributaries of Puget Sound and found that eagle territories averaged 9 ha (22 ac) in size, were located 4.1 km (0.7 mi) from foraging areas, and contained roost trees that were larger in diameter, taller, and more decadent than random trees.

LIMITING FACTORS

Activities that permanently alter bald eagle habitat (e.g., removal of nest, roost, and perch trees, and removal of buffers without regeneration of trees of adequate size and structure), and activities that temporarily disturb eagles to the point of reproductive failure or reduced vigor (e.g., construction, logging, pedestrian activity, boating) are the greatest threats to nesting and wintering eagle populations in Washington state. Food availability may also be an issue in areas with dwindling salmon runs (Stinson et al. 2001). As Washington's human population grows, these types of disturbances and changes to the landscape will also increase. The current availability of large, mature trees along shorelines, and the availability of these trees in the future, will play a primary role in determining how bald eagles will ultimately fare in Washington (Stinson et al. 2001).

Human Population

Washington is the sixth fastest growing state in the nation and the second fastest growing western state (Department of Natural Resources 1998). Most of this growth is occurring in the Puget Sound region, where it impacts bald eagle

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habitat along shorelines (Solomon and Newlon 1991). Half of Washington's 5.4 million people live near the shores of Puget Sound, Hood Canal, and the Pacific Ocean, the same areas where our bald eagle population is concentrated. If current trends continue, Washington's human population will double to 11 million people by 2045. Between 1970 and 1995 the amount of land used for the construction of houses and businesses doubled in the central Puget Sound Region (Department of Natural Resources 1996). As of 1998, two-thirds of the 638 occupied bald eagle nesting territories were on private lands. As of 2000, there were 1154 bald eagle site management plans in Washington. Of these, 891 (78%) were for residential development (Stinson et al. 2001).

Simultaneous growth in bald eagle numbers has resulted in a small proportion of the eagle population establishing territories in habitat patches within urban environments. The greater tolerance of human activity exhibited by these pairs should not be interpreted as the norm for the population, because some birds become accustomed to human activity whereas others tolerate very little (Stalmaster 1987). Although bald eagle populations recently have increased, cumulative habitat changes over time, especially the loss of large trees along shorelines, have the potential to reduce habitat quality, confine eagles to smaller areas, and cause population declines (Stalmaster 1987, Stinson et al. 2001).

Disturbance

Activities associated with timber harvest, and the construction and occupation of homes have the greatest potential to disturb nesting and wintering bald eagles in Washington. These activities cause short- and long-term increases in human activities which may result in long-term habitat alterations.

Watson and Pierce (1998) found that pedestrian activity was the most common human activity within 400 meters (1,300 ft) of 37 eagle nests in western Washington. Along with aircraft, pedestrian activities cause the highest active disturbance responses in bald eagles (Stinson et al. 2001). Research from across the United States shows that pedestrian activities tend to affect eagle behavior at distances up to 991 m (3250 ft) from nests (Fraser et al. 1985, Grubb and King 1991, Grubb et al. 1992, Steidl 1994). Watson and Pierce (1998) found that pedestrian activity increased eagles' flush and agitation responses at <120 m (394 ft), and reduced incubation time at <200 m (656 ft). Similarly, vehicles and pedestrians elicited the highest responses from eagles in Michigan, although aircraft- and aquatic-related activities were more common (Grubb et al. 1992).

Activities such as boating, fishing, and aircraft can negatively affect eagle behavior. Foraging eagles on the Columbia River estuary maintained an average distance of 400 m (1,300 ft) from stationary boats, and they responded to boat presence by reducing feeding time and the number of foraging attempts (McGarigal et al. 1989). Aircraft may disturb nesting eagles depending on the aircraft type (e.g., helicopter, fixed-wing, jet) and the distances of approach to nests (Watson 1993). Flights of non-motorized hang gliders required buffers of 366 m (1,200 ft) to avoid disturbing nesting eagles in southwest Washington (D. Anderson, personal communication). However, Watson et al. (1996) found that low levels of clam harvest activity by boats on Hood Canal was unlikely to affect foraging eagles.

Many studies have characterized nest site selection for bald eagles and identified the detrimental effects of habitat alteration on eagle nesting (Juenemann 1973, Andrew and Mosher 1982, Anthony and Isaacs 1989, Buehler et al. 1991). Fewer studies, however, have defined specific distances to which nesting bald eagles responded to habitat alterations associated with residential development, and their conclusions are varied. Grubb (1980) and Parson (1982) reported average distances of 119 m (390 ft) and 93 m (305 ft) respectively, between productive bald eagle nests and habitat alterations in rural-residential Washington. Grubb (1980) also reported an average distance of 73 m (240 ft) between unproductive bald eagle nests and permanent human activity.

A literature review on how noise impacts raptors (Knight and Gutzwiller 1995) found that raptor responses vary, and can include attraction, tolerance, or aversion to the noise. Effects of noise on bald eagles from residential and recreational activities have not been thoroughly studied. Noise produced by pile driving was considered inconsequential to eagle behavior beyond 400 m (1,300 ft) in the San Juan Islands (Bottorff et al. 1987).

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Mortality

Mortality of bald eagles from shooting and electrocution still occur, but the numbers killed by these means are unknown in Washington state. Productivity of regional bald eagle populations (e.g., Columbia River estuary and Hood Canal) may be affected by, lead, PCBs, mercury, organochlorides, organophosphates, and other toxic contaminants. Secondary poisoning from pesticides (e.g., carbofuran, famphur) has resulted in local die offs in northwest Washington (Stinson et al. 2001, D. Baker, personal communication).

BALD EAGLE SITE MANAGEMENT PLANS

The Bald Eagle Protection Rule (WAC 232-12-292) requires a bald eagle management plan for proposed land-use activities involving land containing or adjacent to an eagle nest or communal roost.

In the 1980's, WDFW attempted to work with multiple landowners to develop large-scale territory plans involving active and alternate nest sites, and perching and foraging habitat (Figure 1). This was a time-consuming process which was not adequately funded, and permit delays were inevitable. It was apparent that some landowners wanted to expedite the regulatory permit process. As a result, WDFW began working with state agencies and local governments to provide alternatives that would simplify the permit process. Generalized Bald Eagle habitat Management Zones (Figure 2) were developed for this purpose along with the generic Site Management Plan which may be issued by local governments.

There are currently 3 options available for bald eagle management plans in Washington:

1) Federal or State Landscape Plans - If a landowner is developing a federal Habitat Conservation Plan (HCP) or a state Landowner Landscape Plan (LLP), WDFW can assist with a long-term conservation strategy for bald eagle habitat. If the strategy is approved by WDFW, then a separate bald eagle management plan is not necessary for each action within the area covered by the HCP or LLP.

2) Custom Plans - A WDFW biologist will work with landowners to develop custom site management plans for forest practice, shoreline, or hydraulic permits; and for subdivisions, short plats, and planned unit developments. A landowner may develop his or her own site-specific plan, or hire a consultant to do so, for approval by WDFW.

3) Generic Plans - WDFW may provide local government permit offices with generic bald eagle site management plans. Landowners may use these generic plans for septic, clearing, grading, road-building (if a DNR permit is not required) and single family home construction. If landowners cannot comply with the generic plan, or if a subdivision or planned unit development is intended, they should contact WDFW for a custom plan (see 2, above).

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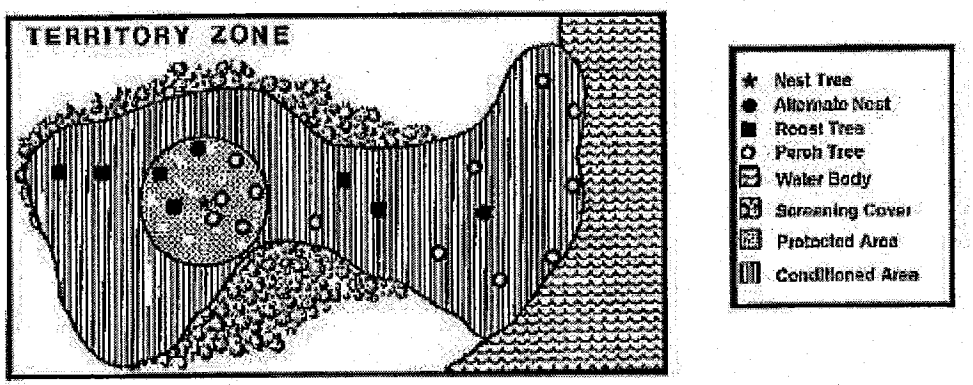

Figure 1. Territory management approach for bald eagle habitat (adapted from Stalmaster 1987).

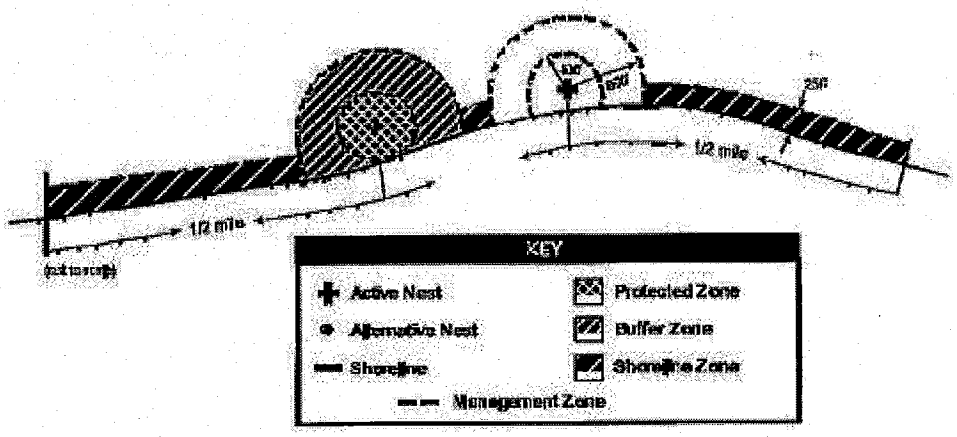

Figure 2. WDFW generalized bald eagle habitat management zones.

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Process for Landowners

Landowners planning new construction of buildings, roads, or docks; septic installation; timber harvest; land conversion; pesticide or other chemical applications; blasting activities, etc. in the vicinity of bald eagle nest or roost sites will be required to obtain a permit and/or a bald eagle site management plan. Most permits are available through county offices, though forest practice activities must be approved by the Department of Natural Resources (DNR). Washington counties and DNR obtain bald eagle nest and roost site information from WDFW.
For county permits, if the proposed activity is further than 122 m (400 ft) from the nest or roost, the county provides the landowner with WDFW's general conditions for bald eagle habitat protection. This is a generic plan that is signed by the landowner and attached to the permit. If the proposed activity is within 122m (400 ft) of a nest or roost, or if the landowner cannot comply with the conditions on the WDFW generic plan, they should contact the appropriate WDFW Regional Office to request a site-specific management plan. A WDFW biologist will discuss development plans and options to protect eagle habitat with the landowner. Once WDFW approves a management plan for the site, it is attached to the permit issued by the county.

For proposed forest practice activities less than 800 m (0.5 miles) from a bald eagle nest or roost, DNR may ask the landowner to obtain a bald eagle site management plan. WDFW will determine and document whether or not a proposed activity is a conflict to eagles. If a management plan is needed, a WDFW biologist will consult with the landowner to discuss development plans and options to protect eagle habitat. Once WDFW approves a management plan for the site or determines that the land use will not impact the eagles, DNR will process the forest practice application.

Elements Addressed by Bald Eagle Management Plans

Breeding Habitat

Residential development, timber harvest, and the construction of buildings, roads, and piers along shorelines are the main habitat alterations affecting breeding eagles in Washington. Habitat management for nesting bald eagles generally occurs within 400m (1320 ft) of the shores of Washington's outer coast, the Puget Sound, and major rivers and lakes. Maintaining tree and stand structure, and maintaining adequate distances between habitat alterations and nest trees, are the key factors for managing habitat near breeding eagles in Washington. The long-term goal in managing habitat alterations is to maintain suitable nest and perch trees within existing territories to insure their continued occupancy by bald eagles (Stinson et al. 2001).

In Oregon, management for uneven-aged forests, dominated by Douglas-fir west of the Cascades and ponderosa pine east of the Cascades, enhanced the potential for future nesting (Anthony and Isaacs 1989). Although maintaining unaltered old-growth stands may provide optimum bald eagle habitat, the necessary structural characteristics may be supplied by a carefully managed, younger forest over time. Selective logging in younger forests may be prescribed to maintain or enhance desired characteristics of nesting or roosting habitat (Stalmaster 1987). Forests that were hand-logged prior to 1940, which left remnant old-growth trees, provided bald eagle breeding habitat along coastal British Columbia in the 1980s (Hodges et al. 1984).

Tree and Stand Structure. Maintain as many mature trees as possible to protect forage, perch, alternate nest, and roost habitat (Anthony and Isaacs 1989). An analysis of nest tree characteristics in western Washington concluded that nest trees were co-dominant with other large trees in uneven-aged stands. Usually the trees were >25% dead and had broken tops (Grubb 1980). More recent evaluation of 37 nests in western Washington found eagles using the largest, tallest trees, with average nest height of 35±9 m (115±30 ft), and nest tree diameter at breast height (dbh) of 110±41 cm (45±18 in) (Watson and Pierce 1998).

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Human Disturbance. The keys to preventing disturbances of nesting bald eagles in Washington are maintaining adequate distances between human activities and nest trees, and timing activities so that they don't interfere with nesting. WDFW recommends scrutiny of construction activities that result in increased pedestrian activity within 240 m (800 ft) of nests, as well as careful management of public trails and camping within this distance (Watson and Pierce 1998). Additionally, during the nesting season, avoid activities such as tree cutting, the use of heavy machinery, pile driving, and blasting within 240 m (800ft) of active bald eagle nests. These activities have a greater potential for disturbance beyond visual effects because they generate noise (U.S. Fish and Wildlife Service 1986). Observations of adult eagles can help determine whether or not human activities are causing the eagles to alter their behavior. Aggressive behavior, alarm calls, and adults flushing from their nest or perch indicate significant disturbance.

Timing. Activities within 240 m (800 ft) of nest trees that may disturb bald eagles should be conducted outside of the critical breeding period. The critical breeding period for Washington's bald eagles begins with courtship in early January and ends with juvenile dispersal in mid- to late-August (Watson and Pierce 1998, S. Zender, personal communication). Bald eagles in Oregon have a similar nesting phenology, with January 1 through August 31 identified as the time when human activities are most likely to affect breeding success (Isaacs et al. 1983). In residential areas, bald eagles that show tolerance to humans may not need the same distance or period of protection from disturbance (J. Bernatowicz, personal communication; S. Negri, personal communication).

Screening. Maintain high tree density and moderate canopy closure to visually buffer bald eagle nests from human activities. In Washington, Watson and Pierce (1998) found that complete vegetative screening around nests dramatically reduced the time and frequency of eagles' responses to disturbance. Partial screening had less of a positive effect, although it did reduce response distance. In the same study, eagles nesting in taller trees at heights >47 m (154 ft) had significantly reduced responses to a walking pedestrian compared to nests that were lower in trees.

Windthrow. A nest stand's vulnerability to windstorms is an important consideration when determining buffer distances and minimum stand size (Anthony and Isaacs 1989). Maintain a buffer of 120-240 m (400-800 ft) from the nest in order to protect the core stand from the effects of windthrow. The shape of the buffer may vary with site topography and prevailing wind direction to maximize vegetative screening and protection of the core stand. Buffers with variable widths can be designed after conducting a windthrow hazard assessment that takes into account prevailing wind direction, soil conditions, etc. (Sathers et al. 1994). Currently, the Washington Forest Practices Regulations use forested buffers of 60-120 m (200-400 ft) for wetlands and marbled murrelet nest stands. Thinning and salvage logging is allowed within these buffers, provided that the residual forest can withstand major wind penetration. Research on the effects of windthrow indicates that the creation of abrupt forest openings may result in negative impacts to residual forest stands. Wind penetration has been documented up to 60 m (200 ft) into a conifer forest interior (Fritschen et al. 1971). Decreases in tree densities and tree canopy cover were noted up to 120 m (400 ft) into conifer forest from the clear cut edge (Chen et al. 1992). These changes were attributed mostly to tree mortality and windthrow caused by high wind velocities along new clear cut edges. A forested buffer can mitigate these edge effects on core nest or roost stands.

Buffer Distances. Buffers between 100-1,200 m (330-4,000 ft) have been recommended throughout the United States to protect the integrity of nest trees and stands (Mathison et al. 1977; U.S. Fish and Wildlife Service 1982, 1986; Fraser et al. 1985; Anthony and Isaacs 1989; Grubb and King 1991; Grubb et al. 1992). Nests and nest trees must be protected year-round, since bald eagles typically use and maintain the same nests year after year. In addition, nests that appear to be abandoned also need protection, since bald eagles often construct alternate nests that are used periodically. When developing site management plans, WDFW recommends buffering bald eagle nests with a two-zone management system that

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mimics a strategy designed by the U.S. Fish and Wildlife Service (1981). The following guidelines for these zones are based on the research cited in this document:

- **Protected Zone (Primary Zone).** This zone protects and screens the nest tree and should extend at least 120 m (400 ft) from the nest tree. Its size and shape will vary with site conditions such as topography, prevailing winds, and screening vegetation, as well as on the eagles' tolerance to human activities. In areas where vegetation and/or topography don't provide adequate screening within 120 m (400 ft) of the nest, consider increasing the size of the protected zone. Retain all existing large trees and existing forest structure within the protected zone. Activities that significantly alter the landscape or vegetation, such as timber harvest; construction of buildings, roads, or power lines; mining; and the application of chemicals that are toxic to plants or animals, should be avoided in this zone. In some situations, noisy, non-destructive activities that can disturb eagles may need to be postponed until after the breeding and nesting seasons.
- **Conditioned Zone (Secondary Zone).** The conditioned zone further screens and protects nest sites in the protected zone and should extend from 100 to 240 m (330-800 ft) beyond the edge of the protected zone. Alternate nest locations, perch trees, and feeding sites should be included in this zone and will influence its size and shape (Stalmaster 1987). Depending on screening vegetation, prevailing winds, topography, and the sensitivity of the nesting eagles to human activities, this zone may need to be expanded up to 800 m (2640 ft) from the edge of the protected zone. Avoid constructing facilities for noisy or intrusive activities, such as mines, log transfer and storage areas, rock crushing operations, and oil refineries, in the conditioned zone. High-density housing and multi-story buildings should also be avoided. Avoid constructing roads or trails within sight of the nest that would facilitate human or predator access to the nest. Construction activities (e.g., homes, roads, and power lines) that take place out of sight of the nest should be postponed until after the young eagles have fledged, as should forest practice activities. Timber harvest within conditioned zones should be designed to avoid blowdown and to provide future nest tree recruitment. Short term, unobtrusive activities, or those shown not to disturb nesting eagles, such as the use of existing roads, trails, and buildings, can occur year-round in the conditioned zone.

Roosting Habitat

Timber harvest, and the construction of roads and buildings are the main habitat alterations that negatively affect roosting eagles in Washington. The long-term goal in managing these alterations is to maintain suitable roost trees and roost components over time in areas inhabited by bald eagles in order to ensure their continued use. Key roost components included core roost stands, buffer trees, flight corridors and staging trees, and prey bases associated with roosts (Stalmaster 1987). Roost tree species vary with geographic area, but communal roost stands are generally uneven-aged with a multi-layered canopy and are often on leeward-facing hillsides or in valleys.

Timber Harvest. Avoid timber harvest within the core stands of communal roost trees and staging areas. Maintain vegetative buffer zones within 120 m (400 ft) from the edge of such stands. Buffer stand density and width should be based on windthrow potential and the need for effective visual screening (see Breeding Habitat). Eleven of 12 roosts studied throughout Washington by Knight et al. (1983) had experienced some degree of timber harvest. These researchers also noted roost abandonment when roost areas were harvested. Anthony et al. (1982) concluded that perpetuating roost habitat with trees that average 131-300 years old was incompatible with 40-80-year stand rotations typical of forest management west of the Cascade Mountain crest.

Human Disturbance. Activities that produce noise or visual effects within 120 m (400 ft) of the edges of communal roost trees or staging trees should be conducted outside of the critical roosting period (November 15-March 15). This corresponds to the time when most eagles begin to arrive in eastern and western Washington, with numbers peaking in December and January and declining rapidly by mid-March (Biosystems, Inc. 1980, 1981; Fielder and Starkey 1980; Garrett et al. 1988; Stalmaster 1989).

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Perching and Foraging Habitat

Perches along shorelines near winter roosts or in nesting territories are important to foraging eagles. Tree structure, and the distance between habitat alterations and shorelines should be considered when managing for bald eagle wintering habitat.

Perch Structure and Location. In Washington, protect known bald eagle perch trees and potential foraging perches greater than 51 cm (20 in) dbh and within 75 m (246 ft) of the top of a bank or shoreline. Chandler et al. (1995) studied the influence of shoreline perch trees on bald eagle distribution in Chesapeake Bay and found that shoreline segments used by eagles had more suitable perch trees, more forest cover, and fewer buildings than unused segments. Eagles used suitable perch trees that were less than 50 m (164 ft) from the shoreline but preferred those closer than 10 m (33 ft). This is consistent with other authors who observed bald eagles perching less than 50 m (164 ft) from shore (Stalmaster and Newman 1978, Steenhof et al. 1980, Buehler et al. 1992). Similarly, tall perch trees in leave strips that are 50-100 m (160-330 ft) wide along shorelines of major feeding areas were deemed important for foraging eagles (Stalmaster 1987). Also, Chandler et al. (1995) described how to map shoreline areas that could be managed or restored to maintain suitable bald eagle foraging habitat. They recommended protecting patches of shoreline forest, and specifically protecting live and dead trees over 20 cm (8 in) dbh for future habitat.

Human Disturbance. Bald eagles often feed on the ground, in open areas where food resources are concentrated. They should be allowed a distance of at least a 450 m (1,500 ft) from human activity and permanent structures. Buffer zones of 250-300 m (800 ft-1,000 ft) have been recommended in perching areas where little screening cover is present (Stalmaster and Newman 1978). Stalmaster and Newman (1979) found that 50% of wintering eagles in open areas flushed at 130 m (500 ft) but 90% would tolerate human activities at 500 m (1,600 ft). Activities that disturb eagles while feeding, especially during winter, can cause them to expend more energy, which increases their susceptibility to disease and poor health (Stalmaster 1987).

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KEY POINTS

Habitat Requirements

- Breeding - Bald eagles breed in uneven-aged forest stands along shorelines where there is minimal human activity. Nest trees are usually large, and are dominant or co-dominant within the overstory.
- Roosting - Bald eagles roost in uneven-aged forest stands with large trees that provide protection from weather. Roosts are often on leeward-facing hillsides or in valleys.
- Perching - Tall trees and snags along shorelines provide perching habitat for bald eagles.
- Feeding - An adequate source of uncontaminated prey is required for bald eagles. Salmon, gulls, and waterfowl are major components of the bald eagle's diet.

State and Federal Laws

- Three federal laws provide protection for the bald eagle: the Endangered Species Act, the Bald and Golden Eagle Protection Act, and the Migratory Bird Treaty Act. The U.S. Fish and Wildlife Service Pacific Bald Eagle Recovery Plan (1986) includes recommendations for managing habitat and human disturbance. Projects involving federal permits that may affect bald eagle habitat must be reviewed by the U.S. Fish and Wildlife Service. Contact the nearest U.S. Fish and Wildlife Service office for management consultation on federally-funded projects.
- Through the Bald Eagle Protection Rule (WAC 232-12-292), Washington State law requires the development of a cooperative Site Management Plan whenever activities that alter habitat are proposed near a verified bald eagle nest territory or communal roost.

Elements Addressed by Bald Eagle Management Plans

- The habitat management zone for nesting bald eagles is within 400 m (1/4 mi) of the marine shorelines of Washington's outer coast and Puget Sound, and the shorelines of major rivers and lakes.
- Maintain as many mature trees as possible to protect forage, perch, alternate nest, and roost habitat.
- WDFW recommends scrutiny of construction activities that result in increased pedestrian activity within 240 m (800 ft) of nests, as well as careful management of public trails and camping within this distance (Watson and Pierce 1998).
- Avoid activities such as tree cutting, the use of heavy machinery, pile driving, and blasting within 240 m (800 ft) of bald eagle nests during the breeding season.
- Maintain high tree density and moderate canopy closure to visually buffer bald eagle nests from human activities.
- A buffer of 120-240 m (400-800 ft) from the nest should be maintained to protect the core stand from the effects of windthrow. The shape of the buffer may vary with site topography and prevailing wind direction to maximize vegetative screening and protection of the core stand.

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- Nests and nest trees must be protected because bald eagles typically use and maintain the same nests year after year. In addition, nests that appear to be unoccupied also need protection, because bald eagles often construct alternate nests that are used periodically.

- Buffer bald eagle nests with a two-zone management system, consisting of a protected zone ≤ 120 m (400 ft) from the nest tree and a conditioned zone that extends from 100 to 240 m (330-800 ft) beyond the edge of the protected zone. The size and shape of each zone will depend on screening vegetation, prevailing winds, topography, and the sensitivity of the nesting eagles to human activities. Large trees (>20 in dbh) should be retained in both zones.

- Protect core communal roost stands and staging stands with a buffer of approximately 120 m (400 ft) around core stands. The forest structure of buffer stands should include large trees and follow prescriptions to prevent deterioration from the effects of windthrow.

- Activities that produce noise or visual effects within 120 m (400 ft) of the edges of communal roost trees or staging trees should be conducted outside of the critical roosting period (November 15 - March 15).

- Leave 250 ft wide strips of perch trees and protective buffers along shorelines within eagle nesting territories and winter feeding areas.

- Consider timing restrictions to avoid activities that may disturb eagles during critical periods. The following periods and distances may be less in urbanizing areas where eagles show more tolerance to human activities:
  Breeding: 1 January - 31 August within 800 ft of nest trees
  Wintering: 15 November - 15 March within 400 ft of roost stands

- In foraging areas with little or no screening, bald eagles that are feeding should be allowed at least 450 m (1500 ft) from human activity and permanent structures.

- Perch trees and potential foraging perches >51 cm (20 in) dbh and 45 m (240 ft) from the top of a bank or shore should be protected.

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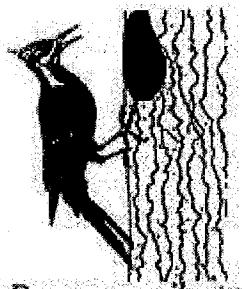


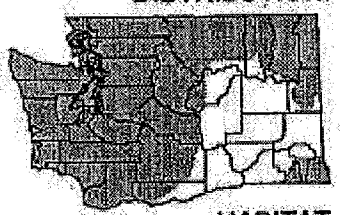
Dryocopus pileatus

Washington Department of Wildlife
Management Recommendations for Priority Species

Pileated Woodpecker

RANGE: Resident from northern British Columbia, and southern Canada east to Nova Scotia; south to northern California, Idaho, Montana, eastern Kansas, and south to the Gulf Coast and Florida.

WASHINGTON DISTRIBUTION: Forested areas of the state.



HABITAT REQUIREMENTS: Pileated woodpeckers inhabit mature and old growth forests and second growth forests with significant numbers of large snags and fallen trees. The best habitat is conifer stands with two or more canopy layers, the uppermost being 25-30 m (80-100') high (Bull 1987).

Nesting - Breeding season is from mid-March to mid-July. Pileateds spend most of their time in stands older than 70 years. They excavate nest cavities in snags or live trees with dead wood, generally excavating through hard outer wood into rotten heartwood. Pileateds excavate large nest holes (3/yr/pair) and may excavate winter roost cavities in the fall or use previous nests (Mannan 1984, Bull 1987, Mellen 1987).

Five studies in Oregon and Washington report similar nest tree characteristics for pileateds: mean dbh > 68 cm (27") and mean height > 27 m (87') (Mannan 1984, Madsen, 1985, Mellen 1987, Bull 1987, Nelson, 1988). The preferred tree species are western larch, ponderosa pine, and black cottonwood east of the Cascade Mountains (Madsen 1985, Bull 1987) and Douglas fir and grand fir west of the Cascades (Mellen 1987, Nelson 1988). Most nest trees were hard snags with bark and broken tops.

Feeding - Pileated woodpeckers forage primarily within forests 40 years or older. They seldom use clearcuts, but do forage in shelterwood cuts if logging debris is left (Mannan 1984, Irwin 1987, Mellen 1987). Pileateds forage on large snags (>50 cm or 20" dbh), logs (>18 cm or 7" dbh), and stumps (especially naturally formed versus cut). They feed mainly on carpenter ants, beetle larvae, and other insects. Snags take on special importance in winter for roosting and foraging when logs and stumps may be covered with snow (McClelland 1979). They may excavate large rectangular holes during foraging that may be used by smaller birds for nesting and roosting.

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Roosting - Fall and winter roosts generally are in the same nest tree and cavity that was previously excavated. Consequently, the roost tree characteristics are similar to those of nest trees (McClelland 1977, Bull 1987).

Home range varies from an average of 480 ha (1200 ac) in western Oregon (Mannan 1984, Mellen 1987) to 220 ha (540 ac) in northeast Oregon (Bull 1987). In western Oregon home ranges, the amount of nesting and roosting habitat averaged 200 ha (500 ac) and the foraging habitat averaged 306 ha (750 ac) (Mellen 1987). Several studies found that the density of pileateds increased with the abundance of large conifers and snags.

MANAGEMENT RECOMMENDATIONS:

For areas that must be harvested, leave at least 32 snags > 50 cm dbh/100 ha (14> 20"/100 ac) to maintain nesting habitat for pileated woodpeckers (Neitro et al. 1985).

In addition, to provide foraging habitat, large stumps and numerous large logs should be left in various stages of decay. During thinning and cutting the following types of trees should be left standing where it is safe to do so: dying trees, trees with heartwood rot, insect-infested trees, and trees with distorted shape or wind breakage. Trees with greatest potential for immediate use by pileated woodpeckers have old pileated cavities, broken tops, about 33% of limbs and bark remaining, and some decay (Bull 1987). Trees with broken tops (both live and dead) are the most heavily used for foraging.

Retention of nest snags can be accomplished in two ways: 1) clustering potential nest trees in small areas, or 2) dispersing the trees throughout each territory. The second method may be preferable because it reduces loss to wind, fire, and woodcutters. Safe logging techniques for snag retention are outlined in Neitro et al. (1985) and a U.S. Forest Service publication (1986). In areas where snags are lacking, they can be created by topping live trees or inoculating them with heartrot fungus at nest height (> 12 m or 40') (Bull 1986).

The U.S. Forest Service (1986) has a mandate to maintain viable populations of wildlife on public lands. They developed Minimum Management Recommendations based on this legal requirement. The pileated woodpecker was selected as a management indicator species for old growth conifer forests because its highest densities occur in old growth. The MMRs for the pileated woodpecker apply to a 400 ha (1000 ac) unit. Within the unit, 240 ha (600 ac) are managed for one pair of pileated woodpeckers: a 120 ha (300 ac) old growth or mature nesting area and an additional 300 ac for feeding. One such habitat area is retained for every 4850 ha (12,000 ac) dispersal area. Specific requirements for the 300 ac nesting area include maintaining at least two hard snags/ac > 30 cm (12") dbh and of these 600 snags, 45 should be > 50 cm (20") (15 snags/100 ac). A minimum of two hard snags/ac > 25 cm (10") dbh should be maintained in the additional 300 ac feeding area.

The MMRs were based on data from northeast Oregon where there are high densities of pileateds with small home ranges (Bull 1987). Recent studies for western Oregon show lower densities and a mean home range that is twice the size found in northeast Oregon (Mannan 1984, Mellen 1987). The MMRs should be adjusted to reflect these regional differences. Mellen (1987) recommends a 50% increase in the size of the nesting and feeding areas for each breeding pair in western Oregon and Washington.

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Also, Conner (1979) notes that managing for the minimum habitat components may cause gradual population declines. Instead, he suggests that average values for habitat elements be used in forest management. The average dbh for pileated nest trees in the Northwest is 76 cm (30"). Since Douglas fir in Washington will not reach this size until after 100 years, nesting areas should be managed for long rotations. Perhaps the MMRs should be revised using mean values of habitat components rather than minimum values.

Mannan (1984) and Mellen (1987) question the suitability of the pileated woodpecker as an indicator species for other snag-dependent species that may need higher snag densities, and for the old growth community since pileateds also use riparian hardwoods and forage in immature stands. The pileated may be a better indicator species for mature forests west of the Cascade Range.

Irwin (1987) also questions several assumptions about the pileated woodpecker as an indicator species and the MMRs. He contends that pileated woodpeckers may be more adaptable than indicated by the MMRs based on available research in fragmented forests. He suggests a hypothesis for testing: that pileated woodpecker populations can be maintained or enhanced in managed forests by maintaining a minimal total amount of habitat components distributed through time and space. This would occur by using existing forest reserves and riparian zones along major streams and retaining or creating standing dead and down woody debris. Such a test could be conducted through monitoring programs.

Bull et al. (1990) discuss techniques for monitoring pileated woodpecker populations including: 1) density of breeding pairs, 2) reproduction, and 3) presence or absence of birds. Pileated nests can be located by using vocal or recorded calls and locating nests and roost trees or foraging signs. The monitoring method will depend on the size of the area, the work resources and time available, and the amount of information desired.

Woodpeckers, along with other insectivores, play an important role in reducing insect populations at endemic levels. Biological control of forest insects is preferred over use of insecticides. It has a longer term effect to regulate future insect outbreaks and is less costly and nontoxic. Management to increase woodpecker populations should have the secondary benefits of increasing other insectivorous birds and controlling insect outbreaks (Takekawa et al. 1982).

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KEY POINTS

Habitat Requirements:

- Pileateds inhabit mature and old growth forests and second growth forests with numerous large snags and fallen trees.
- Nest trees are mostly snags > 27" dbh and taller than 87'.
- They forage on large snags, logs, and stumps for ants, beetle larvae, and other insects.
- Home range west of Cascade Crest is 1200 ac, east of Cascades 540 ac.

Management Recommendations:

- Pileateds are sensitive to forest management that removes large standing and down woody material.
- U. S. Forest Service Minimum Management Recommendations:
  Maintain one 600 ac habitat area for one pair every 12,000 ac.
  Nesting area - 300 ac with two hard snags/ac > 12" dbh, 45 of which are > 20" dbh (15/100 ac).
  Foraging area - 300 ac with two hard snags/ac > 10" dbh (200/100 ac).
- During logging, retain 14 snags > 20"/100 ac and green trees in clusters

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or dispersed throughout a habitat area. Where snags are lacking, top live trees or inoculate them with fungus above nest height.

- Leave large logs and stumps in various stages of decay. During thinning and harvesting, leave deformed or dying trees and green replacement trees of sufficient size such that they will replace existing snags when they fall.
- Limit insecticide use and promote biological insect control.

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Chaetura vauxi

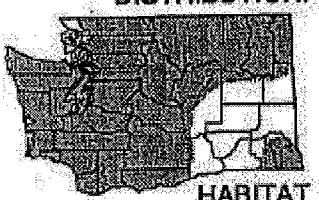
Washington Department of Wildlife

Management Guidelines for Species of Concern

Vaux's Swift

RANGE: Breeds from northern British Columbia and western Montana south to central California, west of the Cascade and Sierra Nevada Mountains. Winters in Central America and northern South America (American Ornithologists Union 1983).

WASHINGTON DISTRIBUTION: Summer resident throughout wooded areas of Washington (Paulson, pers. comm.).



HABITAT REQUIREMENTS: Vaux's swifts nest in mature and old-growth coniferous forests (Baldwin and Zaczkowski 1963, Meslow and Wight 1975, Manuwal and Huff 1987). They require cavities in large hollow snags or broken tops of live trees for nesting and night roosting. Nest snags are apparently at least 9.5m (31') tall and 51cm (20") dbh east of the Cascades (Thomas et al. 1979), and at least 12m (40') tall and 63.5cm (25") dbh west of the Cascades (Brown 1985). Suitable nest snags are often hollow and charred by fire. Nests have been found in hollow cavities close to the bottom of snags with broken tops and rotted trunks (Baldwin and Zaczkowski 1963). Vaux's swifts have also been occasionally observed nesting or roosting in chimneys and on cliffs (Jewett et al. 1953, Baldwin and Hunter 1963).

Vaux's swifts feed primarily on flying insects. All seral stages are apparently used for foraging (Brown 1985).

LIMITING FACTORS: Unknown, but likely related to the availability of hollow snags in old-growth forests.

MANAGEMENT RECOMMENDATIONS: Vaux's swifts find optimum habitat, and thus reach greatest densities, in old-growth forests in the Douglas-fir region (Meslow et al. 1981). Consequently, patches of mature (older than 100 years) or old-growth forest should be maintained where Vaux's swifts occur (Mannan et al. 1980). To preserve older forest stand conditions, these patches should be managed over long (>200-year) rotations with all snags and large defective trees retained (Cline et al. 1980, Neitro et al. 1985). Long rotation stands should be interspersed among younger, intensively managed stands (Cline et al. 1980).

Snags in younger managed stands should also be retained for use by Vaux's swifts in order to insure that large snags are available across the entire spectrum of successional stages. Leave large snags (>20cm dbh) in different

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stages of deterioration in clear cuts and thinning cuts. Large defective trees, especially those showing signs of decay such as butt rot, broken tops, fungal conks, dead branch stubs, or other defects should be left (Cline et al. 1980, Neitro et al. 1985).

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KEY POINTS:

Habitat Requirements:

- Nest in mature and old-growth coniferous forests.
- Cavity nester.

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Management Recommendations:

- Retain patches of mature and old-growth forest habitat.
- Retain large snags and large "defective" trees in younger, managed stands.

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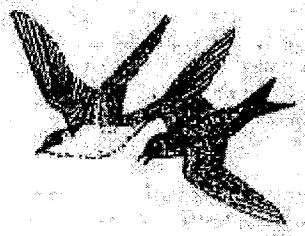


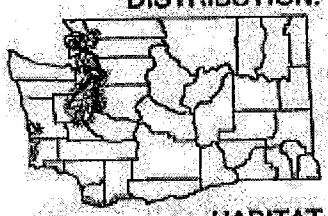
Washington Department of Wildlife
Management Recommendations for Priority Species

Progne subis

Purple Martin

RANGE: Breeds locally from southern Canada to northern Mexico. Winters in South America.

WASHINGTON DISTRIBUTION: Breeds primarily near water around Puget Sound and the Columbia River. Breeding pairs have been confirmed in San Juan, King, Pierce, Thurston, Mason, Clark, Skamania, and Gray's Harbor counties.



HABITAT REQUIREMENTS: Purple martins are insectivorous swallows that nest in cavities. In Washington, most of the birds have been reported nesting in manmade structures near cities and towns in the lowlands of western Washington. Historically, they probably bred in old woodpecker cavities in large dead trees. Only a few such nests are known today. Nesting is more common now in bird boxes.

Purple martins feed in flight on insects. Favorable martin foraging habitat includes open areas, often located near moist to wet sites where flying insects are abundant.

LIMITING FACTORS: Availability of nesting cavities, which are not usurped by starlings and house sparrows.

MANAGEMENT RECOMMENDATIONS: Purple martins are known to nest in cavities located in old pilings and occasionally in snags with clear air space and easy access. These pilings and snags (especially snags near water) should be protected and left standing. Snags should be retained during timber harvesting operations, including salvage operations after burns, blow-downs, and insect infestations. Prescribed burns can be used as a tool to create favorable martin foraging habitat. Create snags in forest openings, or at forest edges (e.g., by topping) where nesting cavities are lacking, especially within 10 miles of an existing purple martin colony. Insecticides should not be applied within at least seven and a half miles of martin nesting colonies in order to maintain a food base and avoid chemical contamination.

If natural sites are lacking and cannot be provided by manipulating habitat, artificial nesting sites can be provided according to the following specifications:

1) Construct nest boxes according to the designs such as that shown in

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Figure 1. Box dimensions should be at least 7" x 7" x 7", and preferably at least 10" deep. It is important to make the entrance exactly 1 1/4" high, without a threshold (i.e. continuous with the porch floor). The top of the opening should be sanded smooth. The porch is a necessary feature, and the floor board should be rough to provide traction. These features will aid in dissuading starlings from taking over the nest boxes.

2) Protect boxes from wet weather by sealing edges with caulking material, painting or varnishing wood, using cedar for construction or protecting the roof with galvanized tin. Provide drainage holes in the box floor and ventilation holes near the top.

3) Locate boxes in existing colonies first. Locate additional boxes within 10 miles of existing colonies.

4) Locate boxes near water or wetlands with minimum clear air space of 15' (preferably 100') for circling and foraging about the nest. Erect houses 10' or more above the ground or water.

5) It is not necessary to remove martin nests from previous years. If you clean out old nesting material, do so in the spring and place the contents in a dry place beneath the nest. This is to allow for the emergence of chalcid wasps, which help to control Protocalliphora, a nestling parasite. The wasp larvae live in nest materials and will return to the martin boxes if old nests are left nearby.

6) Where starlings and house sparrows are a problem, plug the box entrances from October to mid-April. If starlings establish themselves in a box, remove their nests, eggs, and young on a routine basis (they will renest several times in a breeding season).

The same measures can be taken with house sparrows early in the breeding season, however removal of sparrow nests later in the cycle may cause sparrows to wander into martin nests and destroy their young. Adult sparrows may be controlled. If this is impossible, remove eggs and young, but leave sparrow nests in later months to prevent sparrows from taking over martin nests.

Starlings and house sparrows are not classified as a protected species. Their numbers may be controlled by trapping or shooting them around a martin colony.

REFERENCES:

Adapted from:

Milner, R.L. 1988. Guidelines for establishing and maintaining a purple martin nest box colony. Unpublished report for the Washington Department of Wildlife.

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KEY POINTS:

Habitat Requirements:

- Nest in natural and man-made cavities.
- Readily nest in bird boxes in areas where the species is already established.
- Usually nest in colonies.
- Feed on flying insects.

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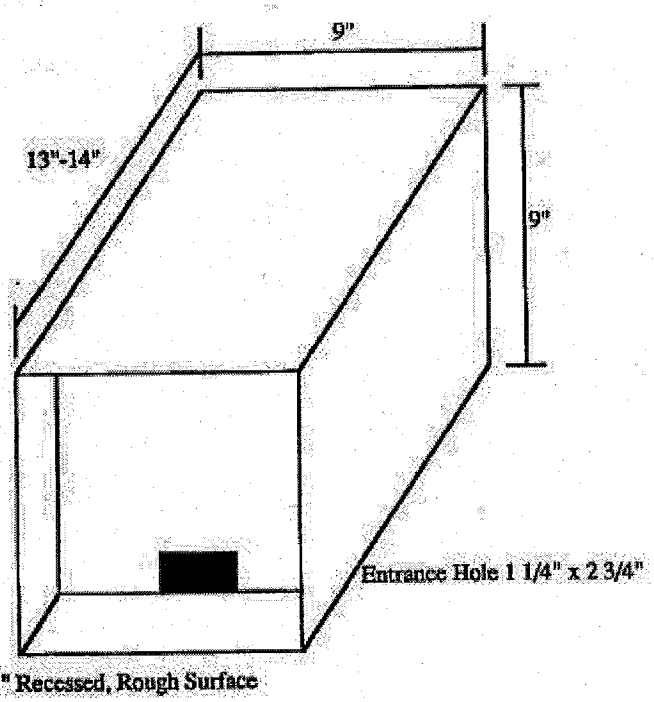
Management Recommendations:

- Retain snags during timber harvesting.
- Retain old pilings.
- Use fires in favorable martin foraging habitat, where appropriate.
- Create snags in forest openings and along forest edges if snags are lacking or limited.
- Avoid applying insecticides within 12 km (7.5 miles) of martin nesting colonies.
- Place nest boxes if cavities are lacking or limited and cannot be created (see text for details).

Figure 1
(Courtesy of Tom Lund, USFWS, 1985)

Purple Martin Nest Box Plan



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WASHINGTON DEPARTMENT OF FISH AND WILDLIFE

Priority Habitats and Species

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Management Recommendations for Washington's Priority Species, Volume IV: Birds

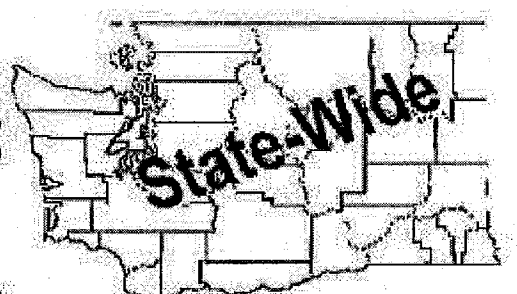
Great Blue Heron

Ardea herodias

Prepared by Timothy Quinn and Ruth Milner, 1999

GENERAL RANGE AND WASHINGTON DISTRIBUTION

Great blue herons are found throughout most of North America south of 55 north latitude and into much of Central and South America. Breeding pairs on the Pacific coast occur only to about 52 north latitude. Distribution of great blue herons within Washington is state-wide.



The great blue heron, *Ardea herodias*, occurs state-wide in Washington. Map derived from the literature.

RATIONALE

Great blue herons can be vulnerable because of their tendency to aggregate during the breeding season. The availability of suitable great blue heron breeding habitat is declining as human population increases in Washington State. In addition, great blue herons may abandon

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breeding colonies or experience reduced reproductive success when disturbed by humans.

HABITAT REQUIREMENTS

Great blue herons occur near most types of fresh and saltwater wetlands including seashores, rivers, swamps, marshes, and ditches. They are found throughout Washington but are most common in the lowlands.

Nesting

Great blue herons are colonial breeders that nest in a variety of deciduous and evergreen tree species. Nests are usually constructed in the tallest trees available, presumably to reduce the risk of predation by mammals (Butler 1992, Carlson 1995), but may also be located in bushes and in artificial structures (Bruce 1986, Blus et al. 1980) when trees are absent (Henny and Kurtz 1978). In King and Kitsap counties, great blue herons nested at heights ranging from 9-26 m (30-85 ft) in the tallest trees available (Jensen and Boersma 1993). A British Columbia study found that most great blue heron nests occurring in trees were located >14 m (46 ft) in height. No nests were found under 10 m (33 ft) (Mark 1976). Great blue herons in western Oregon nested at heights ranging from 7-25 m (23-82 ft) (Werschkul et al. 1976).

Feeding

Great blue herons feed on a wide variety of aquatic and marine animals found in shallow waters. Great blue herons also feed on mice and voles (Calambokidis et al. 1985, Butler 1995), which were an important food for nestlings in Idaho (Collazo 1981) and may be an important food for British Columbia great blue herons during winter (Butler 1995).

At large spatial scales (e.g., great blue heron home range), the location of great blue heron colonies is probably best explained by the distribution of foraging habitat (Gibbs 1991, Jensen unpublished data, see human disturbance below for smaller scale considerations). Although great blue herons may forage up to 29 km (18 mi) from a colony, most forage within 2-5 km (1-3 mi) of the colony (Short and Cooper 1985, Butler 1995). The number of nests per colony in British Columbia (Butler 1991), Oregon (Werschkul et al. 1977, Bayer and McMahon 1981), Maine (Gibbs 1991), and Washington (Jensen unpublished data) were positively correlated with the amount of nearby foraging habitat, and in Maine were negatively correlated with the costs of foraging at greater distances (km flown/ha of wetland visited).

Feeding territory size and location may vary from year to year (Hoover and Wills 1987). The availability of alternative foraging and nesting habitat within close proximity of known foraging sites is probably critical to great blue heron reproductive success. Butler (1995) suggested that food availability strongly affects great blue heron survival, the spacing of their colonies, and their use of habitat. Moreover, great blue heron food supply may be limiting, particulary in areas where foraging areas freeze during winter (Butler 1992).

Colonies usually exist at the same location for many years, and productivity (number of fledglings/nesting herons) may be positively related to the number of years colonies have been in use (Butler 1995). Great blue herons may relocate their colonies in response to increased predation on eggs and young by mammals and birds such as eagles (Jensen

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unpublished data), declines in food availability (Simpson et al. 1987), or human disturbance. Jensen (unpublished data) suggested that 2 of the 5 King County colonies monitored in 1991 were abandoned in late spring due to bald eagle predation, but Butler (1995) found that there was no relationship between the location of great blue heron colonies and the location of areas with high densities of nesting eagles. Thus, abandonment of colonial nesting areas due to predation pressure from eagles may be regionally specific. Great blue heron colonies built in spruce or Douglas-fir trees may damage host trees over time, which may also influence colony relocation (Julin 1986).

LIMITING FACTORS

The availability of nesting habitat in close proximity to suitable foraging habitat limits great blue herons. The availability of alternative foraging sites could be critical to nesting success.

Great blue herons are generally sensitive to human disturbance and are frequently the target of vandalism (Parker 1980, English 1978). The type and extent of human disturbance can affect great blue heron colony site selection (Gibbs et al. 1987, Watts and Bradshaw 1994). In Virginia, great blue herons chose colony sites further from roads and human structures than would be expected by chance; a pattern that was apparent up to 400-800 m (1,312-2,625 ft) from colonies (Watts and Bradshaw 1994). Great blue heron colonies have been abandoned in response to housing and industrial development, highway construction, logging, vehicle traffic, and repeated human intrusions (Leonard 1985, Parker 1980, Kelsall and Simpson 1979, Werschkul et al. 1976). In King and Kitsap counties, Jensen (unpublished data) found that great blue heron colony size decreased as distance to the nearest human disturbance within 300 m (984 ft) decreased, and as the amount of human development within 300 m (984 ft) of the colony increased. Nests occupied first in each of 3 King County colonies in 1991 were furthest from development and had more than twice as many fledgling than nests closer to development (3.13 versus 1.51 young/nest) (Jensen unpublished data).

Other studies suggested that great blue herons may habituate to non-threatening repeated activities (Webb and Forbes 1982, Vos et al. 1985, Calambokidis et al. 1985, Shipe and Scott 1981). Thus, different great blue herons may have different tolerance levels to disturbance depending on disturbance history and type (Simpson 1984). Although the effects of visual and auditory buffers have not been well studied, topographic or vegetation obstructions may ameliorate some types of disturbance (Webb and Forbes 1982).

MANAGEMENT RECOMMENDATIONS

We suggest that the most effective way to conserve great blue herons in Washington is through comprehensive land-use planning that considers the needs of all species. In the absence of comprehensive land-use plans, we recommend the protection of existing great blue heron colonies using colony site-specific management plans. Colony site-specific management plans are based on general recommendations from current research, knowledge of the colony, surrounding land uses, and landowner goals. The Washington Department of Fish and Wildlife can assist in development of these management plans. All plans designed to conserve great blue heron colonies should consider the following factors, among others:

The colony's size, location, relative isolation, and the degree of habituation to disturbance

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(Henny and Kurtz 1978, Bowman and Siderius 1984). Colonies located in close proximity to existing human activities may tolerate more disturbance than colonies located in undisturbed areas (Simpson 1984, Webb and Forbes 1982, Bowman and Siderius 1984). While it's currently unclear how colony size affects reproductive success (Butler 1995), larger colonies may be more stable and are probably indicative of more or better foraging habitat and higher productivity (number of fledglings/nesting herons) than smaller colonies. Should priorities need to be set, larger colonies should receive more protection than smaller colonies.

The timing of a proposed activity. Great blue herons are less tolerant of disturbance during the pre-nesting and courtship periods, becoming progressively less likely to temporarily leave or abandon nests after laying eggs (Kelsall 1989, Bowman and Siderius 1984, Rodgers and Smith 1995).

Topographic or vegetative features surrounding the colony that might ameliorate the effect of human disturbance.

The availability of foraging areas and their proximity to the colony site (Simpson 1984; Gibbs et al. 1987; Gibbs 1991; Butler 1992, 1995).

Proximity of forest lands that could be used as alternative colony sites (Simpson 1984, Julin 1986, Gibbs et al. 1987).

Land-use patterns and potential for long-term availability of nesting and foraging habitat.

To protect colonies from human disturbance, most studies reviewed by Butler (1992) recommended a minimum 300 m (984 ft) buffer zone from the periphery of colonies in which no human activity occurs during the courtship and nesting season (15 February to 31 July). Many authors of these studies, however, make recommendations in the absence of data showing the effects of human disturbance on nesting great blue herons. Moreover, colonies in Washington have been established or continue to persist within 300 m (984 ft) of human disturbance. Following experimental work on the disturbance of nesting great blue herons in Ontario, Canada, Vos et al. (1985) recommended that a 250 m (820 ft) buffer zone (their greatest flushing distance) plus 50 m (164 ft) for a total of 300 m (984 ft) would be suitable to minimize disturbance to nesting great blue herons. In a similar study on flushing distance in Florida, Rogers and Smith (1995) recommended a distance of 100 m (328 ft) to avoid disturbance to nesting great blue herons from motor boats and humans on foot.

In the absence of comprehensive land-use and/or colony site management plans, we recommend the establishment of permanent, year-round minimum protection areas (buffers) of 250-300 m (820-984 ft) from the peripheries of colonies (Bowman and Siderius 1984, Quebec 1986 *in* Kelsall 1989, Vos et al. 1985, Buckley and Buckley 1976, Pullin 1988, Short and Cooper 1985, Parker 1980). All human activities likely to cause colony abandonment should be restricted in this buffer year-round. All human activities likely to cause disturbance (flushing and other behaviors that may reduce fitness) to nesting great blue herons should be restricted in this buffer area from the beginning of courtship behavior through fledging (15 February to 31 July) unless site specific nesting chronology is known (J. Kelsall, personal communication) in which case timing of restrictions should reflect this knowledge. In addition, we concur with Butler's (1991) recommendation that activities such

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as logging or construction should not occur within 1,000 m (3,281 ft) of a colony and no aircraft should fly within a vertical distance of 650 m (2,133 ft) during the nesting season unless those activities can be shown to have no effect on great blue heron fitness.

Since the proximity of nesting habitat to foraging habitat is important to great blue heron fitness (Butler 1995), the loss or degradation of nesting habitat may be a problem if alternative great blue heron nesting habitat becomes limited. We recommend that several alternative forested stands at least 4 ha (10 ac) in size with dominant trees at least 17 m (56 ft) in height be left in the vicinity of existing great blue heron breeding colonies (Parker 1980, Jensen and Boersma 1993). Large colonies (>50 nests) would likely require more alternative nesting habitat. J. Kelsall (personal communication) suggested leaving large nesting trees in the center of an area having 300 m (984 ft) or more of isolation during the breeding season.

Important foraging areas within a minimum radius of 4 km (2.5 mi) of colonies should be protected from development (Hoover and Willis 1987). In addition, each foraging area, particulary those that are intensively used, should have a surrounding buffer zone of at least 100 m (328 ft) (Short and Cooper 1985). Human activities that reduce the value of foraging sites should be minimized in these buffer zones. Buffer zones may be critical for foraging areas that are surrounded by intense human development (Short and Cooper 1985, Hoover and Wills 1987).

Organochlorine, organophosphate, and carbamate insecticides can be highly toxic to birds, mammals, and fish, and their use should be avoided near great blue heron colonies and upland/wetland foraging habitat (McEwen et al. 1972, Grue et al. 1983, Grue et al. 1986, Smith 1987). Synthetic pyrethroids (e.g., permethrin) are low in their toxicity to birds and mammals and may be used as alternatives. However, they are highly toxic to fish and should be kept out of water systems (Grue et al. 1986, Smith and Stratton 1986). The use of any insecticide (Smith 1987) or herbicide (Santillo et al. 1989) should be avoided in great blue heron nesting or foraging habitat unless it has been shown to have no effect on great blue heron fitness. Appendix A provides contacts useful for assessing pesticides, herbicides, and their alternatives.

Buffer zones around great blue heron colonies (300 m [984 ft]) and foraging areas within 4 km (2.5 mi) of colonies (100 m [328 ft]) should be free of pesticides (Brown 1978, Smith 1987). Suggested buffer widths for insecticide spray application near foraging areas range from 31-500 m (102-1,640 ft) (Kingsbury 1975, Payne et al. 1988, Terrell and Bytnar-Perfetti 1989), but in general buffer widths should increase as the toxicity of the treatment compound increases. Determination of buffer widths should account for pesticide droplet size and volume and meteorological conditions (Kingsbury 1975, Brown 1978, Payne et al. 1988).

Efforts to increase awareness of great blue heron nesting colonies should concentrate on inventories, information exchange, and education. Used and abandoned colony sites should be inventoried regularly and mapped by local and state agencies. Reproductive success should be monitored, particularly if it is likely to be affected by bald eagles and/or human disturbance.

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KEY POINTS

Habitat Requirements

- Great blue herons are colonial breeders that nest in tall (>7 m [23 ft]) deciduous or evergreen trees near fresh and saltwater wetlands.
- Great blue herons typically nest at heights ranging from 9-26 m (29-85 ft).
- Great blue herons feed on aquatic and marine animals found in shallow water, and sometimes on mice and voles from upland habitats. They usually forage within 2-5 km (1-3 mi) of their breeding colony site.
- Alternative nesting and feeding habitat is probably critical to great blue heron reproductive success.
- Great blue herons that have experienced few disturbances may not tolerate human activities near their colonies. However, great blue herons that have been frequently or consistently exposed to disturbance may be more tolerant of human disturbances.

Management Recommendations

- Wherever possible, a habitat protection buffer at least 300 m (984 ft) wide should be established around the periphery of a colony. All human activities likely to cause colony abandonment should be restricted in this buffer year-round, and all human activities likely to cause disturbance to nesting great blue herons should be restricted in this buffer area from 15 February to 31 July.
- Site specific management plans should be developed for each great blue heron colony whenever activities that might affect that colony are proposed. Such plans should consider the following:
  - The colony's size, location, relative isolation, and degree of habituation to disturbance;
  - Topographic or vegetative features surrounding the colony that might ameliorate the effect of human disturbance;

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  - The availability of foraging areas and their proximity to the colony site;
  - Proximity of forest lands that could be used as alternative colony sites;
  - Land-use patterns and potential for long-term availability of nesting and foraging habitat.
- Stands of large trees at least 17 m (56 ft) high and at least 4 ha (10 ac) in size that can be buffered from disturbance should be left in the vicinity of great blue heron breeding colonies as alternative nesting habitat.
- Foraging areas, especially wetlands, within a minimum radius of 4 km (2.5 mi) of colonies should be protected from development and should have a surrounding disturbance free buffer zone of at least 100 m (328 ft).
- Attempts should be made to keep all pesticides out of great blue heron foraging and nesting habitat, and associated buffer zones. Refer to Appendix A for contacts useful when assessing pesticides, herbicides, and their alternatives.
- Activities such as logging or construction should not occur within 1,000 m (3,281 ft) of a colony, and no aircraft should fly within a vertical distance of 650 m (2,133 ft) during the nesting season.
- Alternative forested stands at least 4 ha (10 ac) in size with dominant trees at least 17 m (56 ft) in height should be left in the vicinity of existing great blue heron breeding colonies.

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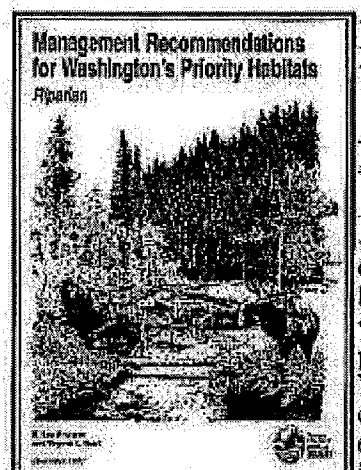
WASHINGTON DEPARTMENT OF FISH AND WILDLIFE

Priority Habitats and Species



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Management Recommendations for Washington's Priority Habitats: Riparian

Executive Summary

By virtue of its high productivity, diversity, continuity, and critical contributions to both aquatic and upland ecosystems, riparian habitat provides a rich and vital resource to Washington's fish and wildlife. Riparian habitat occurs as an area adjacent to rivers, perennial or intermittent streams, seeps, and springs throughout Washington. Because it is generally a narrow band, riparian habitat covers a relatively small portion of the state. Riparian areas contain elements of both aquatic and terrestrial ecosystems which mutually influence each other and occur as transitions between aquatic and upland habitats.

Seventy-seven species of fish inhabit freshwater in Washington. Riparian habitat performs many functions that are essential to fish survival and productivity, and it is critical in supporting suitable instream conditions necessary for the recovery of imperiled native salmon stocks. Vegetation in riparian areas shades streams maintaining cool temperatures needed by most fish. Plant roots stabilize stream banks and control erosion and sedimentation, and vegetation creates overhanging cover for fish. Riparian habitat contributes leaves, twigs, and insects to streams, thereby providing basic food and nutrients that support fish and aquatic wildlife. Large trees that fall into streams create pools, riffles, backwater, small dams, and off-channel habitat that are necessary to fish for cover, spawning, rearing, and protection from predators. Pools help maintain riffles where gravel essential for spawning accumulates. Riparian vegetation, litter layers, and soils filter incoming sediments and pollutants thereby assisting in the maintenance of high water quality needed for healthy fish populations. Riparian habitat moderates stream volumes by reducing peak flows during flooding periods and by storing and slowly releasing water into streams during low flows.

Approximately 85% of Washington's terrestrial vertebrate species use riparian habitat for essential life activities and the density of wildlife in riparian areas is comparatively high. Forested riparian habitat has an abundance of snags that are critical to cavity-nesting birds and mammals and to many insectivorous birds. Downed logs are common and provide cover and resting habitat for amphibians, reptiles, and small mammals. Intact riparian habitat has well-developed vegetation, usually with multiple canopy layers. Each layer consists of unique habitat niches that together support a diversity of bird and mammal species. The relatively mild microclimate of riparian areas offers relief from hot, dry summers and cold, snowy winters which is especially important to deer, elk, and moose. Riparian

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habitat forms natural corridors that are important travel routes between foraging areas, breeding areas, and seasonal ranges, and provides protected dispersal routes for young. Protected access to water is also an essential attribute of intact riparian habitat.

Riparian habitat is limited geographically, however, and is vulnerable to loss and degradation through human activities and land uses. Since the arrival of settlers in the early 1800s, at least 50% and as much as 90% of riparian habitat in Washington has been lost or extensively modified. Protecting riparian habitat may yield the greatest gains for fish and wildlife across the landscape while involving the least amount of area.

The Washington Department of Fish and Wildlife (WDFW) has developed statewide riparian management recommendations based on the best available science. Nearly 1,500 pieces of literature on the importance of riparian areas to fish and wildlife were evaluated, and land use recommendations designed to accommodate riparian-associated fish and wildlife were developed. These recommendations consolidate existing scientific literature and provide information on the relationship of riparian habitat to fish and wildlife and to adjacent aquatic and upland ecosystems. These recommendations have been subject to numerous review processes.

Recommendations on major land use activities commonly conducted within or adjacent to riparian areas are provided, including those relative to agriculture, chemical treatments, grazing, watershed management, roads, stream crossings and utilities, recreational use, forest practices, urbanization, comprehensive planning, restoration, and enhancement. Management recommendations for riparian areas are generalized for predictable application across the Washington landscape and include the following standard riparian habitat area (RHA) widths.

Standard recommended Riparian Habitat Area (RHA) widths for areas with typed and non-typed streams. If the 100-year floodplain exceeds these widths, the RHA width should extend to the outer edge of the 100-year floodplain.

Stream Type	Recommended RHA widths in meters (feet)
Type 1 and 2 streams; or Shorelines of the State, Shorelines of Statewide Significance	76 (250)
Type 3 streams; or other perennial or fish bearing streams 1.5-6.1 m (5-20 ft) wide	61 (200)
Type 3 streams; or other perennial or fish bearing streams <1.5 m (5 ft) wide	46 (150)
Type 4 and 5 streams; or intermittent streams and washes with low mass wasting* potential	46 (150)
Type 4 and 5 streams; or intermittent streams and washes with high mass wasting* potential	69 (225)
*Mass wasting is a general term for a variety of processes by which large masses of rock or earth material are moved downslope by gravity, either slowly or quickly.	

Management recommendations for riparian habitat are developed to meet the goal of maintaining or enhancing the structural and functional integrity of riparian habitat and associated aquatic systems

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needed to perpetually support fish and wildlife populations on both site and landscape levels. Riparian habitat characteristics required by fish and wildlife include habitat connectivity; vegetation diversity in terms of age, plant species composition, and vegetation layers; vegetation vigor; abundance of snags and woody debris; unimpeded occurrences of natural disturbances and minimization of human-induced disturbances; an irregular shape; and a width that is adequate to retain riparian habitat functions. Although generalized for use across the landscape, these same characteristics can serve as performance guidelines if alternative site-specific management activities are pursued. Ideally, planning for riparian areas should be done from the perspective of an entire watershed.

It is expected that these management recommendations will contribute to the scientific component of planning, protection, and restoration efforts for fish and wildlife. These efforts include the Growth Management Act; habitat conservation plans (e.g., the Department of Natural Resources Habitat Conservation Plan); the WDFW Hydraulic Code; the Puget Sound Action Plan; the Timber, Fish, and Wildlife Agreement; individual landowner farm and forest plans; and restoration projects conducted through the Jobs for the Environment Program, Regional Fisheries Enhancement Groups, State Conservation Commission, For the Sake of the Salmon, and other efforts. Habitat requirements for salmon recovery outlined in WDFW's Wild Salmonid Policy were derived, in part, from these management recommendations. These recommendations may provide a basis for WDFW participation in other planning processes that address riparian management strategies; however, WDFW will defer to negotiated agreements (e.g., the TFW Forestry Module) regarding riparian management that may result from our participation in those planning processes.

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MANAGEMENT RECOMMENDATIONS FOR THE RED-TAILED HAWK (*Buteo jamaicensis*)

RANGE

Ubiquitous throughout North America. Breeds from western and central Alaska, across Canada and the United States to Central America, Costa Rica and western Panama, and northern Bahamas and Greater and Lesser Antilles. Mostly migratory, wintering from southern Canada and over the U.S., south to Central America and the remainder of its breeding range (AOU 1957, Johnsgard 1990).

WASHINGTON DISTRIBUTION

Present year-round and breeder in Washington except uncommon to absent in winter in the northcentral and northeastern parts of Washington especially in higher elevations (Larrison 1981, Knight and Smith 1982).

HABITAT REQUIREMENTS

Common red-tailed hawk nesting habitat is characterized by mixed deciduous, open woods, or small woodlots with large trees and relatively open canopies, surrounded by large, open fields (Orians and Kuhlman 1956, Howell et al. 1978, Rothfels and Lein 1983, Toland 1990). Titus and Mosher (1981) found red-tailed hawks nesting in continuous forests. Trees are favored for nesting but other substrates are used including cliffs, tall shrubs, and, rarely, artificial structures (Craighead and Craighead 1956, USDI 1979, Knight and Smith 1982, Bechard et al. 1990). In Missouri, Toland (1990) found the majority of woodlots with nests ranged from 1-10 acres (0.4 to 4 ha). Speiser (1990) found woodlots as small as 1 ha were sometimes used. Solitary and shelterbelt trees may rarely be used but they are not preferred (Bednarz and Dinsmore 1982, Speiser 1990, Toland 1990). Howell et al. (1978) concluded that amount of woodlot within the territory may not be as important as the character and proximity of

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surrounding hunting fields. Thick conifers may be needed as winter night roosts (Brown and Amadon 1968).

Red-tailed hawks hunt primarily in non-forested fields and open areas (Smith and Murphy 1973, Howell et al. 1978) and over short vegetation less than 4 in (10 cm) (Orde and Harrell 1977). Because perches provide access to prey, number and arrangement of hunting perches within the territory are vital for successful hunting and reproduction (Fitch et al. 1946, Brown and Amadon 1968, Janes 1984b, Preston 1990). Janes (1984b) found that long-term reproductive success was determined mostly by dispersion and density of hunting perches and suggested that a minimum number of regularly dispersed perches enables the hawks to forage more effectively.

Red-tailed hawks construct stick nests high in the tree (at about 70% of the tree height) with a wide view of the surrounding land, and unobstructed access (Bent 1937, Howell et al. 1978, Titus and Mosher 1981, Bednarz and Dinsmore 1982, Bechard et al. 1990, Speiser 1990, Toland 1990). Orians and Kuhlman (1956), Titus and Mosher (1981) and Bednarz and Dinsmore (1982) believe that given a suitable territory, the overriding factor in red-tailed hawk nest tree selection is open access to the nest. Nest trees are probably selected more for dominance (height), structure, and placement rather than species (Orians and Kuhlman 1956, Howell et al. 1978, Toland 1990). Nonetheless, Speiser (1990) found that, in Snohomish County WA., only black cottonwood and red alder were used as nest trees. Titus and Mosher (1981) concluded that red-tailed hawks select for specific characteristics in the nest tree. Nest tree height is usually 54-97 ft (16-30 m) but varies from a few feet to over 135 ft (41 m) (Howell et al. 1978, Titus and Mosher 1981, Speiser 1990, Toland 1990). Nest trees are not necessarily the largest of the deciduous trees in the area (Speiser 1990). Average nest height above ground is 51-66 feet (16-20m) (range 10-120 ft [3-37 m]) depending on tree species (Bent 1937, Bednarz and Dinsmore 1982, Bechard et al. 1990, Speiser 1990, Toland 1990).

Nesting red-tailed hawks are territorial and defend the hunting range around the nest (Craighead and Craighead 1956, Smith and Murphy 1973, USDI 1979, Rothfels and Lein 1983). Pairs or individuals tend to return to the same nest territory over the years (Craighead and Craighead 1956, Janes 1984a, Toland 1990). Where there are good alternative sites, the pair may construct more than one nest (Craighead and Craighead 1956, Toland 1990). Even though suitable nest sites are available, space free of intra- or interspecific interference, or human disturbance, can be limiting (Rothfels and Lein 1983). Breeding density reported in the literature varied from one pair per 5 km^2 to one per 33 km^2 depending on habitat conditions

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SDI 1979, Minor and Minor 1981, Rothfels and Lein 1983, Toland 1990). Janes (1984b) reported a mean territory size of 2.3 km^2 and Craighead and Craighead (1956) gave a 0.75 mile (1.2 km) hunting radius around the nest. Andersen and Rongstad (1989) reported fall territory sizes ranging from 4 - 14 km^2.

Red-tailed hawks can successfully nest in urban/suburban areas if habitat requirements are met and if there is freedom from direct human persecution (such as destroying nest or nest tree, killing adults or young or taking of young from the nest) (Valentine 1978, Hull 1980, Minor and Minor 1981, Bechard et al. 1990). Nevertheless, humans are an extremely significant source of mortality and nest failure for red-tailed hawks. Human disturbance causes changes in red-tailed hawk behavior and activity (Knight et al. 1989, Andersen et al. 1990), adversely affects nest success and productivity (Fitch et al. 1946, Wiley 1975, Henny and Wight 1972, Janes 1984b, Andersen 1990), and causes displacement of and affects the size and placement of the home range (Andersen et al. 1990). Wiley (1975) reported 60% nest failure in human-disturbed areas whereas only 6% in areas of minimal or no human disturbance. Wiley (1975) also observed that failures in areas near people were five times as great during incubation and 15 times as great during the nestling period. Individuals will vary in their tolerance of disturbance. Pairs that choose to nest in existing urban areas will have more tolerance for human activity than those encroached upon by development or in rural areas (Fitch and Bare 1978, Howard and Postovitt 1987, Speiser 1990, Kochert pers comm.).

Red-tailed hawk diet is exceptionally varied and flexible with small mammals and snakes as the main prey (Craighead and Craighead 1956, Knight and Erickson 1976, Stinson 1980, USDI 1979, Janes 1984b, Steenhof and Kochert 1985 and 1988, Toland 1990). Immature red-tailed hawks have a more restricted diet because of hunting inexperience and may even subsist largely on invertebrates such as slugs (Craighead and Craighead 1956, Johnson 1986, Toland 1980). Even though red-tailed hawks are flexible, adequate numbers of prey are necessary for successful reproduction (Janes 1984b). Red-tailed hawks may be particularly vulnerable to urbanization because of their dependence upon terrestrial prey whose habitat is destroyed by development (Howard and Postovitt 1987). Low prey abundance can decrease clutch size (Howell et al. 1978, Cress and Langley 1988).

LIMITING FACTORS

Factors limiting distribution, nesting densities, population density and nest success are: 1. suitable nest substrate availability and distribution, 2. hunting perch availability and

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distribution, 3.availability and accessibility of hunting habitat and prey, and 4. distance and safety from human disturbance. Authors vary on which factor is most limiting.

MANAGEMENT

Management for red-tailed hawks should include protection of nest substrate (usually trees) and associated habitat, protection of hunting perches and fields or open habitat adjacent to the nests, and protection from human persecution and disturbance. Monitoring reproduction is needed to determine the effects of development and cumulative human pressure on reproductive success, and to ensure that replacement numbers are being met. Henny and Wight (1972) suggest 1.3-1.4 fledglings/pair/year as replacement. Specific management techniques are:

1. Preserve nest tree or other substrate and at least one acre (0.4 ha) of the nesting woodlot or area around the nest (Toland 1990). Maintain and protect all trees at least within the woodlot 50 ft (15 m) tall and greater. Maintain and protect nearby woodlots whenever possible. If alternate nest trees are unavailable, plant fast growing replacement trees such as cottonwoods. Periodically thin trees and ground cover in nesting woodlot (Bednarz and Dinsmore 1982). Provide education on the affects of disturbance, and legal consequences of taking, harming or killing (Howard and Postovitt 1987). Neighborhood covenants could stipulate protection of red-tailed hawk nest and habitat. Fences may be needed to protect nestlings from being taken.

2. Restrict clearing, grading, construction and other human activity, including recreational, around the nest site during the nesting period of February 1 - July 31 (Bent 1937, Fitch et al. 1946, Craighead and Craighead 1956, Brown and Amadon 1968, Wiley 1975, USDI 1979, Johnson 1986, Toland 1990). Heavy activity such as clearing, grading, or outside construction should be prohibited within a radius of 1320 ft (400 m) of the nest during the nesting period and less intrusive activity such as walking, driving, and daily human activity should be restricted within 660 ft (200 m) of the nest (Michael Kochert, U.S. Bureau of Land Management, pers. comm). Site specific management plans may be considered for each site tayloring management to site characteristics, amount of urbanization and type of human activity and providing as much buffer as possible. Sites with greater vegetational buffer may require a smaller restricted area.

3. Preserve hunting fields adjacent to nesting woodlot and as many as possible within a one mile (1.6 km) radius of the nest. Preserve hunting perches within territory or erect artificial perches such as utility poles or as described by Stumpf (1977), Hall et al. (1981), or Reinert 1984 and disburse evenly throughout range (Janes 1984b).

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4. Reclaim hunting field vegetation by clearing shrubs and seeding with native forbs and grasses (Craighead and Craighead 1956, Buttery and Shields 1975 in Kochert 1989, Howell et al. 1978, Baker and Baker 1981 in Kochert 1989, Bednarz and Dinsmore 1982, Janes 1984b). Restrict pesticide use in and adjacent to hunting habitat.

5. Grant permits only if appropriate mitigation and/or protection is provided for red-tailed hawk nest and habitat. Moore and Mills (1977 in Howard and Postovitt 1987) offer a guide to developing lease and permit stipulations for wildlife mitigation.

Red-tailed hawks are protected under the Federal Migratory Bird Treaty Act making it unlawful to take, possess, buy, sell, purchase, transport or barter it or any part of it including feathers or other parts, nests, eggs, or products. "Take" means to pursue, hunt, shoot, wound, kill, trap, capture or collect or other harm caused to this species or its nest. The red-tailed hawk is also protected in the state of Washington. Violations of these laws should be reported to the U.S. Fish and Wildlife Service and to the local regional office of the Washington Department of Wildlife.

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COB_SMP009538

APPENDIX A

Protection of Red-Tailed Hawks in Seattle, Washington

Federal

16 USC 703-712; Migratory Bird Treaty Act – unlawful to molest or kill migratory birds, destroy nests or eggs.

State

RCW 77.16.120; Taking of protected wildlife – unlawful to destroy nests or eggs; or injure, capture, or harass a wild bird.

RCW 43.21C; State Environmental Policy Act (SEPA) – procedures for coordinated environmental planning.

City of Seattle

Seattle Environmentally Critical Areas Policy, July 13, 1992; – calls for the protection of wildlife habitat areas.

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COB_SMP009540

Washington Department of Wildlife
Management Recommendations for Priority Species

Pandion haliaetus

Osprey

RANGE: Breeds along sea coasts, rivers and lakes of coastal North America. Winters in the West Indies and in Central and South America.

WASHINGTON DISTRIBUTION: A summer resident along waterways east and west of the Cascade Mountains. Ospreys are found in western Washington from Bellingham to the Columbia River, and in forested portions of eastern Washington.

HABITAT REQUIREMENTS: Ospreys feed almost exclusively on live fish captured at or near the water's surface. Although nests are generally built near productive bodies of water, estimates of osprey hunting ranges may extend to distances of 10 to 15 km (16-24mi.) from the nest (Henny 1986, Poole 1987, Sidle and Suring 1986). Ospreys usually construct large stick nests in live trees or dead snags with flat, broken tops. These trees are typically as tall or taller than surrounding structures. Sites that offer accessory perches within view of the nest are preferred (Zarn 1974).

This species exhibits strong nest-site fidelity; breeding pairs usually return to the same site year after year to breed (Vana-Miller 1987). Nesting pairs defend the area around their nest and raise one brood per year (Sidle and Suring 1986, Vana-Miller 1986, Poole 1987). Males use the same perch site located within view of the nest (Hickman, pers. comm.).

Individual osprey pairs apparently vary in their ability to tolerate human disturbance (Van Daele and Van Daele 1982). Several studies (in Vana-Miller 1987) indicate that tolerance to human activities depends upon the timing and frequency of the activities and on the degree of habituation that individual pairs develop to them. Ospreys initiating nesting in or near an area frequented by humans may be more tolerant of subsequent human activities than those unaccustomed to humans (Swenson 1979, Van Daele and Van Daele 1982). Human activities that are initiated during incubation and early nesting are probably most disturbing to ospreys. Disturbance during this critical period (April 1-June 30) can cause adults to leave the nest frequently or for extended periods of time, which can be fatal to embryos and nestlings (Van Daele and Van Daele 1982, Levenson and Koplin 1984).

LIMITING FACTORS: Availability of snags, suitable live trees, or other suitable nest structures near large bodies of water that produce adequate fish supplies.

MANAGEMENT RECOMMENDATIONS: Land managers should observe the following guidelines around osprey nests: 1) Restrict all human activities within 201m (660') of any active osprey nest, from April 1 to October 1; 2) Do not cut trees within a 61m (200') radius of each individual nest. This radius can be reduced to 40m (130') when topography dictates; 2) Beyond the 61m "no cut" zone, retain 3-5 live or dead dominant trees currently suitable for nesting or roosting, and some healthy

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young trees suitable for future roosting or nesting within a 201m radius of the nest tree (Zarn 1974, Westall 1986). At least one snag or perch site for each pair member is recommended (Hickman, pers. comm.); 3) Where vandalism is unlikely, mark nest trees with metal signs to prevent destruction by uninformed individuals (Zarn 1974, Westall 1986).

When osprey nests are located along a shoreline, the following additional guidelines should be observed:
1) Retain a 61m buffer around water bodies where ospreys nest in which timber and snags are not cut (Zarn 1974, Westall 1986); 2) Beyond the 61m "no cut" zone, maintain at least two dominant live trees and two desirable snags per acre within an additional, "restricted cutting" zone of 335m (1,100') (Zarn 1974, Westall 1986); 3) Preserve all broken-top snags and live trees suitable for osprey nesting for a distance of 3.2km (2 mi.) beyond the "restricted cutting" zone.

Ospreys which are unaccustomed to human activities should be protected from disturbance. Roads should be closed between April 1 and September 15 if they are located within 201m of a sensitive pair. In remote areas, campsites should not be located within 1km (0.7 mi.) of occupied nests, and hiking trails should not come within 91m (300') of the nest tree.

Some chemicals applied to water systems could contaminate or reduce the amount of prey available to ospreys. Pesticides, especially organochlorines, should not be used in any watershed used by ospreys. Fish control projects, including rotonone applications, should not be undertaken in waters where the birds hunt unless temporary alternative food sources are available.

Artificial platforms may be useful if mitigation for loss of a naturally occurring nest site is required.

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KEYPOINTS:

Habitat Requirements:

- Feed exclusively on fish.
- Construct large stick nests in the largest snags or live trees with flat, broken tops, usually located near water.
- Individual pairs show variation in their ability to tolerate human disturbance.

Management Recommendations:

- Restrict all human activities within 201m of any active osprey nest between April 1 and October 1.
- Establish a "no cut" zone within 61m of each nest.
- Retain 3-5 live or dead dominant trees and young recruitment trees with 201m of the nest tree.
- Do not cut trees within 61m around bodies of water associated within osprey nests.
- Maintain two dominant live trees and two snags per acre within 335m of the "no cut" zone around bodies of water associated with osprey nests.
- Preserve snags and live trees suitable for nesting for 3.2km beyond the "restricted cutting" zone around water bodies associated with osprey nests.
- Close roads between April 1 and October 1 if birds are unused to disturbance.
- Do not apply chemicals to any watershed used by ospreys.

C: T2/27/91 RM

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APPENDIX BAS-WL-2. BUFFER RECOMMENDATIONS FOR WILDLIFE FUNCTIONS

COB_SMP009544

Riparian Buffer Widths for Various Wildlife Functions

Buffer Functions	Riparian Buffer Width Studied (feet)	Reference	Notes
Wildlife Habitat	33	Petersen et al., 1992	Minimum for wildlife species
	75	Mudd, 1975	Pheasant, quail, and deer use
	100	Gregory et al., 1987	Macroinvertebrate diversity
	100 - 165	Dickson, 1989	Range for amphibian, reptile needs
	100-300	Castelle et al., 1992	Range for most wildlife species
	100 - 310	Rudolph & Dickson, 1990	Reptiles & amphibians
	100 - 330	Allen, 1983	Beaver
	105	Groffman et al., 1990	Forested buffer for minimizing noise impacts to wildlife
	220 - 305	Jones et al., 1988	Small mammals

COB_SMP009545

APPENDIX BAS-WL-3 CITY OF REDMOND DRAFT COMPREHENSIVE PLAN POLICIES FOR WILDLIFE

COB_SMP009546

THE CITY OF REDMOND
PLANNING DEPARTMENT

Technical Committee Report

To: Planning Commission

From: Technical Committee

Staff Contacts: Roberta Lewandowski, Director of Planning and Community Development, 425-556-2447
Judd Black, Development Review Manager, 425-556-2426
Cathy Beam, AICP, Senior Environmental Planner, 425-556-2429

Date: November 29, 2001

Application Number: DGA 01-004, Wildlife Habitat Plan

Recommendation: Adoption of Comprehensive Plan policy changes and associated Wildlife Habitat Plan.

Recommended Action: Move to approve policies to implement the Wildlife Habitat Plan.

Summary: The Wildlife Habitat Plan contains a comprehensive non-fish wildlife habitat inventory, maps of remaining habitat and linkages between them, a habitat assessment by priority, a comprehensive strategy for protecting/enhancing habitat, an analysis of current policy on and regulation of wildlife habitat, and recommendations on policy and regulatory changes. The proposed Comprehensive Plan amendments are in response to the policy recommendations (which includes non-regulatory approaches) of the Wildlife Habitat Plan. (See Exhibit C for a summary of these changes.)

Reasons the Proposal should be Adopted: The proposed amendments should be adopted because:

- There currently exists a gap in the city's wildlife habitat coverage that relies on development activity to prepare. The proposal will allow property owners and developers

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to know immediately land that is designated critical habitat and what policies pertain to it.

- The proposed policies provide predictability and eliminate uncertainty and time-consuming analysis during the development review process.
- Citizens of Redmond highly value wildlife and the natural beauty their habitats provide. Public surveys consistently have shown wildlife and wildlife habitat to be a high priority for preservation and protection.
- The proposed policies provide a comprehensive approach and solid framework for developing a logical, overall strategy for critical wildlife habitat management in an urbanizing area.
- The proposed policies assist in maintaining a rich environmental mosaic that complements other components of human welfare.
- The proposed policies best prevent unnecessary habitat loss in the city.
- The proposed policies best retain critical wildlife habitat citywide.
- The plan allows the city to qualify for wildlife habitat acquisition and restoration grants through the InterAgency Committee on Outdoor Recreation (IAC).
- The plan identifies potential sending sites for transfer of development rights (TDRs) to help provide incentives for preserving wildlife habitat.
- The proposed policies implement Countywide Planning Policies pertaining to wildlife habitat.

I. Applicant and Reason for Proposal

A. Applicant

City of Redmond

B. Reason for Proposal

Values

Public values establish wildlife and wildlife habitat as a high priority for Redmond citizens. A change from species-specific management to wildlife habitat management reflects public values.

Effectiveness

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The City adopted a Sensitive Areas Ordinance (SAO) in 1992. One of the components of the SAO includes the identification of, and regulation of development in, critical wildlife habitat. However, unlike other sensitive areas such as wetlands and streams, critical wildlife habitats were not mapped as part of the Ordinance. Therefore, little information relating to the properties that contain critical wildlife habitat is available ahead of the development process. Critical wildlife habitats are currently identified during the development review process (when they may be threatened) and are managed on a case-by-case basis. This creates significant problems during the development process.

A finding of the Wildlife Habitat Plan inventory analysis is that there has been a dramatic loss of habitat over the past several years. A total of 234 acres of wildlife habitat have been lost to development from 1996 to 1999. This equates to an average loss of 80 acres per year. Approximately 426 acres of additional habitat have been under construction or under development review since 1999. Although not all habitat can be saved in a growing urban area, this strategy of looking at habitat as a system and not on a case-by-case basis can be more effective in identifying and saving much of the best habitat remaining rather than isolated woodlands.

Intended Results

The proposed Wildlife Habitat Plan and associated Comprehensive Plan policy changes will allow the City to provide a proactive comprehensive approach and solid framework and strategy for critical wildlife habitat management. They will give clear direction on a balanced approach to critical wildlife habitat protection levels in an urbanizing environment. This will help eliminate the uncertainty during the development review process and assure administrative decisions that reflect the City Council's policy intent. This will assist in making the development review process predictable and less cumbersome, eliminating inconsistent decisions and time-consuming analysis. In addition, the Plan will assist the City in identifying potential sending sites for transfer of development rights (TDRs) and allow the City to qualify for wildlife habitat acquisition and restoration grants through the InterAgency Committee on Outdoor Recreation.

The amendments apply citywide. Figure 7 of the Wildlife Habitat Plan shows recommended habitat protection areas and corridors (See attached Exhibit B). These areas total 3,129 acres, approximately 29% of the City's area. Of this figure, 2,073 acres are already protected; leaving 1,056 acres of habitat not identified but likely to be identified in the development process.

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II. Recommendation

The proposal contains two elements: a Wildlife Habitat Plan document and policies that are based upon the Plan's recommendation. The policies are changes to the existing policy language of the Conservation and Natural Environment Element of the Comprehensive Plan.

The basic components of the Wildlife Habitat Plan include a comprehensive wildlife habitat inventory, maps of remaining habitat and linkages between them, habitat assessments, recommended habitat protection areas and linkages, an analysis of existing policies and regulations pertaining to wildlife habitat, and policy and regulatory recommendations.

Five key strategies are proposed:

- Identify habitat areas comprehensively and citywide versus during the development process;
- Focus on retaining the 3,129 acres of recommended habitat protection areas identified on Figure 7 of the Wildlife Habitat Plan (of this figure, 2,073 acres are already protected, leaving 1,056 acres currently not identified but likely to be identified during the development process);
- Establish wildlife corridors (habitat linkages) as identified on Figure 7 of the Wildlife Habitat Plan;
- Protect isolated parcels containing unique or unusual habitat; and
- Implement wildlife habitat enhancement and restoration opportunities.

Each of the policy/regulatory recommendations of the Plan have been included as policy in the amendment. These policies reflect an array of tools for protecting wildlife habitat in a growing urban city. They consist of both regulatory and non-regulatory approaches. Most of these policies are built upon fundamental values that are already described in existing City documents, including the Redmond Community Development Guide, Comprehensive Plan, and Park, Recreation, and Open Space Plan.

The proposed policies address the basic goal that the City should keep, maintain, and expand wildlife diversity and enhance degraded wildlife habitat. As mentioned above, there has been a dramatic loss of wildlife habitat over the past several years, averaging roughly 80 acres per year from 1996 to 1999. In addition, approximately another 426 acres of habitat have been lost because they either under construction or in the development review process since 1999. If the City is to retain some wildlife habitat, direction needs to be given regarding the appropriate level of protection. The proposed policies address this basic question.

The Technical Committee recommends adoption of both the Comprehensive Plan policy changes and associated Wildlife Habitat Plan. They concluded it is appropriate to protect wildlife habitat within the City. Further they find that it

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will be extremely useful to establish tools to achieve the proper level of protection while not precluding necessary infrastructure improvements.

III. Background

The Wildlife Habitat Plan (attached Exhibit B), based upon standard wildlife biology practices, is customized to our growing city. It was developed to represent a balanced approach between wildlife habitat protection and urbanization within the urban growth area. The proposed policies are regulatory and non-regulatory tools (education, voluntary programs, city practices) that can be selected or used in combination with one another to best achieve the desired level of wildlife habitat protection.

As discussed more fully later in the report, the proposal achieves: Growth Management Act (GMA) environmental goals; Countywide Planning Policies CA-7 and CA-8 for wildlife habitat; and compliance with Comprehensive Plan policy LU-142. It provides an overall comprehensive strategy for wildlife habitat management.

IV. Supporting Analysis: Facts and Conclusions

A. Existing Conditions

The City of Redmond currently has several policies and regulations designed to protect wildlife and wildlife habitat, which are contained in: the Comprehensive Plan; Community Development Guide (RCDG); and Parks, Recreation and Open Space (PRO) Plan. These policies and regulations form a solid basis for wildlife habitat protection, but can be strengthened through better policies and regulations to improve and broaden protection. The Conservation and Natural Environment policies chapter in the Comprehensive Plan and the Sensitive Areas Regulations of the Redmond Community Development Guide are provided in Appendix D of the Wildlife Habitat Plan. Below are two summary charts, one of existing Comprehensive Plan policies pertaining to wildlife and wildlife habitat and the other of existing Development Guide Regulations pertaining to wildlife and wildlife habitat (See Exhibit H for the complete text to this section).

COB_SMP009551

1. Summary of Existing Comprehensive Plan Policies Pertaining to Wildlife and Wildlife Habitat

Comprehensive Plan	Policy Summary
Conservation and Natural Environment Chapter: Wildlife Habitat Section	• Focus on "critical habitat". • Protect critical wildlife habitats within the City of Redmond. • Avoid impacts from land use plans and development. • Restore and enhance degraded habitat. • Design developments, parks and recreation areas to minimize harassment of fish and wildlife.
Conservation and Natural Environment Chapter: Surface Water Section	Restore degraded fish and wildlife habitat areas.
Conservation and Natural Environment Chapter: Conservation and Enhancement of Trees Section	Habitat protection is one purpose for protecting significant trees.
Land Use Chapter	Direct development away from sensitive areas.
Annexation Chapter	Exclude large areas of sensitive areas from Redmond's Potential Annexation Area.
Parks and Recreation Chapter	• One goal of city's park system includes parks to protect wildlife habitat. • Encourage greenbelts and parkland to provide "circulation linkages" including corridors for wildlife.
Park, Recreation, and Open Space (PRO) Plan	• Resource Parks category includes Natural Open Space Parks that are not intended to be developed. • Open Space Parks include wetlands, steep hillsides, wildlife habitats, stream corridors, environmentally sensitive areas, and unique natural sites. • Policies include improving wildlife corridors, access to water resources to provide for recreation and wildlife, and enhancing habitat in existing recreational corridors. • Acquisition locations identified.

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2. Summary of Existing Community Development Guide Regulations Pertaining to Wildlife and Wildlife Habitat

Development Guide	Regulation Summary
Sensitive Areas Ordinance (RCDG 20D.140.10)	• Protection of "critical habitat". • Restrictions on activities in and near critical habitat. • Establishment of buffers around critical habitat. • Provisions for mitigation of damage. • Type I wetlands and Class I streams classified as critical habitat. • Geologic hazard areas, although not specifically intended to provide wildlife habitat, provide significant habitat areas.
Tree Protection Regulations (RCDG 20D.80.20)	Significant stands of trees provide wildlife habitat, especially if preserved as part of a forest community.
Open Space and Recreation Requirements (RCDG 20D.110)	Conservation Open Space is an area with unique resources including plant and animals left in an undisturbed state.
Agriculture and Urban Recreation Zones (RCDG 20C.10)	Areas to be used for recreation, open space, and resource uses.
Transfer of Development Rights (20D.200)	Property owners with critical wildlife habitat may transfer off development rights.
Steep Slopes Residential Density Bonus (RCDG 20C.30.95)	• Allows a 50 percent density bonus for density transfers from sensitive areas. • Sensitive areas include geologic hazard areas, wetland, streams, critical wildlife habitats, and buffers.
Clustering (RCDG 20C.30.50)	Allows planned dwelling unit capacity on sites with environmental or physical constraints (which includes all sensitive areas).
Shoreline Regulations (RCDG 20D.150)	Includes protection of wildlife and aquatic habitats.

3. Need for Additional Policy Guidance

The policies in the Comprehensive Plan form a solid foundation for regulations to protect wildlife habitat. The City's goal is to protect a broader range of wildlife. This is indicated in the introduction to the wildlife habitat section of the Comprehensive Plan and in the directive that initiated this study. Having a broader knowledge base of critical wildlife habitat in the city allows us to establish a habitat network. This network will capture incidental

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species that happen to occur in critical wildlife habitat, which promotes species diversity. Related sections of the Comprehensive Plan include goals to protect wildlife habitat through land use and annexation regulations, surface water regulations, and significant tree protection regulations.

The recommendations for greenbelts and corridors for wildlife contained in the Comprehensive Plan Parks and Recreation chapter provides the basis for habitat protection that links individual areas. The wildlife habitat section in the Conservation and Natural Environment Chapter also addresses the issue of corridors and habitat fragmentation. The intent of this section is to ensure that connected habitat areas, rather than just isolated fragments are protected. This will allow wildlife migration and improve species health. However, one statement in this goal could be misinterpreted to mean that habitat will be protected only if it is connected to other habitat areas. That statement is: " . . . discouraging preservation of small, isolated areas." These small isolated areas can be important to wildlife, especially those threatened with local extinction. Certain species may require specialized habitats present in these isolated areas, such as amphibians that require seasonal ponds for breeding, or insects adapted to specific substrates for larval development. Because of the distance between habitat areas in the City, animals with limited dispersal ability are often unable to move to other suitable habitat areas when these isolated habitats are destroyed. While fragmentation should be discouraged, protection of small, isolated areas may be necessary for maintaining wildlife species diversity; these isolated areas could later be connected through acquisition of corridor areas.

The Sensitive Area Regulations contain several habitat protection mechanisms. The regulations include adequate buffer widths for most suburban-adapted wildlife. The requirement for permanent protection of buffers will reduce the likelihood that buffers diminish over time. A potential problem with the regulations is that the definition of wildlife habitat is narrowly limited to "critical habitat" as discussed above. Expanding the definition to include other habitat areas or adding regulations aimed at a broader class of wildlife would improve protection. The tree protection regulations appear to provide adequate protection for significant trees and tree stands in the City. However, an examination of recent developments calls into question how effectively the regulations are being implemented. Some developments do not appear to have 35 percent of tree stands remaining after development. In addition to tree retention, maintenance of the

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entire forest community is crucial for native wildlife. These tree protection regulations do not address the preservation and maintenance of the forest community that includes native understory trees, shrubs, and herbs.

The Transfer of Development Rights programs and the clustering regulation provide the City with opportunities to improve wildlife habitat protection by keeping development away from sensitive areas. These programs allow the City to enforce sensitive areas regulations without placing development burdens on property owners.

Redmond currently has several parks that provide wildlife habitat. The PRO Plan contains goals that would allow expansion of those parks into a system of parks and open space areas that could provide significant wildlife habitat in the City. The PRO Plan includes plans to connect park areas with corridors. This is a good idea because interconnected habitat areas provide better quality habitat than isolated areas. However, the PRO Plan currently has a limited definition of corridors and focuses on a narrow corridor width. The corridors discussed are all part of a trail system for recreational use. Although wildlife can use trail corridors for migration if those trails are surrounded by native vegetation, other types of corridors can provide more effective migration routes for wildlife. In addition, corridor widths of 200 feet or more have been found to provide far greater opportunities for wildlife movement than narrow corridors such as those cited in the PRO Plan.

4. Comparison to Neighboring Jurisdictions

Neighboring jurisdictions, Bellevue, Kirkland, and King County were contacted for information regarding wildlife habitat protection in their respective jurisdictions. Bellevue has four policies in their Comprehensive Plan that address fish and wildlife habitat. The overall goal is to provide fish and wildlife habitat of sufficient diversity and abundance to sustain existing indigenous wildlife populations. Bellevue does not have regulations. However, Bellevue does plan to address wildlife habitat as part of their critical areas update.

Kirkland is in the process of putting together a Natural Resource Management Plan that will include policies for fish and wildlife. There are a supporting few policies in their Comprehensive Plan. These policies address managing activities to preserve fish and wildlife habitat, working cooperatively with resource management

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agencies to improve wildlife habitat and preserving opportunities to observe and enjoy wildlife and wildlife habitats. Kirkland does not have regulations that specifically address wildlife.

King County has several policies related to fish and wildlife in their 2000 Comprehensive Plan. Their policy objectives are to: identify and protect critical fish and wildlife habitat conservation areas; link those critical habitat areas and other protected lands through a network system; and integrate fish and wildlife habitat and conservation goals into new and existing developments. King County also has a Wildlife Habitat Network and Public Ownership 2000 map. It shows wildlife linkages throughout the County. King County does not have regulations specific to wildlife and wildlife habitat (other than fish) in their Critical Areas Ordinance. However, they do have a Great Blue Heron overlay zone.

B. Consistency with the Growth Management Act, Procedural Criteria, Countywide Planning Policies and Other Statutes

1. Consistency with the Growth Management Act

In considering adoption of comprehensive plan amendments and development regulations, local government decision-makers must first consider consistency with the Growth Management Act. The comprehensive plan policies and development regulations must substantively comply with the Growth Management Act's goals. The Growth Management Act also contains substantive requirements that must be met. Compliance with the Growth management Act goals and the applicable substantive requirements is described below. Only the Growth Management Act goals that are related are addressed.

a. Environment Goal [RCW 36.70A.020(10)]

This goal requires the protection of the environment and enhancement of the state's high quality of life, including air and water quality, and availability of water. The proposed Wildlife Habitat Plan and associated Comprehensive Plan policy changes further this goal of environmental protection.

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b. Citizen Participation and Coordination [RCW 36.70A.020(11)]

This goal encourages the involvement of citizens in the planning process. The City issued a press release June 12, 2000 notifying the public that the City was going to develop a Wildlife Habitat Plan. The release invited those interested to participate in a kick-of meeting on June 21, 2000. Meeting notices were posted in City buildings, the library, the City's web site and cable TV. Notices were sent to those people on an informal environmental issues mailing list the City maintains. Mention of the Wildlife Habitat Plan was made on KOMO 4 News June 18, 2000 and an article appeared in the Eastside Journal on June 18, 2000. In addition, the City published an article about the Plan inviting citizens to participate in its development in the Fall 2000 issue of *Focus on Redmond*.

Citizen Review Committee involvement is discussed below under *Public Involvement*.

2. Consistency with the State of Washington Office of Community Development Procedural Criteria

Consistency with the Growth Management Act was discussed above. The "procedural criteria" are interpretative regulations adopted by the State of Washington Office of Community Development to guide local governments in carrying out the GMA. The definition of "critical areas" includes fish and wildlife habitat conservation areas.[1] Each city planning under the GMA is required to adopt development regulations that protect critical areas.[2] Each city shall include the best available science in developing policies and development regulations to protect the functions and values of critical areas.[3] The Wildlife Habitat Plan was developed using best available science and current industry standards.

3. Consistency with Countywide Planning Policies

The King County Countywide Planning Policies mirror the Growth Management Act requirements for wildlife habitat discussed in the prior section. Countywide Planning Policy CA-7 states, "Adjacent jurisdictions shall identify and protect habitat networks that are

[1] RCW 36.70A.030(5)
[2] RCW 36.70A.060(2)
[3] RCW 36.70A.172

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aligned at jurisdictional boundaries. Networks shall link large protected or significant blocks of habitat within and between jurisdictions to achieve a continuous countywide network. These networks shall be mapped and displayed in comprehensive plans." In addition, policy CA-8 states, "All jurisdictions shall identify critical fish and wildlife habitats and species and develop regulations that promote their protection and proper management; and integrate native plant communities and wildlife with other land uses where possible." Both the Wildlife Habitat Plan and associated policy changes to the Comprehensive Plan address these two policies.

C. Compliance with the Criteria for Comprehensive Plan or Development Regulations Amendments

Amendments to the City of Redmond Comprehensive Plan and development regulations must undergo Washington State Environmental Policy Act (SEPA) review, state agencies must be given the opportunity to comment, a public hearing must be held, the Planning Commission must make a recommendation on the proposed amendments, and the City Council must adopt the policies and regulations. Compliance with the procedural requirements completed to date is documented in the findings of fact below.

Comprehensive Plan Policy LU-142. Comprehensive Plan Policy LU-142 and Redmond Community Development Guide Section 20F.40.50 establish criteria for comprehensive plan map and policy amendments. The compliance with each criterion is discussed below:

1. **Consistency with the Growth management Act (GMA), the State of Washington Department of Community, Trade and Economic Development Procedural Criteria, and the King County Countywide Planning Policies.**

   See discussion above.

2. **Consistency with the Comprehensive Plan policies and the designation criteria.**

   The proposal is consistent with the Comprehensive Plan policies and designation criteria.

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3. **The capability of the land including the prevalence of sensitive areas.**

   Wildlife habitat designations are consistent with the capability of the land. The majority of these areas are already protected as other sensitive areas, such as wetlands, streams and steep slopes. These areas are also consistent with the City's current regulations pertaining to development of land with critical wildlife habitat.

4. **Consistency with the preferred growth and development pattern in the Land Use Chapter of the Comprehensive Plan.**

   The preferred growth and development pattern directs growth away from sensitive areas. This is consistent the proposal.

5. **The capacity of public facilities and services and whether public facilities and services can be provided cost-effectively at the intensity allowed by the designation.**

   Land use designations are not changed by this proposal.

6. **Whether the allowed uses are compatible with nearby uses.**

   The proposal does not modify allowed uses.

7. **If the purpose of the amendment is to change the allowed uses in an area, the need for the land uses which would be allowed by the Comprehensive Plan change and whether the change would result in the loss of the capacity to accommodate other needed land uses, especially whether the proposed change complies with the policy of no net loss of housing capacity.**

   The amendment does not change the allowed uses in an area. The majority of the wildlife habitat areas are areas that are designated protected open space, city-owned park lands and lands with other sensitive areas restrictions. The city has not relied on these areas to meet either housing or employment targets.

8. **For issues which have been considered within the last four annual updates or comprehensive plan amendments, whether there has been a change in circumstances that makes the proposed plan designation or policy change appropriate or whether the amendment is needed to remedy a mistake.**

   There has been a dramatic loss of habitat over the past several years. A total of 234 acres of wildlife habitat have been lost to

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development from 1996 to 1999. This equates to an average loss of 80 acres per year. Approximately 426 acres of additional habitat have come under construction or development review since 1999. It appears that the city's current critical wildlife habitat regulations are not sufficiently addressing habitat loss. The proposed Wildlife Habitat Plan and associated Comprehensive Plan policy changes will give clear direction on wildlife habitat protection levels in an urbanizing environment.

V. Authority and Environmental, Public and Agency Review

A. Subject Matter Jurisdiction

The Redmond Planning Commission and Redmond City Council have subject matter jurisdiction to hear and decide whether to adopt the proposed comprehensive plan amendments.

B. The Washington State Environmental Policy Act (SEPA)

A SEPA checklist has been prepared for the Wildlife Habitat Plan and associated policies. A Determination of Non-Significance was issued by the City on June 4, 2001 (See attached Exhibit E). No comments or appeals were filed.

C. Sixty-day Agency Review

This Development Guide Amendment will be combined with other Development Guide Amendments and packaged part of the 2001 Comprehensive Plan update packet. This packet was sent for agency review on September 7, 2001.

D. Public Involvement

A Citizens' Review Committee (CRC) was created in February 2001. This seven-member committee represented various interests of people who live, work, or conduct business in Redmond. In addition, Dennis Connors, a former Planning Commissioner, attended the CRC meetings. The purpose of the Committee was to review the draft Wildlife Habitat Plan and offer comments and opinions on whether the plan provides a balanced, comprehensive approach for wildlife habitat management in an urbanizing area. Their discussions gave the city a preliminary reading and reaction to the Plan. The Committee met twice, once in February 2001 and once in March 2001. Minutes of their meetings are recorded in Exhibit F.

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The Planning Commission held a study session to discuss the Wildlife Habitat Plan on September 20, 2001. This meeting was broadcasted on the Redmond Government Access TV Channel (Cable Channel 27). Notice of this study session was given on the Planning Commission agenda and extended agendas.

The Redmond Community Development Guide establishes notification procedures for Comprehensive Plan amendments and hearings. The City will publish a legal notice of the Planning Commission hearing in the Eastside Journal 14 days prior to the hearing. Notice of the Planning Commission hearing will be posted in City Hall, the Redmond Library, and the Redmond Post Office. The City will also mail a notice of the Planning Commission public hearing to all persons on the City's comprehensive plan and development regulations update mailing list. Media releases will be sent to newspapers serving Redmond informing the public of the Planning Commission hearing. The City will place a notice on the Redmond Government Access TV Channel (Cable Channel 27) and City web site informing the public of the Planning Commission hearing. Notice of the hearing is given on the Planning Commission agendas and extended agendas.

E. Appeals

A Development Guide Amendment is a Type VI permit.[4] Final action is taken by the City Council. The action of the City Council on a Type VI proposal may be appealed by filing a petition with the Growth Management Hearings Board pursuant to the requirements set forth in RCW 36.70A.290. The petition is required to be filed within the 60-day time period set forth in RCW 36.70A.290(2).

VI. Exhibits

Exhibit A:	Proposed Amendments to the Wildlife Habitat section of the Conservation and Natural Environment Chapter of the Comprehensive Plan
Exhibit B:	Wildlife Habitat Plan (previously distributed at the Planning Commission's 7/11/01 meeting)
Exhibit C:	Chart Summary of Proposed Comprehensive Plan Policy Changes
Exhibit D:	Planning Commission Issues List
Exhibit E:	State Environmental Policy Act (SEPA) Documentation
Exhibit F:	Minutes from Wildlife Habitat Plan Citizens' Review Committee

[4] RCDG 20F.30.55

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Exhibit G: Definition of Terms
Exhibit H: Existing Wildlife and Wildlife Habitat Policy and Regulation Analysis

Roberta Lewandowski, Planning Director — 11.29.01 Date

O:/Cathy/Wildlife Habitat Plan/TC WHP Report

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D. Wildlife Habitat

Redmond residents highly value wildlife. The salmon and steelhead are enduring symbols of the Northwest. Birds are valued for their songs and appearance. Other wildlife is attractive and helps maintain the valued character of the area. Wildlife diversity often is an indicator of environmental health. This section of the Conservation and Natural Features element addresses wildlife habitat goals and policies. Fish are more specifically addressed under the Surface Water section.

Protecting wildlife requires protection of habitat and measures to tie the protected habitats together. The process of urbanization results in the conversion of wildlife habitat to other uses. However, the loss of certain types of habitat can have significant, adverse effects on the health of certain species. These types of habitat are referred to as critical wildlife habitats. Critical wildlife habitats include the habitats of species which state or federal agencies have designated as endangered, threatened, sensitive, candidate or other priority species; heron rookeries; raptor nests, such as eagle nests, and high quality (Class I) wetlands and (Type I) streams. Redmond protects these habitats.

The central planning concept for wildlife habitat in urban environments is to create an integration of habitat reserves and interconnecting corridors. Habitat reserves are generally considered to be areas of differing sizes that meet the basic needs of wildlife. Corridors are regarded as narrow, linear strips of habitat that have wildlife value. The corridors serve as interconnecting links between or along the habitat preserves. The following graphic illustrates this concept for wildlife habitat management in urban environments.

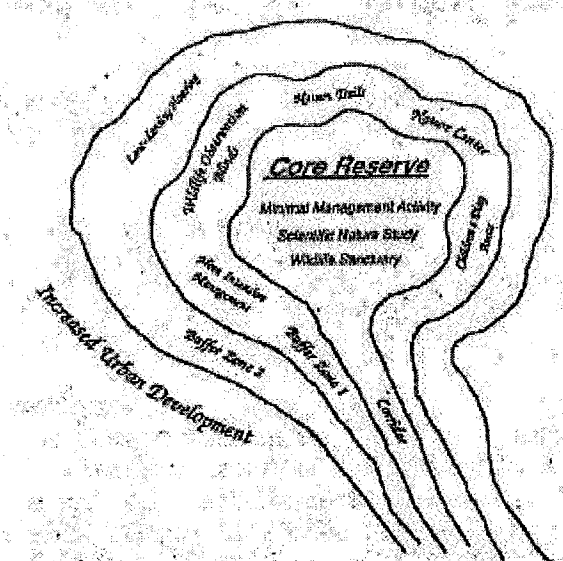

Fig. 1 Wildlife Habitat Management Concept

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The City's goal for wildlife habitat protection includes preservation of core habitat areas that include critical habitat for priority species and larger tracts of habitat that support a sustainable community of native wildlife species. These areas are shown on Figure 7, Existing and Recommended Habitat Protection Areas, and were selected, in part, based on their importance to priority species, Washington Department of Fish and Wildlife management recommendations for these priority species, and on the presence and sustainability of wildlife habitat linkages. Priority species are listed in Table 1 of the Wildlife Habitat Plan.

The following components describe the City's strategy on Wildlife Habitat Protection:

- Preserve core habitat areas identified on Figure 7 of the Wildlife Habitat Plan;
- Establish wildlife corridors as identified on Figure 7 of the Wildlife Habitat Plan;
- Protect unique isolated habitats; and
- Enhance and restore wildlife habitat.

NE-WH-1 The city's overall goal shall be to keep, maintain, and expand wildlife diversity and enhance degraded wildlife habitat.

NE-WH-2 Redmond's Wildlife Habitat Plan shall be used as a tool and guide for preserving and enhancing wildlife. It should also be used as a guide to determine where development is appropriate and which areas should be acquired or set aside from development.

NE-65WH-3 Redmond shall protect and enhance critical wildlife habitats within the City.

NE-WH-4 Protection and enhancement of core habitat areas shall be sufficient to maintain present species diversity and numbers in the Redmond area.

NE-66WH-5 Land use plans and developments ~~should~~ shall avoid impacts on critical wildlife habitats including the corridors and areas that directly support critical species, identified on Figure 7. Developments likely to impact negatively critical wildlife habitat should and restore and enhance degraded or lower quality critical wildlife habitat.

There are many viable habitat sensitive alternatives to traditional development. Planned unit development and clustering options provide flexibility in site layout compared to tradition type subdivision development. Houses can be situated on a portion of a site while permitting the same number of houses. This allows the balance of the site to remain untouched to protect critical wildlife habitat. Similar site "clustering" can be achieved for commercial development through the planned commercial development process. The city's transfer of development rights (TDR) program allows transfer of

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density from critical wildlife habitat areas off-site to designated TDR receiving areas in the city. All of these development options offer flexibility for preserving critical wildlife habitat areas.

NE-WH-6 **The city's transfer of development rights program, planned unit development and clustering options, and planned commercial development options should be used to preserve critical wildlife habitat.**

NE-WH-7 **The city should explore a variety of methods to acquire, protect, and preserve wildlife habitat and corridors, including land purchases, transfer of development rights, purchase of development rights, tax incentive programs, grants, and voluntary designation of sites as wildlife habitat by the landowner.**

NE-67WH-8 **Developments, parks and recreation areas should be designed to minimize ~~harassment~~ disturbance of to fish and wildlife.**

As a community develops, the available wildlife habitats become separated from each other. In part, this is a natural consequence of the development of urban areas. Unfortunately, this can isolate the plants and animals that live in critical wildlife habitats and lead to interbreeding or the loss of wildlife if the area is too small. If the pieces of critical habitat are tied together, populations can move between the habitat areas. This lessens the dangers of interbreeding and allows plants and animals to recolonize the underused habitats. Habitat fragmentation is addressed by protecting resource lands, such as the Sammamish Valley, and rural areas, such as the Bear Creek Valley, and by providing for open space corridors that connect protected habitats and allow wildlife to move through urbanized areas.

NE-68WH-9 **Habitat fragmentation should be minimized by linking wildlife habitats via corridors as identified on Figure 7 ~~and discouraging preservation of small, isolated areas~~. Wildlife habitats should be connected with each other within the City and the region to achieve a continuous countywide network. Wildlife corridors, as shown on Figure 7, ~~Links~~ can include ~~park lands~~parklands usable by wildlife, protected or reserved (Native Growth Protection Easements) open space, utility rights-of-way, riparian corridors, wetland buffers and protected sensitive areas. ~~These corridors and locating habitat areas adjacent to each other where possible. Riparian areas adjacent to creeks, rivers, lakes and wetlands can~~features can serve as important links between wildlife habitats.**

Wildlife corridors range in width from 100 feet to 2,000 feet in the city. In circumstances where they are wide enough, trail systems can link wildlife habitats. These trails and the

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habitat within them must be carefully managed to provide for both habitat and recreational functions without conflicts.

NE-WH-10 Ideally, minimum corridor widths should be at least 200 feet to provide survivable species density.

In some cases, isolated habitats contain specialized niches or microhabitats that certain species depend upon. In other cases, isolated habitats may be the only remaining native habitats available in portions of the city that are highly urbanized.

NE-WH-11 Preservation of a small isolated area should be encouraged when it provides a specialized habitat or localized attraction to birds.

Critical habitats also will be linked through the open space corridors provided for by the Parks and Recreation Chapter.

Many species of fish and wildlife are quite mobile and move from jurisdiction to jurisdiction during their life or with the seasons. This mobility requires a regional approach to their management.

NE-69WH-12 Redmond should coordinate land use planning and management of fish and wildlife resources with other local governments within the region, affected state and federal agencies and ~~Indian~~ Native American Nations and Tribes.

Most native wildlife species require a healthy forest understory of shrubs and herbs for cover, forage, and nesting. It has been scientifically documented that once the native understory is removed or disturbed, it is very difficult to recreate the understory by replanting.

NE-WH-13 Significant trees, as defined in the Redmond Community Development Guide, and any native understory present underneath these trees should be retained to maximize wildlife habitat conditions.

Urban wildlife habitats rarely can be set aside as nature preserves and be expected to maintain their integrity with no monitoring and maintenance due to numerous outside influence and managed landscapes surrounding them. A management strategy is needed for the maintenance of wildlife habitat.

NE-WH-14 The city should develop a wildlife habitat management strategy including well-defined goals, with mechanisms for city and volunteer support.

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NE-WH-15 Wildlife habitat areas that are preserved during land development projects shall be monitored and maintained for a minimum of five years.

Pesticides can kill birds and decimate prey populations of several city priority species. Usage of these substances to maintain city-owned rights-of-way, parklands, and public spaces should be discouraged.

NE-WH-16 The city in its daily operations will restrict the use of pesticides in order to protect wildlife and bird populations.

Weeds can be a problem because they are detrimental to wildlife by replacing native plant species and providing little to no value in terms of forage, cover or nest sites for the wildlife community. These weeds spread quickly from one area to another. Noxious weeds already adversely affect most habitat areas. Currently, the most prevalent problem weeds for wildlife in the city include blackberry species, Scot's broom, reed canarygrass, English ivy, and holly.

NE-WH-17 The city shall use native vegetation on city capital projects, prevent the continued spread of noxious weeds to habitat areas, and manage these weeds where they are present on city-owned properties.

NE-WH-18 English ivy and holly shall not be permitted in landscaping for new developments adjacent to areas or within areas designated for wildlife habitat protection as noted in Figure 7. Holly and English ivy should be avoided in landscaping for all new development in the city.

NE-WH-19 Management of noxious weeds shall be an integral part of landscape plans for new development and shall be covered under the required one-year landscape maintenance bond.

Non-regulatory measures are a key component of a comprehensive wildlife habitat management strategy. Several organizations have urban or backyard wildlife certification programs, including the National Wildlife Federation, the National Institute for Urban Wildlife, and the Washington Department of Fish and Wildlife. The National Institute for Urban Wildlife will certify city parks as urban wildlife sanctuaries when certain criteria are met. The National Wildlife Federation can certify a city as a Community Wildlife Habitat.

NE-WH-20 The city should promote public education outreach and information to residents on how they can participate in the Backyard Wildlife Sanctuary program.

City certification as a Community Wildlife Habitat involves the entire community. This designation may include certified backyard sites, certified school sites, a public

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demonstration garden, participation by the business community, and related projects such as wildlife surveys, sensitive areas mapping, and creation of wildlife corridors.

NE-WH-21 The city should support urban wildlife habitat management by becoming designated as a Community Wildlife Habitat.

Education is a key non-regulatory component towards embracing wildlife habitat management. Wildlife habitat restoration and demonstration projects show residents how habitat can be created or improved in their own backyard. Restoration projects need not be limited to plant installations. Other features important to wildlife can be added to the habitat area depending upon site conditions. These features can include nest boxes, bat boxes, snags, brush piles, ponds, reptile and amphibian mounds, and other constructed and natural features. Habitat enhancement efforts need not be expensive. Limiting mowing to heavily used areas and allowing grassy meadows to grow along forest edges and in other low intensity use areas can provide additional habitat for numerous wildlife species. Rotational mowing can increase habitat value for some species.

NE-WH-22 The city should pursue wildlife habitat restoration demonstration projects for educational purposes.

NE-WH-23 City maintenance practices in city parks should consider wildlife needs and be revised to employ rotational mowing, grassy meadows along forest edges, and low intensity use areas to increase habitat value for some species.

King County has a Native Plant Salvage Program. County staff and volunteers salvage native understory plants on sites where development plans have been approved. The plant material is kept at a holding facility. Plants are typically used on county volunteer projects.

NE-WH-24 Redmond should coordinate with the King County Native Plant Salvage Program to facilitate the identification of potential sites to save plants.

O:/Cathy/Wildlife Habitat Plan/Proposed Wildlife Policy Changes to CP

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CHART SUMMARY OF PROPOSED COMPREHENSIVE PLAN POLICY CHANGES

Policy Number[1]	Policy Summary
NE-WH-1	Reflects overall goal for wildlife habitat.
NE-WH-2	References Wildlife Habitat Plan as a guidance document.
NE-WH-3 (formerly NE-65)	Protects and enhances critical wildlife habitat.
NE-WH-4	Establishes level of wildlife habitat protection.
NE-WH-5 (formerly NE-65)	Avoids development impacts on wildlife habitat and corridors.
NE-WH-6 and NE-WH-7	Addresses developer and city options to help preserve critical wildlife habitat.
NE-WH-8 (formerly NE-67)	Minimizes development, parks and recreational impacts to fish and wildlife.
NE-WH-9 (formerly NE-68)	Discourages habitat fragmentation and establishes wildlife corridors.
NE-WH-10 and NE-WH-11	Identifies wildlife corridors and addresses isolated habitats.
NE-WH-12 (formerly NE-69)	Coordinates management of fish and wildlife resources with other agencies.
NE-WH-13	Encourages preservation of understory in stands of significant trees.
NE-WH-14, NE-WH-15, and NE-WH-16	Addresses wildlife habitat management and maintenance strategies.
NE-WH-17, NE-WH-18, and NE-WH-19	Addresses negative impacts on wildlife habitat from problem non-native weeds and noxious weeds.
NE-WH-20 and NE-WH-21	Promotes non-regulatory approaches to wildlife habitat protection.
NE-WH-22 and NE-WH-23	Promotes city wildlife habitat restoration projects for educational purposes and habitat enhancement policies.
NE-WH-24	Facilitates city coordination with the King County Native Plant Salvage Program.

O:/Cathy/Wildlife Habitat Plan/Chart Summary of Policies

[1] Policies noting former policy numbers are those that currently exist in the Comprehensive Plan. These policies were renumbered and the language was modified in some cases. See Exhibit A of the Technical Committee Report to the Planning Commission for exact policy language. Exhibit A shows both existing and proposed language.

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Wildlife Habitat Plan, DCA 01-004
Issues Identified by the Planning Commission

No.	Issues	Planning Commission Discussion Points	Summary of Public Comments	Responses and Outcomes	Planning Commission Conclusions
1.	Why are fish excluded?				
2.	Why weren't wildlife habitats originally mapped as part of the Sensitive Areas Ordinance?				
3.	Moving from species specific to wildlife habitat management.				
4.	Balance between development and wildlife habitat protection. How much habitat should be protected?				
5.	How was Figure 7 (*Existing and Recommended Habitat Additions*) developed? What analysis was performed?				
6.	Implications of being identified on Figure 7.				
7.	Will there be regulations?				

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8.	Are there non-regulatory approaches?			

O:\Cathy\Wildlife Habitat Plan\PC Issues Table

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