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WSDOT Highway Maintenance: Environmental Compliance for Protected Terrestrial Species

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Abstract: Protected plant and wildlife species that grow, forage, nest, roost, or migrate near the Washington State Department of Transportation (WSDOT) highway system may be susceptible to impacts from routine maintenance activities. In response to community-driven concerns related to the conservation of protected terrestrial species and due to the lack of existing guidance for maintenance personnel when protected-species conflicts arose, WSDOT biologists and maintenance personnel worked together to develop new guidance. The purpose of the guidance is to provide maintenance personnel with resources that identify which projects occur in sensitive plant and wildlife areas and identify best management practices (BMPs) that can be implemented to minimize or avoid impacts to protected terrestrial species in Washington State.

Existing sensitive-species data and aerial photographs were used to identify locations of sensitive species and habitats and to develop guidance. To verify habitat presence, biologists conducted site visits to areas identified as possible sensitive habitats. The guidance document is in the form of a field handbook presented in a step-by-step format to facilitate use by WSDOT maintenance personnel. The guidance document provides maps and descriptions of sensitive areas, each identified by state route and milepost. Species information, such as species name, nest sites, wintering sites, or locations of sensitive habitats, are not identified in the guidance document. Alternatively, biologists placed the species into groups based on habitat needs and identified only the state-route mileposts that fall within each sensitive area. This process helped WSDOT prevent publicizing sensitive wildlife data in the guidance documents and avoided the need for evaluation of habitat by maintenance personnel.

Common maintenance functions were also broken down into groups. For each sensitive location and maintenance function group, a list of BMPs is provided. BMPs may include timing restrictions, equipment use restrictions, or overall activities that should be avoided during certain seasons. The document does not address all possible conditions that may arise during maintenance operations that could affect protected terrestrial species. Maintenance staff consult with their Regional Maintenance Environmental Coordinator prior to initiating any activity that is not addressed by the guidance document or if there is any uncertainty about the applicability of the guidance. Maintenance activities that are not able to comply with the guidance typically require a field review by a biologist and the development of site-specific BMPs. Maintenance personnel do not follow this guidance for emergency actions because separate procedures were previously developed that adequately address protected species compliance for emergency maintenance actions.

This project is currently being piloted with the Olympic Region Maintenance Program. Training courses conducted at individual maintenance sheds have provided opportunity for discussion and question and answer sessions. Biologists and maintenance personnel have had the opportunity to work together to learn each other's programs, perspectives, and observations to improve the effectiveness of the environmental compliance guidance. The WSDOT Highway Maintenance Environmental Compliance Guidance for Protected Terrestrial Species Program has helped the Maintenance Program conduct their projects in a timely fashion without unnecessary delays and to remain good stewards of the environment.

Introduction

Washington State is well known for its diverse species and unique environments. Washington State is also home to many of the species protected by the Endangered Species Act (ESA) and the Migratory Bird Treaty Act (MBTA). Washington State laws or the Washington Administrative Code (WAC) also provide protection for many of these species. The Washington State Department of Transportation (WSDOT) maintains thousands of miles of roadway within our state that bisect terrestrial habitats occupied by these protected species. Protected plant and wildlife species that grow, forage, nest, roost, or migrate near the WSDOT highway system may be susceptible to impacts from routine maintenance activities. WSDOT is presented with the challenge of maintaining the public-transportation systems while protecting plant and wildlife species that occur along or near the WSDOT highway right-of-way (ROW). WSDOT maintenance personnel must prevent harm or harassment to species protected by the ESA, MBTA, or WAC when implementing highway-maintenance activities.

Section 7 of the ESA allows certain activities to be conducted that may impact an ESA-listed species. However, Section 7 provisions are limited to actions that have a federal nexus. Existing rules under Section 4(d) of the ESA provide limited coverage for projects that require in-water work and may have impacts to some ESA-listed fish species under the jurisdiction of the National Marine Fisheries Service (NMFS). WSDOT coordinates with NMFS for approval and permitting when 4(d) activities arise. WSDOT also coordinates with the U.S. Fish and Wildlife Service (USFWS) when conflicts arise with MBTA-listed birds nesting on WSDOT bridge structures and time-sensitive highway-maintenance activities are required that may harm the species. However, the majority of WSDOT maintenance activities that could impact terrestrial species protected under the ESA, MBTA, and WAC have no compliance provisions. Therefore, it is critical to provide guidance to maintenance personnel in the field, as well as to supervisors involved in the planning of activities to assure that WSDOT conducts their highway maintenance in compliance with laws that protect terrestrial species.

The unique environments of Washington State provide a home to a variety of protected terrestrial species and a large number of them regularly encounter the WSDOT highway system. Currently, Washington State is home to 14 ESA-listed endangered species, 32 threatened species, 14 species that are candidates to be listed, three proposed to be listed, 20 species with designated critical habitat, and two species with critical habitat proposed to be designated. Many of these species and habitats overlap or are regular inhabitants of the WSDOT highway ROW.

In response to community-driven concerns related to the conservation of protected terrestrial species and due to the lack of existing guidance for maintenance personnel when protected-species conflicts arise, WSDOT biologists and maintenance personnel worked together to develop a new program. The objective of the program is to determine where protected terrestrial species and habitat coincide with state routes, develop guidance that allows maintenance personnel to avoid or minimize impacts to these species and habitats, and ultimately facilitate project delivery with minimal delay.

Maintenance Activities

Maintenance activities that have the potential to disturb protected terrestrial species or impact habitat were grouped by function. Within each maintenance function group, we identified various pieces of equipment or activities and describe their applicability and how they may potentially impact species or habitat. Table 1 provides a list of the maintenance function groups, the equipment or activities within that group, and their applicability to the environmental guidance.

Table 1. Maintenance activities and potential environmental impact

Maintenance Function Group	Applicability*
1. Roadway Maintenance	Environmental guidance applies due to potential: <ul style="list-style-type: none"> □ Disturbance impacts from pavement grinding, jack hammering, grader patching, shoulder re-grade (pulling shoulders), and chip seal operations.
2. Drainage Maintenance and Slope Repair	Environmental guidance applies due to potential: <ul style="list-style-type: none"> □ Disturbance impacts from operation of excavators, back hoes, vector trucks, jackhammers, and □ Habitat impacts from vegetation clearing outside of the developed right-of-way.
3. Roadside and Landscape Maintenance	Environmental guidance applies due to potential: <ul style="list-style-type: none"> □ Disturbance from brush cutting, hazard tree removal, operation of chain saws, and □ Habitat impacts from hazard tree removal, herbicide application, mowing, and vegetation clearing outside of the developed right-of-way.
4. Bridge and Tunnel Maintenance	Environmental guidance applies due to potential: <ul style="list-style-type: none"> □ Disturbance from common regional maintenance activities, and □ Nest removal from cleaning and washing activities.
5. Snow and Ice Control	Exempt.
6. Traffic Control Maintenance and Operations	Exempt.
7. Rest Area Operations	Exempt. Not applicable to the current rest areas in the region.
8. Support Operations	Exempt.
9. Third Party Damage and Disaster Operations	Exempt.

* Regardless of the maintenance function group, all emergency actions are exempt from this guidance.

Sensitive areas

Sensitive areas are sections of state routes that coincide with occurrences of protected terrestrial species or habitat. These sensitive areas are provided to maintenance personnel in the form of milepost sections of a state route. This approach allowed us to avoid publishing the precise locations of protected species. We located sensitive areas based on species or habitat presence, distance of the species or habitat from the state route, and suitability of the habitat.

Species groups

We grouped species based on their habitat requirements. All species included in this guidance are protected by the ESA, MBTA, or WAC. However, the guidance emphasizes ESA-listed species and habitat. Table 2 summarizes the species groups located in the WSDOT Olympic Region and their associated habitat.

Table 2. Summary of species in the Olympic Region and their assigned groups based on habitat requirements

Species Group	A	B	C	D	E
Habitat Type	Old-growth Forests	Riparian or Marine Forest	Ocean Beaches or Salt-spray Meadows	Prairie or Open Grasslands	Bridges
Species Names	<input type="checkbox"/> Northern Spotted Owl <input type="checkbox"/> Marbled Murrelet	<input type="checkbox"/> Bald Eagle	<input type="checkbox"/> Brown Pelican <input type="checkbox"/> Western Snowy Plover <input type="checkbox"/> Oregon Silverspot Butterfly <input type="checkbox"/> Streaked Horned Lark	<input type="checkbox"/> Golden Paintbrush <input type="checkbox"/> Kincaid’s Lupine <input type="checkbox"/> Nelson’s checkermallow <input type="checkbox"/> Whulge Checkerspot <input type="checkbox"/> Valley Silverspot <input type="checkbox"/> Mardon Skipper <input type="checkbox"/> Puget Blue <input type="checkbox"/> Streaked Horned Lark <input type="checkbox"/> Mazama Pocket Gopher	<input type="checkbox"/> Peregrine Falcon <input type="checkbox"/> Osprey

Species Group A

Species Group A includes those species associated with old-growth forests. Species included in Species Group A are northern spotted owl (*Strix occidentalis caurina*) and marbled murrelet (*Brachyramphus marmoratus*). The USFWS has determined that the destruction, modification, or curtailment of habitat for these species is a significant factor in their decline (Federal Register 1990; Federal Register 1996). The northern spotted owl is a federally threatened species under the ESA (Federal Register 1990) and a Washington State endangered species (WAC 232-12-014). The marbled murrelet is a federally threatened species under ESA and Washington State threatened species (Federal Register 1992a; WAC 232-12-011). Critical habitat has also been designated for both species (Federal Register 1992b; Federal Register 1996). Both northern spotted owls and marbled murrelets are protected under the MBTA (50 CFR 10.13).

Northern spotted owls are nocturnal forest-dwelling owls that nest from March to June (Federal Register 1990) in stands with structural components typical of old-growth forests. Fledging occurs from mid-May to late June, with parental care continuing into September (Federal Register 1990). Nesting generally occurs in cavities of large (>30 inches diameter at breast height [dbh]) coniferous trees and snags (Federal Register 1992b). Adult northern spotted owls require sufficient open space below the canopy to forage (Thomas et al. 1990 in Federal Register 1992b). Use of chainsaws, the sound of falling trees, and the sound of cutting downed wood have the potential to adversely affect northern spotted owls in western Washington between March 1 to July 15 if the sound occurs within 65 yards of the species (USFWS 2003). Use of heavy equipment and motorized tools has the potential to affect northern spotted owls adversely in western Washington during this same timeframe if the sound occurs within 35 yards of the species (USFWS 2003).

Marbled murrelets are seabirds; however, nesting occurs in stands with the structural components typical of old-growth forests usually located within 50 miles of saltwater (Rodrick and Milner 1991). All of the WSDOT Olympic Region falls within the range of the marbled murrelet. The marbled murrelet nesting season takes place in Washington from April through August and juveniles begin to fledge in June (Hamer and Nelson 1995a). These murrelets nest on “platforms” in the upper canopy of large coniferous trees (i.e. large or forked limbs, dwarf mistletoe [*Arceuthobium spp.*] infections, witches’ brooms, deformities, etc.) (Hamer and Nelson 1995b). They may fly over 50 miles from nest sites to coastal waters to forage for fish and return to the nest once a day (one visit by both parents), usually during dawn or dusk, to

deliver prey to the juvenile (Nelson and Hamer 1995). Due to this unique foraging strategy, any interruption during prey delivery could have severe consequences. Murrelets generally follow streams, roads, and other open areas on their flights to and from the nest (Nelson and Hamer 1995). Use of chainsaws, the sound of falling trees, and the sound of cutting down wood have the potential to affect marbled murrelets adversely between April 1 and August 5 if the sound occurs within 45 yards of the species (USFWS 2003). Use of heavy equipment and motorized tools has the potential to affect marbled murrelets adversely during this same timeframe if the sound occurs within 35 yards of the species (USFWS 2003).

Species Group A also includes designated critical habitat for northern spotted owls and marbled murrelets. Northern spotted owls require habitat suitable for nesting, roosting, foraging, and dispersing (Federal Register 1992b). Currently, 20 critical habitat units for northern spotted owls have been designated in Olympic Region; 18 of them are adjacent to or are intersected by WSDOT highways that are maintained by Olympic Region maintenance personnel. Based on this information, approximately 38 miles of WSDOT highway are classified as sensitive due to the presence of critical habitat and potentially being within 0.25 miles of nesting northern spotted owls.

Marbled murrelet critical habitat includes only those primary constituent elements that provide suitable nesting habitat (Federal Register 1996). Currently 541 critical habitat units have been designated in Olympic Region; 18 of them are adjacent to or are intersected by WSDOT highways that are maintained by Olympic Region maintenance personnel. Based on this information, approximately 39 miles of WSDOT highway is classified as sensitive due to the presence of critical habitat and potentially being with 0.25 miles of nesting marbled murrelets.

Due to the increased home range of northern spotted owls and marbled murrelets outside of the nesting season and the decreased threat of disturbance and habitat impacts outside of the nesting season, we are only providing guidance for activities that occur within nesting areas during nesting seasons. We have established guidance for the various maintenance activities that could affect nesting northern spotted owls and marbled murrelets or destroy northern spotted owl or marbled murrelet nesting habitat. Guidance for sensitive zones for Species Group A includes avoiding noisy activities that occur for more than one hour and are between March 1 and September 30. Guidance is also provided for tree removal in sensitive areas, with maintenance personnel contacting the Regional Maintenance Environmental Coordinator prior to removing any trees great than 12 inches dbh.

Species Group B

Species Group B is designated for bald eagles (*Haliaeetus leucocephalus*). Bald eagles are terrestrial raptors that are generally associated with aquatic habitats for foraging purposes. The USFWS has determined that the decline of bald eagles was largely attributed to the widespread use of organochlorine insecticides, habitat loss, harassment and disturbance, shooting, electrocution from power lines, poisoning, and a decline in prey base (Federal Register 1978). The bald eagle is currently listed as a federally threatened species under ESA (Federal Register 1978) and Washington State threatened species (WAC 232-12-011). The bald eagle is also protected under the MBTA (50 CFR 10.13), and the Bald and Golden Eagle Protection Act (16 USC 668a-668c). Protection of nesting and wintering habitats are critical to the continued survival of the bald eagle (Federal Register 1999) and availability of suitable trees for nesting and perching is critical for maintaining bald eagle populations (USFWS 1986).

Biologists have characterized suitable bald eagle habitat as accessible foraging areas and trees that are large enough for nesting and roosting (Stalmaster 1987). Food availability, such as aggregations of waterfowl or salmon runs, is a primary factor attracting bald eagles to wintering areas and influences nest and territory distribution (Stalmaster 1987; Keister et al. 1987). Bald eagles generally nest in the same territories each year and often use the same nest repeatedly, although alternate nests in the territory may be used as well. Bald eagle nests in the Pacific Recovery Area are usually located in uneven-age stands of coniferous trees with old-growth forest components (USFWS 1986) that are located within 1 mile of large bodies of water (Stalmaster 1987). Factors such as relative tree height, diameter, tree species, form, position on the surrounding topography, distance from the water, and distance from disturbance influence nest-site selection. When foraging, bald eagles generally select perches in the tallest trees that provide an unobstructed view of the surrounding area.

Wintering bald eagles typically congregate in large aggregations where, most importantly, food is abundant. Suitable perch sites adjacent to foraging areas and winter-roost habitat are also necessary. In Washington, these criteria are typically met where waterfowl and salmon populations are present, as well as marine areas (Stinson et al. 2001). Communal night-roosting sites are traditionally used year after year and are usually the largest trees with the most open structure (Keister and Anthony 1983; Watson and Pierce 1998). These sites are often located in areas that provide a more favorable microclimate during inclement weather (Keister et al. 1985; Knight et al. 1983; Watson and Pierce 1998).

Human disturbance is a continuing threat to nesting and wintering bald eagles (USFWS 1986). Use of heavy equipment and motorized tools between January 1 and August 15 or October 31 and March 15 and within 0.25 miles (no line of sight) or 0.50 miles (line of sight) of bald eagle nesting or winter-roost sites is expected to result in an adverse effect (USFWS 2003). Bald eagles can occur in the Olympic Region throughout the year as both resident and wintering populations. Information obtained from the Washington Department of Fish and Wildlife (WDFW) indicates the presence of over 984 bald eagle nest sites distributed throughout Olympic Region, with 96 of the nest sites within 0.25 miles of a

WSDOT highway. We have provided guidance for maintenance activities that may be disruptive to nesting and wintering bald eagles or activities that may alter bald eagle nesting, roosting, or wintering habitat. Highway-maintenance activities do not pose a threat to eagles outside of the nesting and wintering periods. Therefore, no guidance is provided for non-nesting/wintering eagles. Guidance includes minimizing noisy activities on highways occurring within 0.25 miles of bald eagle nest sites between January 1 and August 15 and within 0.25 miles of bald eagle wintering roost sites between October 31 and March 31.

Species Group C

The species in group C are associated with ocean beaches or salt-spray meadows and include brown pelican (*Pelecanus occidentalis*), western snowy plover (*Euphryas editha taylori*), streaked horned lark (*Eremophila alpestris strigata*), and Oregon silverspot butterfly (*Speyeria zerene hippolyta*). Currently, the brown pelican is listed as a federally endangered species under ESA (Federal Register 1970), is a Washington State endangered species (WAC 232-12-014), and is also protected under the MBTA (50 CFR 10.13). The western snowy plover is a federally threatened species under ESA (Federal Register 1993a), a Washington State endangered species (WAC 232-12-014), and is also protected under the MBTA (50 CFR 10.13). The streaked horned lark is a candidate to be federally listed under ESA (Federal Register 2005), a candidate to be protected by Washington State law (WDFW Policy M-6001), and is already protected under the MBTA (50 CFR 10.13). The Oregon silverspot butterfly is a federally threatened species (Federal Register 1980) and a Washington State endangered species (WAC 232-12-014).

The brown pelican is a coastal seabird that requires terrestrial habitat for communal roosting. Biologists have determined that the primary reason for the decline of brown pelicans is the past widespread use of organochlorine insecticides. These pelicans are also threatened by oil spills, disturbance at post-breeding roosts, entanglement with fishing lines, and disease outbreaks resulting from overcrowding in harbors. Protection of major roost sites was included among the primary objectives for the recovery of the species (USFWS 1983).

Brown pelican nesting is restricted to southern California during March and April. Northward seasonal movements begin after breeding, beginning as early as mid-May. Roosting and loafing sites in Washington State provide important resting habitat for these birds. These sites are located around good marine fishing areas with offshore rocks and islands, river mouths with sand bars, breakwaters, pilings, and/or jetties. Aerial surveys along the Washington coast from 1987 to 1991 have documented the presence of large numbers of pelicans from the mouth of the Columbia River north to Cape Flattery. Pelican numbers have increased each year of the survey from 922 observed in 1987 to 7,610 observed in 1991 (Jaques et al. 1996).

Brown pelicans are diurnal and roost on land at night. Roosting pelicans are extremely susceptible to disturbance. Human activities such as walking, jogging, fishing, dog walking, and hunting have all been documented as being very disturbing to pelicans (Jaques et al. 1996). Headlights flashing across roosting birds have been observed to cause a flushing reaction. Construction and maintenance activities resulted in several cases of disturbance at a roost at Mugu Lagoon in Southern California, but operating heavy equipment and installing riprap along the edge of the lagoon, approximately 330 feet from the birds, was not observed to cause a disturbance (Jaques et al. 1996). Thus disturbance appears to be dependent on the type and duration of the activity.

Brown pelicans are likely to occur along the outer Washington coast with the greatest concentrations of pelicans in and around bays and estuaries. Brown pelican concentrations are documented in Grays Harbor areas (Jaques et al. 1996). We have provided guidance for maintenance activities that may be disruptive to night-roosting brown pelicans. Guidance includes avoiding disturbance near brown pelican night roost sites (from an hour before sunset to an hour after sunrise) between June 1 and October 31, such as from the use of chainsaws and heavy equipment. Highway-maintenance activities pose no other potential threat to brown pelicans.

Western snowy plovers are coastal seabirds that breed on coastal beaches from southern Washington to southern California. Biologists have determined that the primary reason for the decline of the western snowy plover is due to loss of nesting habitat and disturbance of breeding western snowy plovers (i.e. crushing eggs) by humans and domestic animals (USFWS 2001a). Nesting season on the Washington coast occurs from early March through late September. Eggs are present from early March through the third week of July. Nest sites are generally flat, open areas with sandy or saline substrates. Vegetation and driftwood are present, but sparse. Nesting usually occurs within several hundred meters of water. To minimize disturbance to breeding and nesting western snowy plovers, the USFWS recommends preventing disruptive activities from occurring near nesting habitat and preventing off-road pedestrian or vehicular traffic through nesting habitat (USFWS 2001a). Therefore, we provided guidance for maintenance activities that may be disruptive to breeding and nesting western snowy plovers and activities that may impact western snowy plover habitat.

Most western snowy plovers remain in Washington State year round, while others migrate. In 1995, the breeding population in Olympic Region was restricted to one site, the Damon Point/Oyhut Wildlife Area at Ocean Shores (WDFW 1995); however, suitable habitat occurs at other coastal sites in Olympic Region. Recent estimates indicate the population at Damon Point and Oyhut Wildlife Area may have increased to up to nine nesting adults (Federal Register 2004). Due to the small population and documented concentrated use areas in Olympic Region, road projects are expected to have a very minor impact on this species.

Streaked horned lark are terrestrial songbirds that were once abundant in Puget Sound prairies and open coastal habitats (Stinson 2005). During nesting season, these larks are closely associated with spacious grasslands containing a significant amount of bare ground (i.e. bunchgrass-type habitat) but have adapted to nesting in grasslands at airports and on sandy coastal spits (Stinson 2005). Biologists have determined that the primary reason for the decline of streaked horned lark populations in Washington is due the extensive destruction of native grasslands and disturbance during nesting season (Pearson and Hopey 2005).

Nesting season for the streaked horned lark is very long, typically beginning in early April with nest building and breeding displays, and seems to exhibit two peaks in clutch initiation, with the first peak from late April until early June and the second peak from late June to late July (Pearson and Hopey 2005). Biologists working towards the recovery of this species and others species associated with grassland and beach-dune habitat discourage the introduction of non-native plant species (i.e. European beachgrass [*Ammophila arenaria*]), off-road vehicle operation, pedestrian presence, and land-management activities (i.e. mowing) while eggs are in nests (Pearson and Hopey 2005). In conjunction with these management recommendations, we provided guidance for maintenance activities that may be disruptive to nesting streaked horned larks or may impact nesting habitat. According to Pearson and Hopey (2005), management activities that benefit the western snowy plover will likely benefit the streaked horned lark. In Washington, suitable nesting habitat for western snowy plovers typically is occupied by nesting streaked horned larks. Therefore, the guidance we designed to minimize impacts to western snowy plovers will likely be protective of streaked horned larks.

The Oregon silverspot butterfly is a coastal subspecies of the widespread Zerene fritillary butterfly in montane western North America. Biologists believe that this subspecies is now extirpated from its historical range along the Washington coast (USFWS 2001b). The Oregon silverspot butterfly depends on a diverse wildflower habitat, including known caterpillar host plants and a variety of adult nectar plants and that are associated with fescue-dominated (*Festuca* spp.) montane grasslands, stabilized dunes, and marine salt-spray meadows (USFWS 2001b). Current efforts by WDFW and USFWS include conserving existing habitat, rehabilitating marginal habitat, and possibly reintroducing the species into its historical range along the Washington coast (USFWS 2001b). Management recommendations for the recovery of the Oregon silverspot butterfly include timely land-management activities (i.e. mowing) that foster growth of native species and prevent the spread of invasive plant species (USFWS 2001b).

The only known larval host plant for the Oregon silverspot butterfly is the early blue violet (*Viola adunca*). The early blue violet is a low-growing plant that needs open spaces or bare ground, which is common in fescue-dominated grasslands, dunes, and meadows. The adult Oregon silverspot has a late-summer flight period (July through September). Therefore, it depends on late-blooming nectar plants such as common California aster (*Aster chilensis*), western pearly everlasting (*Anaphalis margaritacea*), dune goldenrod (*Solidago spathulata*), yarrow (*Achillea millefolium*), and dune thistle (*Cirsium edule*).

The potential habitat for this species in the Olympic Region is limited to coastal areas along Grays Harbor County. We provided guidance for maintenance activities that may alter suitable Oregon silverspot habitat. Disturbance is not considered a limiting factor. Therefore, no guidance specific to limiting disturbances near Oregon silverspot butterflies is provided. Guidance includes avoiding clearing vegetation (grading, grubbing, filling) and applying herbicides outside of the vegetation-free zone (zone 1) of the WSDOT highway ROW along stretches adjacent to suitable habitat. Also, mowing is not recommended outside of zones 1 and 2 (zone 2 is the operational zone and is typically maintained for erosion, sight distance, vehicle recovery, and other purposes) of the WSDOT highway ROW during May and between July 1 and September 31 along highway segments with suitable habitat. Mowing is encouraged at these sites during the months of April, June, and after September.

Species Group D

Species in group D are located in glacial outwash prairies and alluvial valley meadows and include golden paintbrush (*Castilleja levisecta*), Kincaid's lupine (*Lupinus sulphureus kincaidii*), Nelson's checkermallow (*Sidalcea nelsoniana*), whulge checkerspot butterfly (*Euphydryas editha taylori*), mardon skipper butterfly (*Polites mardon*), Mazama pocket gopher (*Thomomys mazama*), and the streaked horned lark. Currently, golden paintbrush, Kincaid's lupine, and Nelson's checkermallow are all listed as federally threatened under ESA (Federal Register 1997, 2000, 1993b). The whulge checkerspot butterfly, mardon skipper butterfly, and Mazama pocket gopher are candidates to be listed as threatened or endangered under ESA (Federal Register 2005). The mardon skipper butterfly is also endangered under Washington State law (WAC 232-12-014).

Golden paintbrush, Kincaid's lupine, and Nelson's checkermallow are native wildflower species that are believed to have once flourished in the expansive native prairies of the Puget and Willamette Trough. Over time, the destruction of this habitat by development, the introduction of competitive non-native species, and the conversion of native grasslands for agricultural purposes has threatened the continued existence of these species (Caplow 2004, Federal Register 2000, USFWS 1998). Biologists involved with the recovery of these species recommend protecting remaining native grasslands, providing guidance for appropriate roadside-management techniques in areas with documented plants, and managing for invasive species (Caplow 2004, Federal Register 2000, USFWS 1998). Therefore, we provided guidance for maintenance activities that may directly impact golden paintbrush, Kincaid lupine, and Nelson's checkermallow flowers or permanently alter their habitat.

The whulge checkerspot and mardon skipper butterflies require a diverse habitat with a wildflower population supportive of adult foraging and larval development (Fimbel 2004). Suitable habitat for these species also includes appropriate topography and sparse deciduous trees or forest “nooks” that create complex microclimates throughout the seasons (Fimbel 2004). This diverse and complex habitat is characteristic of native fescue-dominated grasslands of the Puget and Willamette Trough (Fimbel 2004).

Both of these butterflies have an early spring flight period, typically occurring from May through June. This timing is consistent with the bloom time of the early blue violet (*Viola adunca*), an important nectar plant for the adult mardon skipper and the bloom time of the common camas (*Camassia quamash*), desert parsley (*Lomatium* spp.), and broad-petal strawberry (*Fragaria virginiana*), known nectar plants for the adult whulge checkerspot. Also an important habitat component for these butterflies is the presence of summer food resources for pre-diapause larvae. Diapause for butterfly larva is a “sleep time” that begins before harsh winter conditions arrive and during which the larva does not grow. Fescue (*Festuca* spp.) is the primary larval host plant for the mardon skipper, while harsh paintbrush (*Castilleja hispida*) and English plantain (*Plantago lanceolata*) are important larval host plants for the whulge checkerspot. Protection of these native species and other species that make up native grasslands is critical for the recovery of these butterfly species (Fimbel 2004). Therefore, we provided guidance for maintenance activities that may alter mardon skipper or whulge checkerspot habitat.

The Mazama pocket gophers need open meadows, prairie, or grassland habitat with friable soils that are not too rocky (Stinson 2005). They are generally associated with glacial-outwash prairies in western Washington (Hartway and Steinberg 1997). Mazama pocket gopher habitat has been lost to development and succession to forest. What remains continues to be degraded by the invasion by Scotch broom (*Cytisum scoparius*) (Stinson 2005). These gophers do not usually occur where grassland has been taken over of dense Scotch broom (Steinberg 1996). Given these requirements, we provided guidance for maintenance activities that may permanently alter mazama pocket gopher habitat. Disturbance is not identified as a potential limiting factor. Therefore, no guidance that pertains to limiting disturbance was provided for Mazama pocket gophers.

The streaked horned lark was placed in species group C and D due to its overlap into both habitat types. Information on this species was provided in the previous species group. Management recommendations for the streaked horned lark coastal habitat represented in species group C also apply to its upland grassland habitat represented in this species group.

The guidance manual highlights sensitive areas where suitable habitat exists adjacent to the state route for Species Group D. Recommended guidance that may minimize impacts to habitat for Species Group D includes avoiding vegetation clearing (grading, grubbing, filling) and application of herbicides outside of zone 1 of the WSDOT highway ROW. Also, the guidance signals maintenance personnel to contact the Regional Maintenance Environmental Coordinator prior to mowing outside of roadside management zones 1 and 2 between March 15 and September 1.

Species Group E

Species in group E are those species that commonly nest on WSDOT bridges. Included in this group are American peregrine falcon (*Falco peregrinus*), osprey (*Pandion haliaetus*), and pelagic cormorant (*Phalacrocorax pelagicus*). American peregrine falcons have been delisted from protection under the ESA since 1999 (Federal Register 1999). However, they are still classified as an endangered species in Washington State (WAC 232-12-014) and are also protected by the MBTA (50 CFR 10.13). Osprey population declines have been noted (Levenson and Koplín 1984), but their population has not decreased to the point that they are endangered or threatened with becoming extinct. Regardless, they are protected under the MBTA (50 CFR 10.13) as are pelagic cormorants.

American peregrine falcons in Washington State may begin courtship displays at the nesting site as early as February (Hayes and Buchanan 2002). Eggs may be present at the nest site from April to June (Hayes and Buchanan 2002) and juveniles fledge by the end of July (Hayes and Buchanan 2002, Wilson et al. 2000). Like most falcons, peregrines do not build nests, instead, nesting pairs form a hollow, or a “scrape,” in loose rock or gravel (Hayes and Buchanan 2002). During the breeding period, these peregrines will protect their nest, eggs, and young from predators (including humans) at varying levels of intensity (Hayes and Buchanan 2002). Limited data suggests that peregrines have a tendency to return to the areas where they nested the previous year (Mearns and Newton 1984).

Established pairs of osprey also use the same nest year after year unless it is destroyed. If the nest is destroyed, the osprey pair usually rebuilds a new nest as close to the old site as possible (Westall 1986). Although constructed primarily of sticks, the osprey incorporates just about anything into its nest that is not tied down (Westall 1986). Osprey generally nest mid-May through June (Bent 1937 in Westall 1986), with juveniles fledging after eight weeks (Westall 1986), or by the end of September.

Pelagic cormorants are colonial-nesting seabirds and are year-round residents of some WSDOT bridges. They appear to be nesting on the underside of bridges as early as mid-March (Carey pers. comm. 2005). Nests are made from seaweed or other plant debris (Baicich and Harrison 1997). All juveniles fledge the occupied bridges by mid-October (Carey pers. comm. 2005).

Due to the susceptibility of American peregrine falcons, osprey, or pelagic cormorants to disturbances at nest sites, we provided guidance for highway-maintenance activities that may disturb nesting. A list of bridges with documented nests from these birds is provided in the guidance manual. We recommend avoiding noisy highway-maintenance activities (i.e. pavement grinding, jack hammering) during the nesting season. The sensitive seasons provided in the guidance manual for nesting American peregrine falcons, osprey, and pelagic cormorants are February 1 through July 15, April 1 through September 30, and March 15 through October 15, respectively.

The three bird species discussed above are the only identified species in Species Group E that may be impacted by common highway-maintenance activities. However, the Olympic Region Maintenance Program also conducts some bridge-structure maintenance and inspection activities that could, depending on the extent and location of the maintenance activity on the bridge, cause injury to other wildlife species nesting on bridges. In an effort to provide regional bridge-maintenance personnel with the ability to plan in advance and conduct work without injuring nesting wildlife species, we added a bridge appendix to this guidance manual. The appendix was written to be a stand-alone document and is provided only to regional bridge-maintenance personnel to minimize distribution of this sensitive information. This appendix identifies the species and the bridges where nesting is likely occurring. We included those species that WDFW and USFWS have asked WSDOT to protect. Maintenance personnel are signaled to inspect the bridge for nesting status prior to conducting the work. Inspecting the bridge first will prevent unnecessary implementation of BMPs if the species is not nesting. Species included in the appendix are American peregrine falcons, osprey, pelagic cormorants, golden eagles (*Aquila chrysaetos*), owls (*Order Strigiformes*), bats, (*Order Chiroptera*), swallows (Family Hirundinidae), American dippers (*Cinclus mexicanus*), and pigeon guillemots (*Cephus columba*). Guidance includes inspecting the bridge for nesting status of the identified wildlife species and if the species is nesting, contacting the Regional Maintenance Environmental Coordinator prior to conducting work to determine the least-invasive means of conducting the activity.

Identifying Sensitive Areas

WSDOT Geographic Information System (GIS) and Biology staff queried Priority Habitat and Species (PHS) and other sensitive species databases to identify wildlife nest and roost sites, historical and current sensitive-plant locations, old growth, and critical habitat in the vicinity of WSDOT highway ROWs. State route sections that overlap with a 0.25-mile buffer around nest and roost sites were highlighted and mileposts identified for mapping purposes. Aerial photographs were used to identify possible prairie or open grassland areas that are adjacent to the state route. WSDOT Bridge and Structures staff assisted in the development of a list of WSDOT bridges with documented nesting/roosting wildlife based on bridge-inspection reports and personal communications.

WSDOT biologists conducted site visits to verify sensitive habitat presences. The habitat was delineated by a Global Positioning System (GPS) and data was converted into state route milepost sections by the GIS staff.

In the guidance document, WSDOT presents the location of sensitive areas (identified by state route and milepost) in map and table formats. Both formats are provided for each species group (assignment of species into groups is discussed above). Species information, such as species name and locations of nest sites, wintering sites, or sensitive habitats, are not identified in the guidance document. WSDOT developed this system to prevent publicizing or distributing PHS and other sensitive species data. Figure 2 provides an example of this system.

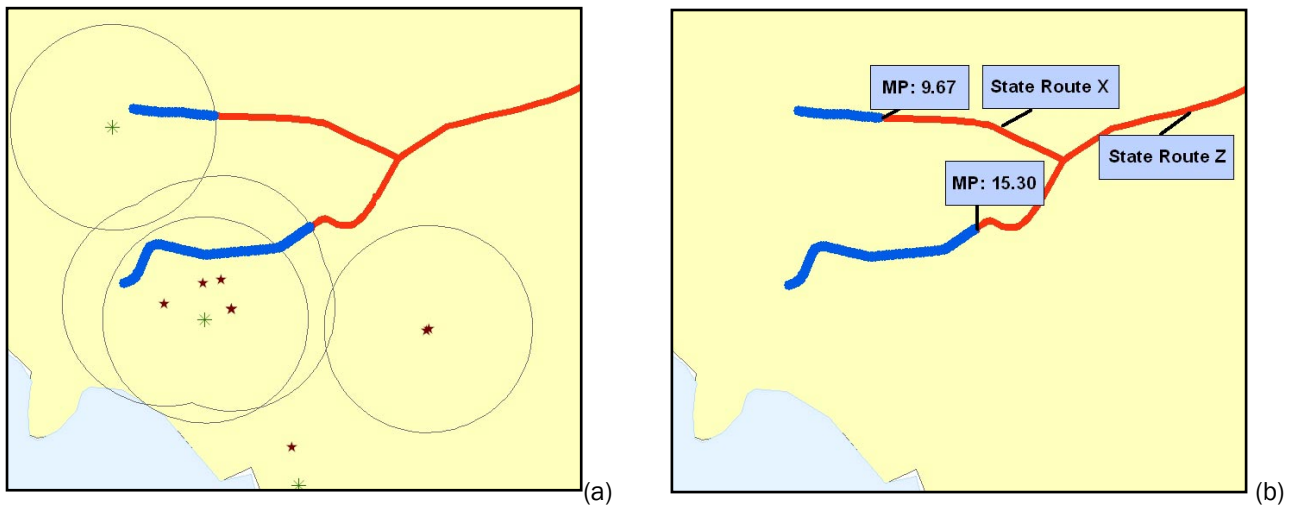


Figure 1. Example of the process used to determine sensitive zones of state routes. (a) PHS data overlaid with state routes. The figure shows the nest sites with a 0.25-mile buffer and its overlap with the state route. (b) Example from the guidance document. The guidance document only identifies the state route and mileposts that overlap with the buffer.

Guidance implementation

The guidance document is in the form of a field handbook presented in a step-by-step format to facilitate use by WSDOT maintenance personnel. The guidance document provides maps and descriptions of sensitive areas for each species group, identified by state route and milepost, as illustrated in figure 2. The first step for maintenance personnel is to determine if a maintenance activity will take place in one of these sensitive areas prior to conducting the work. If the activity will not occur within an identified sensitive area, the action may proceed without implication from this guidance. If the activity will occur within a section of state highway identified as sensitive, the reviewer identifies which species group(s) occur(s) in that highway section, then proceeds to Step 2.

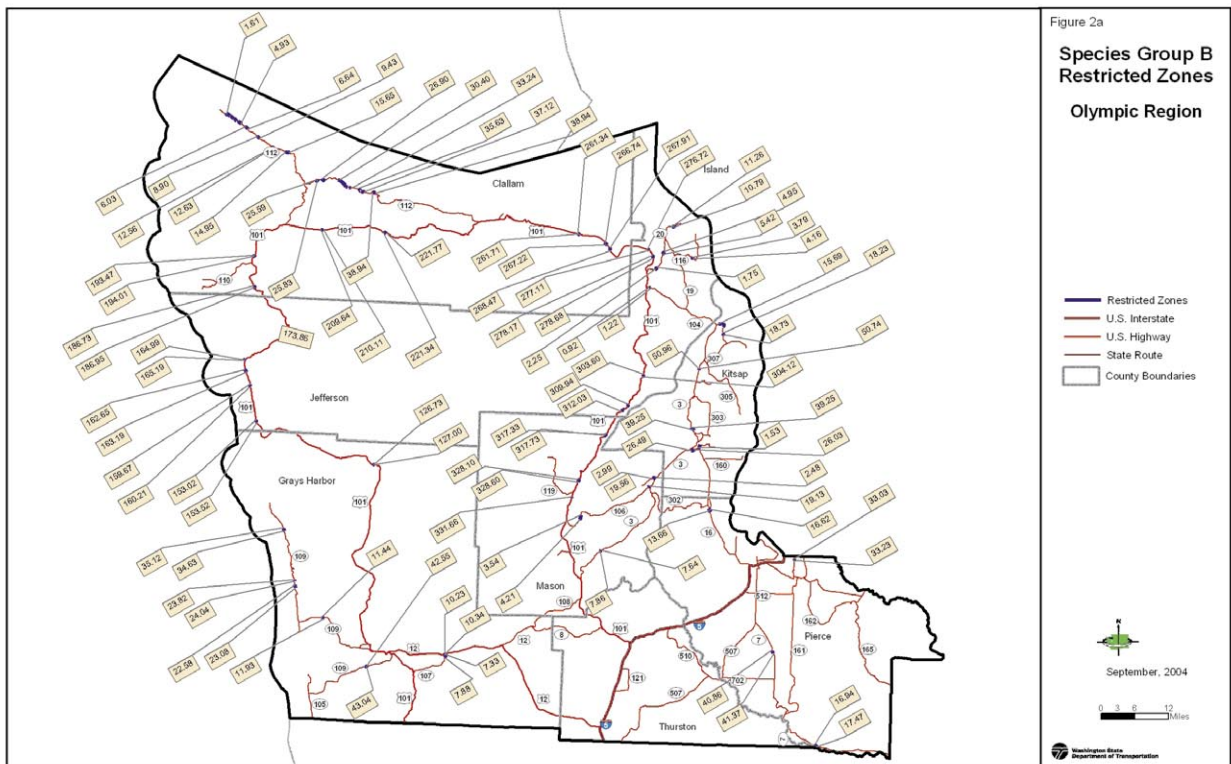


Figure 2. Example of the sensitive areas for Species Group B in map format.

The second step for maintenance personnel is to determine if the proposed maintenance activity is applicable to the guidance. (No guidance was developed for those maintenance actions that pose no potential threat to sensitive species. Those actions were identified as “exempt”.) If a maintenance activity is not exempt, Best Management Practices (BMPs) will be assigned to the activity based on the species group(s) that are present, as illustrated in figure 3.

Maintenance Activity	Best Management Practices														
	Species Group A		Species Group B			Species Group C					Species Group D			Species Group E	
	A-1	A-2	B-1	B-2	B-3	C-1	C-2	C-3	C-4	C-5	D-1	D-2	D-3	E-1	E-2
Group 1															
Pavement grinding	X		X	X					X	X				X	X
Grader patching	X		X	X					X	X				X	X
Shoulder re-grade (pulling shoulders)	X		X	X					X	X					
Chip seal	X		X	X					X	X				X	X
Jack hammering	X		X	X					X	X				X	X
Group 2															
Maintenance Activity	Best Management Practices														
	Species Group A		Species Group B			Species Group C					Species Group D			Species Group E	
	A-1	A-2	B-1	B-2	B-3	C-1	C-2	C-3	C-4	C-5	D-1	D-2	D-3	E-1	E-2
Excavator / backhoe operation (over 1 hour duration)	X		X	X					X	X					
Vactor truck operation (over 1 hour duration)	X		X	X					X	X					
Jack hammering	X		X	X					X	X					
Vegetation clearing		X			X	X					X				
Group 3															
Brush cutting	X		X	X					X	X					
Mowing							X					X			
Hazard tree removal	X	X	X	X	X				X	X					
Chain saw use	X	X	X	X	X				X	X					
Herbicide application								X					X		
Vegetation clearing						X					X				

Figure 3. BMPs for selected Olympic Region Maintenance Program activities. BMPs are defined in the guidance manual provided to Olympic Region Maintenance Program personnel and are based on management recommendations discussed in the “Species Groups” section of this paper.

BMPs are grouped based on management recommendations and guidance discussed in the previous section under individual species groups. A table (see figure 3) is provided in the guidance document to designate the appropriate BMP(s) that is recommended within a proposed work area. BMPs may include timing restrictions (i.e. during nesting season for birds, flight season for butterflies, or flowering season for wildflowers), equipment use restrictions (i.e. noisy equipment such as pavement grinding or jackhammering), or activities that should be avoided (i.e. vegetation clearing).

BMPs are guidance and are to be used as a planning tool. BMPs are not meant to stop projects from occurring. If a project cannot comply with the applicable BMPs, then maintenance personnel are signaled to contact their Regional Maintenance Environmental Coordinator to develop site-specific BMPs. Site-specific BMPs are designed to allow the project to continue while minimizing impacts to protected terrestrial species. Site-specific BMPs are developed cooperatively by maintenance personnel, the Regional Maintenance Environmental Coordinator, and a biologist.

The document cannot address all possible conditions that may arise during maintenance operations that could affect protected terrestrial species. Maintenance staff consult with their Regional Maintenance Environmental Coordinator prior to initiating any activity that is not addressed by the guidance document or if there is any uncertainty about the applicability of the guidance. The guidance documents are not applicable to emergency actions because separate procedures have been developed that address protected species compliance for emergency actions.

Due to the success implementing this new guidance document in the Olympic Region, maintenance staff reformat- ted the guidance handbook to facilitate data entry into the existing Personal Data Assistant system that documents statewide WSDOT environmental compliance. This BMP Field Guide has been printed and distributed to Olympic Region maintenance personnel and we are now beginning to work with other regions to implement the program in other areas of Washington State.

Biographical Sketches: Tracie M. O'Brien has been a wildlife biologist for WSDOT since January 2004. She has been involved in the creation and implementation of the WSDOT *Highway Maintenance: Environmental Compliance for Protected Terrestrial Species* project. She has been actively involved in creating site-specific BMPs for various maintenance projects. She will be leading the completion of this project statewide.

Bret Forrester, while working for David Evans and Associates, was a place-based biologist at WSDOT where he worked on a variety of tasks including Programmatic Biological Assessments and the initial draft of the WSDOT *Highway Maintenance: Environmental Compliance for Protected Terrestrial Species*. He has since moved on to work in the wildlife-management arena and is working for Tacoma Public Utilities.

Marion Carey is the fish and wildlife program manager for the Headquarters office of WSDOT. She is responsible for developing and implementing statewide policies like Programmatic Biological Assessments and the *Highway Maintenance Manual for Terrestrial Species*.

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