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WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
WIND POWER GUIDELINES

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March 2009

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WIND POWER GUIDELINES ON-LINE

DISCLAIMER

The Washington Department of Fish and Wildlife (WDFW) does not have regulatory authority specific to wind power development at this time. WDFW is an agency with environmental expertise as provided for through the Washington Administrative Code (WAC) 197-11-920. Comments related to environmental impacts are provided to regulatory authorities through the State Environmental Policy Act (SEPA) Revised Code of Washington (RCW) 43.21C review process.

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Recommended citation:

Washington Department of Fish and Wildlife. 2009. Wind Power Guidelines. Olympia, WA. 35pp.

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INTRODUCTION

These guidelines have been developed collaboratively through a representative stakeholder group comprised of environmental representatives, county planners, wind energy developers, State and Federal natural resource managers and biologists, and the public with consideration for fish and wildlife habitat protection, conservation and mitigation related to the development of wind energy facilities. These guidelines are intended to provide permitting agencies and wind project developers with an overview of the considerations are made by Washington Department of Fish and Wildlife (WDFW) in the review of wind energy project proposals.

The purpose of the WDFW Wind Power Guidelines is to provide consistent statewide guidance for the development of land-based wind energy projects that avoid, minimize and mitigate impacts to fish and wildlife habitats in Washington State.

In 2006, Washington voters approved legislation to require 15 percent of the electricity sold in Washington is derived from renewable energy resources by 2020 with a reduction in greenhouse gas emissions to 50 percent below 1990 levels by the year 2050. Wind energy is expected to play a key role in meeting this renewable energy standard for energy production and reducing greenhouse gas emissions.

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WDFW serves as Washington's principal agency on species protection and conservation (RCW - Title 77). Legislative Mandate RCW 77.04.012 establishes that wildlife, fish, and shellfish are property of the state and that WDFW is entrusted by and through the Fish and Wildlife Commission to … "*preserve, protect, perpetuate, and manage the wildlife and food fish, game fish, and shellfish…*" and "… *attempt to maximize the public recreational game fishing and hunting opportunities of all citizens…"* Therefore, these wind power guidelines acknowledge the need for increased energy production in Washington, while attempting to balance natural resource protection with the broad interests of the public.

In Washington State, the developer of a new wind power generation facility has the option of pursuing a permit through either the local jurisdiction (cities and counties) or the state (Energy Facility Site Evaluation Council (EFSEC). Permitting authorities are encouraged to consult with WDFW on wind energy proposals and integrate the WDFW Wind Power Guidelines into their siting approval process.

Compliance with the State Environmental Policy Act (SEPA) is required for wind energy proposals. WDFW is considered an agency with environmental expertise through SEPA and provides review and comments on environmental documents. The permitting authority is responsible for SEPA review before issuing a project permit. However, wind project developers and permitting agencies are

encouraged to consult with WDFW as early as possible in the siting process to discuss the potential environmental impact of the development prior to formal SEPA review. Early consultation with WDFW can ultimately result in a more efficient review of the proposal with upfront discussion of potential impacts.

GUIDING PRINCIPLES

Wind-generated electricity is recognized to be a viable option for augmenting current and future energy needs for the residents of Washington. As a renewable source of energy, with specific consideration to avoid or minimize environmental impacts, wind power can have a lesser impact on the environment compared to most conventional energy sources. Environmental impacts of concern include those to wildlife species or their habitats that may result from placement or operation of wind turbines. In some instances, the Department may conclude that a proposed project would have excessive and unavoidable, and therefore undesirable, wildlife impacts.

This document is based upon the premise that project proponents, permitting authorities and other stakeholders desire the best possible information with which to make decisions about turbine placement, impact assessment, mitigation strategy development, and monitoring. With this in mind, WDFW recommends the following guiding principles for addressing potential wildlife impacts based on the ecology and behavior of wildlife species of the Pacific Northwest.

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1. Several categories of wildlife species – including various categories of listed species and those that aggregate during any season – are potentially impacted by wind project development.

2. Various aspects of the ecology and behavior of potentially vulnerable species should be considered in risk assessments and management work. For example, wildlife can be present during one or more seasons or life stages at a project site, and this seasonality should be taken into account. Also, some species may not breed or be present every year, and this would require that more than one year of surveys be conducted to better understand their use of or occurrence at the site. Similarly, some species may be difficult to detect or varying times of occurrence from one year to the next that might require multiple survey visits to provide data on site use. In addition, some species have substantially larger home ranges than others, and assessments should take these species-specific differences into account.

3. Protection of certain species may be accomplished by protection of sensitive habitats, whereas other species will be best protected by certain management actions involving degraded or more common habitats. This occurs when species or species groups – for example, sandhill cranes, waterfowl, shorebirds, and raptors – aggregate in areas that are not

considered sensitive or special habitats. As a result, both habitat value and species needs should be considered.

4. From a wildlife conservation perspective, a species in decline may be absent from an area with specific consideration to avoid or minimize environmental impacts it formerly occupied, yet the habitat remains important for the conservation or recovery of that species.

5. Potential effects of wind turbine development may be direct (e.g. turbine collision resulting in mortality) or indirect (e.g. displacement from territory) and may have cumulative effects. These effects potentially include those related to road construction or maintenance, the loss or degradation of territories, and alteration of community dynamics (e.g. predator-prey interactions). These types of factors should be addressed in assessments, monitoring and mitigation strategies.

6. There are a number of important considerations related to information needed to inform management decisions. First, even the most basic information is lacking for many species in major agency databases. Consequently, the absence of data does not necessarily indicate the absence of a particular species at the site. Second, although application of some off-site information (including information on disturbance buffers) may be appropriate, multiple factors may complicate extrapolation and result in the need for local information. Finally, information used to assess impacts and upon which to base management decisions should be judged as to both the standards with which it was generated and its ability to credibly and appropriately inform the decision-making process.

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1.0 BASELINE AND MONITORING STUDIES

1.1 PRE-PROJECT ASSESSMENT

The primary purposes of pre-project assessment studies are to 1) collect information suitable for predicting the potential impacts of the project on wildlife, habitat and plants and 2) design the project layout (e.g., turbine locations) so that impacts on biological resources are avoided and/or minimized. Species status or the potential to impact large numbers of common species should be taken into consideration when developing a target list of species to be surveyed. The pre-project assessment may utilize relevant information from projects in comparable habitat types in locations close to the proposed project. The site-specific components and the duration of the assessment should depend on the size of the project, the availability and extent of existing and applicable information in the vicinity of the project, the habitats potentially affected, the likelihood and timing of occurrence of threatened, endangered and other special- status species at the site, the magnitude of impacts to other species (e.g., bats, passerines, etc.) and other factors such as issues and concerns identified during the SEPA public process. Each component is discussed below. The results of the information

review and baseline studies should be reported to the affected stakeholders (e.g., state and federal wildlife agencies) in a timely fashion.

1.2 Information Review

Existing information on species and potential habitats in the vicinity of the project area should be reviewed and if appropriate, mapped. Sources of existing information should include resource agencies, local experts, recognized databases (e.g., Priority Habitats and Species [PHS] database, Wildlife Program Wildlife Resources Data System [WRDS]), and data gathered at other nearby wind facilities or other types of projects. This information should be used to develop field and analysis protocols reviewed and approved by the WDFW.

1.3 Habitat Mapping

Key information about general vegetation and land cover types, wildlife habitat, habitat quality, extent of noxious weeds, and physical characteristics within the project area should be collected and compiled using *current protocols*[1].

1.4 Raptor Nest Surveys

At a minimum, one raptor nest survey during breeding season within 1-mile of the project *site*[2] should be conducted to determine the location and species of active nests potentially disturbed by construction activities, and to identify active and potentially active nest sites with the highest likelihood of impacts from the operation of the facility. A larger survey area (e.g., a 2-mile buffer around project site) is recommended if there is some likelihood of the occurrence of nesting state and/or federally threatened and endangered raptor species (e.g., ferruginous hawk, bald eagle, golden eagle), or if empirical data on displacement impacts may be monitored after construction (see Research-Oriented Studies Below).

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1.5 General Avian Use Surveys

A minimum of one full year of avian use surveys is recommended following current protocols to estimate the use of the project area by avian species/groups of interest during the major migratory seasons or season of most concern. This information should be used to guide decisions regarding appropriate survey intensity.

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[1] Current protocols are developed using Best Available Science in consultation with WDFW.
[2] Site – a project "site" for the purposes of addressing potential raptor nest disturbances is defined as the furthest extent of a ground disturbing activity and includes gravel sites used for construction, overhead and underground electrical routes, new and upgraded buildings and substations.
[3] Construction of turbines within existing project area.
[4] WDFW and the permitting authority should consult regarding this determination.

Two or more years of relevant data are recommended in the following cases: 1) risk to avian groups of concern is estimated to be high, 2) there is limited or no relevant data regarding seasonal use of the project site (e.g., data from nearby areas of similar habitat type), and/or 3) the project is significantly diverse in habitat and species. This additional avian use data should be collected to refine impact predictions and make decisions on project layout.

If a project is an *infilling*[3] or expansion of an existing operating wind project or is sited in close proximity to an existing operating wind project in a similar habitat type, the wind project developer should consult with WDFW to *determine*[4] if existing relevant/adequate data may be used to determine potential impacts.

1.6 Bat Surveys

An assessment, possibly including a bat literature review, and consultation with WDFW should be conducted to determine if bat surveys are needed. Appropriate methods, including species-discriminating bat detectors and radar, survey periods and locations depend on local habitat, environmental conditions and elevation, and vary by species and/or life stage.

Site-specific bat surveys are recommended in the following cases: 1) use of the site by bat species is estimated to be high relative to other projects and/or 2) there is limited or no relevant existing data regarding seasonal use of the project site (e.g., data from nearby areas of similar habitat type).

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1.7 Surveys for Threatened, Endangered and Sensitive Species

If existing information suggests the probable occurrence of state and/or federal threatened or endangered or sensitive-status species on the project site at a level of concern, focused surveys are recommended during the appropriate season to determine the presence or likelihood of presence of the species. For example, if T&E species were expected to winter in concentrations in the project vicinity, targeted surveys to estimate T&E species use of the site would be appropriate. For ESA listed species, early consultation with the US Fish and Wildlife Service for species specific survey protocols is highly recommended.

2.0 MINIMIZATION OF WILDLIFE IMPACTS

One goal of the pre-project assessment is to help design the project to avoid and minimize impacts to habitat and wildlife. Below are some considerations for avoiding and minimizing impacts to wildlife.

2.1 Impact Avoidance and Minimization

- Where appropriate develop in agricultural and other disturbed lands, including using existing transmission corridors and roads where possible.

- Avoid high bird and bat aggregation areas, and areas used by sensitive status species
- Encourage the protection of Priority Habitats and Species (PHS).
- Minimize use of overhead collector lines, unless underground collector lines are not appropriate/feasible due to environmental conditions (i.e.- topography, soil conductivity, environmental impacts, etc.).
- When overhead lines are used, use designs that avoid and minimize impacts to raptors and other birds (Refer to Avian Power Line Interaction Committee [APLIC] Guidelines regarding adequate conductor spacing, use of perch guards).
- Use tubular towers to reduce the ability of birds to perch on towers and to possibly reduce the risk of collision. Avoid use of lattice towers, particularly those with horizontal cross-members.
- Avoid using permanent tower types that employ guy wires. If guy wired towers are approved, encourage the requirement of bird flight diverters on the guy wires.
- Discourage the use of rodenticides to control rodent burrowing around towers.
- Minimize the use of lights on towers and facilities structures, in accordance with federal, state, and local requirements
- Control of noxious weeds in accordance with federal, state, and local laws.
- Encourage the control of detrimental weedy species that invade existing habitat as a result of disturbance from construction, maintenance and operation.
- Encourage the permitting authority to require a fire protection plan and a complete road siting and management plan that includes vehicle-driving speeds that minimize wildlife mortality.
- Reduce availability of carrion *(animal carcasses)*
- Minimize roads and stream crossings
- Encourage a decommissioning condition for restoration of the site to approximate or improved pre-project conditions that would require removal of the turbines and infrastructure when project ceases operation.

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3.0 OPERATIONAL MONITORING

Mortality of birds and bats is expected to result from wind power projects. However, it is anticipated that significant impacts to wildlife can be avoided or lessened such that they are ecologically negligible at local and regional scales and do not contribute to cumulative impacts at most wind projects if these guidelines are employed. Monitoring studies, such as carcass surveys, using current protocols are required to determine the estimated direct impacts of the wind farm on birds and bats. The duration and scope of the monitoring should depend upon, but are not limited to the size of the project and the availability of existing monitoring data at projects in similar habitat types. Proponents should work with WDFW to develop and/or determine acceptable monitoring protocols for use. Project operators are encouraged to develop an incidental fatality reporting protocols to coincide with regular on-going operational activities.

A Technical Advisory Committee (TAC) is recommended to function as a post-construction advisory committee to the project owner and the permitting authority. The TAC is responsible for reviewing results of post-construction monitoring data and making suggestions to the project owner and permitting authority regarding the need to adjust mitigation and monitoring requirements based on results of monitoring data and available data from other projects. Potential members include stakeholders from environmental groups, wind project owners and/or developers of the project, landowners, and county representatives, tribes, state and federal resource agencies.

The range of potential adjustments to the monitoring and mitigation requirements should be clearly stated in the project permit. Adjustments should be made if unanticipated impacts become apparent from monitoring data. Such changes may include but are not limited to the following examples: reducing or eliminating the source of the impact, management plans, additional monitoring or research focused on understanding the identified impacts to particular species (e.g. bats) and creation of raptor nesting structures (artificial or natural, on or off-site) if significant impacts to raptor species are identified. TACs should review and comment on the protocols for conducting the monitoring study and the procedures and form for reporting the information. Progress reports summarizing the monitoring results should be reported to the TAC on a regular basis, as agreed to by TAC members. Information from these meetings and mitigation and monitoring suggestions will be summarized by the WDFW TAC member and reported regularly to WDFW Headquarters in Olympia.

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TACs generally function for the duration of the operational monitoring period. However, a TAC may reconvene to address an unforeseen circumstance outside the regular operational monitoring schedule.

Reporting of ESA species impacts to Federal and State agencies and the TAC are the operator's responsibility. The operator shall contact the US Fish and Wildlife Service or National Marine Fisheries Service to determine the appropriate measures to resolve un-authorized take of ESA listed species or species covered by other federal regulations.

4.0 RESEARCH-ORIENTED STUDIES

Standard pre-project assessment surveys and studies and standard fatality operational monitoring are separate from research-oriented studies. At some projects, additional studies that utilize pre-construction data may be conducted to test specific research hypotheses about impacts to a particular species or group of species. Rather than being necessary for pre-project assessment, such studies are focused on research, such as indirect impacts (e.g. displacement, cumulative impacts, etc.), that provide information for future projects.

Examples of research oriented studies include the use of gradient analysis in understanding the level of displacement of grassland nesting birds(e.g., greater sage-grouse, long-billed curlew)as a function of distance from turbines, construction and operations effects on resident and migratory bats, and raptor nest monitoring comparing density and nest success before and after operation of the wind plant. If such studies are determined to be important to the overall understanding of wind energy/wildlife interactions, they should be designed to follow appropriate experimental designs (Anderson et al. 1999, Morrison et al. 2002). Funding and/or support for these more research-oriented studies should be solicited from multiple sources, including the wind industry, environmental groups, state and federal agencies, advocacy groups and other sources.

5.0 HABITAT MITIGATION

5.1 General Principles for Habitat Mitigation

These principles are intended for land-based projects proposed throughout Washington State. These principles are not intended for evaluating offshore wind facility proposals and would likely require review and revision for relevance and applicability as such.

- Implementation of the habitat mitigation measures contained in this proposal are presumed to fully mitigate for habitat losses for all species, including species classified as “protected,” in the Washington Administrative Code (WAC 232-12-011), with the exception of species classified as state “threatened” or “endangered” and/or federally “threatened” or “endangered,” for which additional species- and site-specific mitigation may be necessary.
- Wind project developers should be encouraged to site wind power projects on disturbed lands (i.e., developed, cultivated, or otherwise disturbed by road or other corridors), except where such lands host significant aggregations or are used by state of federally listed species.
- Wind project developers should be encouraged to place linear facilities (such as collector cable routes, transmission line routes, or access roads) in or adjacent to existing disturbed corridors in order to minimize project footprint, habitat fragmentation and habitat degradation.
- Wind project developers should be discouraged from using or degrading high value habitat areas, and habitat areas that are difficult to restore.
- Wind project developers are responsible for acquiring replacement habitat under this proposal and for management of such lands for the life of the project, unless otherwise indicated.
- Mitigation packages should be negotiated in consultation with WDFW and the permitting authority.
- The functions and values of the mitigation package should meet the extent of the impact on habitat.

Exception for Habitat in “Excellent” Condition

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Where a wind project will affect habitat in “excellent” condition (based on methods acceptable to WDFW), wind project developers should engage in additional consultation with WDFW and the permitting authority regarding suitable mitigation requirements for such habitat.

Customized Acquisition or Other Mitigation Options

This Habitat Mitigation guidance should not be viewed as preventing or discouraging WDFW, the permitting authority and wind project developers from negotiating “customized” or “alternative” mitigation packages. Where appropriate, parties may use accepted methodologies for other mitigation options.

Habitat Mitigation agreements

Finalized mitigation agreements are reviewed by the Washington State Attorney General’s Office (AGO). The AGO reviewed agreements are then signed by the WDFW representative and the project proponent or their representative and filed with the WDFW Olympia Headquarters.

Habitat Classification

Class I and Class II habitats are considered the highest priorities for current statewide conservation action in Washington. Class I habitats have a greater number of associated Species of Greatest Conservation Need (SGCN) than the Class II habitats and Class II habitats have a greater number of associated Species of Greatest Conservation Need (SGCN) than the Class III habitats. Class IV habitats are generally low value habitats.

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5.2 MITIGATION FOR PERMANENT HABITAT IMPACTS

Permanent impacts to habitat are those that are anticipated to persist and cannot be restored within the life of the project. Permanent impacts may include new permanent roads, operations and maintenance facilities, turbine pads, impervious and/or areas devoid of native vegetation resulting from project operations. See Habitat Mitigation Classification Chart (*Appendix 8.2)*, for mitigation ratios.

A. No Mitigation Required for Class IV

No mitigation will be required for impacts to lands that have low habitat value. *(Exception: Deliberate intent to covert habitat to avoid mitigation).*

Examples generally include lands that are:

- Currently being cultivated
- Developed; or

- Disturbed by an active road or other corridor that eliminates natural habitat values.

B. Criteria for Mitigation by Acquisition of Replacement Habitat

In each of the mitigation categories listed below, the criteria indicate that the replacement habitat should be negotiated in consultation with WDFW and the permitting authority and include the following considerations:

- Like-kind (e.g., shrub-steppe for shrub-steppe; forested for forested, grassland for grassland) and/or of equal or higher habitat value than the impacted area, noting that an alternative ratio may be negotiated for replacement habitat that differs from impacted habitat;
- Given legal protection (through acquisition in fee, a conservation easement, or other enforceable means);
- Protected from degradation, including development, for the life of the project to improve habitat function and value over time;
- In the same geographical region as the impacted habitat;
- At some risk of development or habitat degradation and the mitigation results in a net habitat benefit

1. Acquisition of Replacement Habitat Subject to Imminent Development – 1:1

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One acre of suitable replacement habitat will be accepted as mitigation for one acre of permanently impacted habitat where the replacement habitat is subject to imminent development – that is, there is a credible plan to develop the replacement habitat within five years and WDFW concurs with this assessment.

There is no assumed net loss of habitat function or value where the replacement habitat would be lost but for its acquisition as mitigation. In fact, there should be a net gain in habitat value over time since protection of the replacement habitat (of equal or better value than the impacted area) will usually result in improved habitat value.

2. Acquisition of Class III Replacement Habitat – 1:1

Habitat values are protected under this approach because:

- Development of the above-listed habitat types is preferable to development of other high value habitats.
- The replacement habitat was at some risk of development and is now given permanent protection.
- The replacement habitat is likely to improve in habitat function and value over time as degrading forces are removed.
- The value of the replacement habitat is equal to or better than the habitat value of the impacted area.

- The 1:1 ratio combines a number of factors -- which could require much time, effort, and expense to analyze and process -- in a simple and equitable approach.

3. Acquisition of Class II Replacement Habitat – 2:1

Two acres of suitable replacement habitat will be accepted as mitigation for one acre of permanently impacted habitat. In this context high-value habitat could include lithosol/shrub matrix (plant communities on lithosol soils intermixed with other plant communities on deeper soils).

A net gain in habitat value is likely under this approach because the replacement habitat:

- Was at some risk of development and is now given permanent protection.
- Is likely to improve in habitat function and value over time as degrading forces are reduced on the protected area.
- Value is equal to or better than the habitat value of the impacted area.
- The 2:1 ratio combines a number of factors -- which could require much time, effort, and expense to analyze and process -- in a simple and equitable approach.

5.3 MITIGATION FOR TEMPORARY IMPACTS TO HABITAT

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Temporary impacts to habitat are those that are anticipated to end when construction is complete and the impacts have been restored. Temporary impacts include trenching for placement of underground cables, construction staging areas, lay-down areas, and temporary construction access. Temporary impacts also include the portions of road corridors that are used during construction but that are re-vegetated at the end of construction, but do not include the portions of roads that continue to be used for project operations (which are considered permanently affected). The goal of restoration of temporary impacts should be to restore the disturbed habitat to a condition that is at least as good as its pre-project condition. A reduced mitigation ratio may be considered if restoration results in a higher level of habitat function than pre-project conditions. See Habitat Mitigation Classification Chart (*Appendix 8.2)*, for mitigation ratios.

A. No Mitigation Required for impacts to cropland, pasture, developed or disturbed areas (The same as for permanent impacts and as provided for in general principles described above.)

B. Restoration, Mitigation for impacts to Class III Habitat – 0.1:1

Temporary impacts to these habitats should be mitigated by:

- Implementing a WDFW approved restoration plan for the impacted area. A restoration plan should include site preparation, reseeding with appropriate vegetation, noxious weed control, and protection from degradation (irrigation or planting with live plants will not be required).
- Acquiring 0.1 acres of suitable replacement habitat for every acre temporarily impacted by the project.
- A good faith effort should be made to restore the impacted area. However, if restoration efforts of temporary habitat impacts are not successful within 10 years of impact, a permanent loss should be assumed with a minimum replacement ratio of 1:1 for all unsuccessful restoration areas. *(Exception: Long-term performance targets should not be imposed if temporal losses and the possibility of restoration failure are incorporated into the acquisition and improvement of replacement habitat).*
- WDFW and a wind developer may agree on other ratios and terms where doing so is mutually beneficial.

C. Restoration, Mitigation for impacts to Class II Habitat – 0.5:1
Temporary impacts to shrub-steppe or other high-value habitat can be mitigated by:

- Implementing a WDFW approved restoration plan for the impacted area. A restoration plan should include site preparation, reseeding with appropriate vegetation, noxious weed control, and protection from degradation (irrigation or planting with live plants will not be required).
- Acquiring 0.5 acres of suitable replacement habitat for every acre temporarily impacted by the project.
- A good faith effort should be made to restore the impacted area. However, if restoration efforts of temporary habitat impacts are not successful within 10 years of impact, a permanent loss should be assumed with a minimum replacement ratio of 1:1 for all unsuccessful restoration areas. *(Exception: Long-term performance targets should not be imposed if temporal losses and the possibility of restoration failure are incorporated into the acquisition and improvement of replacement habitat).*
- WDFW and a wind developer may agree on other ratios and terms where doing so is mutually beneficial.

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5.4 MITIGATION "BY FEE" OPTION

After determination by the wind project developer, in consultation with WDFW, of the project's impact on habitat (in terms of acres permanently and temporarily impacted, and the type and general quality of habitat impacted), the wind project developer, permitting authority and WDFW will identify an appropriate annual fee for the life of the project. This fee will be based upon the estimated cost of probable habitat conservation properties identified by WDFW. The properties used to determine the mitigation fee should be representative of the types of habitat that were impacted by the wind energy development. A wind project developer, through consultation with WDFW and the permitting authority, may choose to use "By Fee" mitigation or a combination of habitat acquisition and "By

Fee" mitigation.

- The fee is based on habitat in "average" condition and can be increased or decreased to account for differences in habitat quality.
- The wind project developer should implement an approved restoration plan for temporarily impacted areas (in accordance with WDFW Guidelines).
- In cases where the project impacts a mixture of habitat types, the fee schedule will be applied according to the habitat mixture (to the nearest acre).
- The annual fee will be used primarily to support "stewardship" (management, monitoring, restoration, protection from degradation) of high-value habitat in the same ecological region as the project. . It is envisioned that these annual stewardship funds will be applied to strategically important habitat acquired by WDFW throughout Washington. . The annual fees will be deposited into a dedicated WDFW account and may also be used for acquisition.
- A "lump-sum" up-front payment may be applied in-lieu of annual fees. To be determined by the number of acres impacted, both temporary and permanent multiplied by the life of the project, which is assumed to be the term of the permit for the project.

Default for Unresolved "By Fee" Mitigation

If the wind project developer, permitting authority and WDFW cannot agree on a mutually advantageous mitigation package under the "By Fee" mitigation option, acquisition of replacement habitat should be pursued to fulfill the mitigation requirements.

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6.0 HABITAT TYPES

The following habitat types are found throughout the nine ecoregions in Washington (Appendix IV). These habitat descriptions are based upon the *Washington's Comprehensive Wildlife Conservation Strategy (WDFW 2005)* and the *Wildlife-Habitat Relationships in Oregon and Washington (WHROW) (Johnson and O'Neil 2001)*. Useful information related to habitat and species for each ecoregion are listed in Appendix V.

6.1 EASTERN WASHINGTON HABITAT

Eastside (Interior) Grasslands

This habitat is found primarily in Washington at mid- to low elevations (500 to 6,000 ft.) and on plateaus in the Blue Mountains. Most grassland habitat occurs in 2 distinct large landscapes: plateau and canyon grasslands. This habitat is dominated by short to medium-tall grasses (<3.3 ft). Total herbaceous cover can be closed to only sparsely vegetated. Annual plants are a common spring and early summer feature of this habitat. The soil surface between perennial plants

can be covered with a diverse cryptogamic or microbiotic layer of mosses, lichens, and various soil bacteria and algae. Native perennial bunchgrasses can be common but degraded sites may have a residual native grass component dominated by annual non-native grasses and forbs.

Shrub-steppe (includes dwarf shrub-steppe and eastside [interior] canyon shrublands, Wyoming big sagebrush and three-tip sagebrush)
Shrub-steppe habitat defines a biogeographic region and is the major vegetation on average sites in the Columbia Plateau. Elevation range is wide (300-9,000 ft with most habitats occurring between 2,000 and 6,000 ft). This habitat forms mosaic landscapes with woodland habitats and native perennial Eastside Grasslands, Dwarf Shrub-steppe. In an undisturbed condition, shrub cover varies between 10 to 30 percent and greater. Shrub height typically is medium tall (1.6-3.3 ft) although some sites support shrubs approaching 9 ft tall.

Dwarf shrub-steppe habitat is found across a wide range of elevations from 500 to 7,000 ft characterized by low shrub (<1.6 ft high) communities with undergrowth of short native perennial grasses and forbs with extensive exposed rock and cryptogamic crusts. Includes stiff sagebrush/Sandberg bluegrass. Dwarf shrub-steppe habitat is widely distributed in the Columbia Basin, particularly associated with the channeled scablands, High Lava Plains, and in isolated spots throughout the Blue Mountains and the Palouse.

Eastside (interior) canyon shrublands habitat occurs from 500 to 5,000 ft in elevation and primarily on steep canyon slopes in the Blue Mountains and along the margins and as isolated patches across the Columbia Basin. Sites are generally steep (>60%) on all aspects but most common on northerly aspects in deep, dry canyons. This habitat type is generally a mix of tall (5 ft) to medium (1.6 ft) deciduous shrublands in a mosaic with bunchgrass or annual grasslands. Shrub canopies are almost always closed (>60% cover).

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Montane Mixed Conifer Forest
These forests occur in mountains throughout Washington, including the Cascade Range, Olympic Mountains, Okanogan Highlands, Coast Range (rarely), and Blue Mountains. Elevation is middle to upper montane, as low as 2,000 ft in northern Washington. On the west side, it occupies an elevational zone of about 2,500 to 3,000 vertical feet, and on the eastside it occupies a narrower zone of about 1,500 vertical feet. This is a forest, or rarely woodland, dominated by evergreen conifers. Mosses are a major ground cover and epiphytic lichens are typically abundant in the canopy.

Eastside (Interior) Mixed Conifer Forest
The Eastside Mixed Conifer Forest habitat appears primarily in the Blue Mountains, East Cascades, and Okanogan Highland ecoregions of Washington. The Eastside Mixed Conifer Forest habitat is primarily mid-montane with an elevation range of between 1,000 and 7,000 ft, mostly between 3,000 and 5,500 ft.

Ponderosa Pine Forest and Woodlands (includes Oak Woodlands)
This habitat occurs in much of eastern Washington, including the eastern slopes of the Cascades, the Blue Mountains and foothills, and the Okanogan Highlands. This habitat can be found at elevations of 100 ft in the Columbia River Gorge to dry, warm areas over 6,000 ft. This habitat is typically a woodland or savanna with tree canopy coverage of 10-60 percent, although closed canopy stands are possible. Shrub-steppe shrubs may be prominent in some stands and create a distinct tree shrub-sparse-grassland habitat.

Lodgepole Pine Forest and Woodlands
This habitat appears primarily along the eastern slope of the Cascade Range and occasionally in the Blue Mountains and Okanogan Highlands. This habitat is located mostly at mid- to higher elevations from 3,000-9,000 ft. These environments can be cold and relatively dry, usually with persistent winter snowpack.

Upland Aspen Forest
This habitat is found from 2,000 to 9,500 ft in elevation and Quaking aspen (*Populus tremuloides*) is the characteristic and dominant tree. Habitat structure is usually tall (<48 ft) with forb-, grass-, or low-shrub-dominated undergrowth.

6.2 WESTERN WASHINGTON HABITAT

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Westside Grasslands
This habitat is restricted primarily to the Puget Lowland ecoregion, with most now occurring in Pierce, Thurston and San Juan counties, Washington. This includes prairies and savannas. Elevation is mostly low and ranges up to a maximum of about 3,500 feet. Many other small sites, often called “balds”, have shallow soils overlying bedrock and typically are on south- or west-facing slopes. This habitat is native perennial grassland or, less commonly, savanna, with <30% tree or shrub cover. Bunchgrasses predominate in native-dominated sites. Montane balds are sometimes dominated by short forbs or dwarf shrubs. Scattered trees are either evergreen conifers or deciduous broadleaves. Shrubs may be absent, scattered, or very prominent.

Westside Lowlands Conifer-Hardwood Forest

This is the most extensive habitat throughout low-elevation western Washington. These forests range from early to late successional stands with occasional old growth. Elevation ranges from sea level to a maximum of about 2,000 ft. This habitat is forest, dominated by evergreen conifers, deciduous broadleaf trees, or both. However, while sub-mature stands are quite common, mature stands are not and late successional stands are critically limited to scattered public ownership, mostly parks and regulatory leave areas. Additionally, older stands typically exhibit a much higher occupancy of conifer rather than hardwood species. In younger stands sword fern and salal comprise the preponderance of

ground cover with increasing moss cover with increasing stand age. Lichens are abundant only in the canopy of old stands.

Subalpine Parkland
The Subalpine Parkland habitat occurs throughout the high mountain ranges of Washington (e.g., Cascade crest, Olympic Mountains, and Okanogan Highlands). Elevation varies from 4,500 to 6,000 ft in the western Cascades and Olympic Mountains and from 5,000 to 8,000 ft in the eastern Cascades. The habitat appears either a mosaic of treeless openings and small patches of trees often with closed canopies, or as woodlands or savanna stands of scattered trees.

Westside Oak and Dry Douglas-fir Forest and Woodlands
This habitat is common in and around the San Juan Islands and in parts of Thurston, Pierce and Mason counties. Elevation ranges from sea level to about 3,500 in the Olympic Mountains, but is mainly below 1,500 ft. This is a forest or woodland dominated by evergreen conifers, deciduous broadleaf trees, and evergreen broadleaf trees. Deciduous broadleaf shrubs are perhaps most typical as understory dominants in the existing landscape.

Coastal Headlands and Islets
This habitat occurs mainly on coastal headlands, bluffs, and islands with steep slopes or cliffs typically from sea level to about 500 ft (152 m). This habitat is always located adjacent to, or in the case of the rock islets ("sea stacks"), within the Marine Nearshore habitat.

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Coastal Dunes
This habitat occurs primarily in wet, mild outer coastal climates at elevations at and very near sea level and only extending as high as the highest dunes. Topography is mildly to strongly undulating in the form of mostly north-south trending dune ridges and troughs. These dunes, spits, and berms are derived from sand carried by longshore drift and wind erosion. This habitat consists of a variable mosaic of structures ranging from open sand with sparse herbaceous vegetation to dense shrublands. Medium-tall grasslands, typically closed, are a major component in the current landscape. Coniferous evergreen trees and tall broadleaf evergreen shrubs, typically dense, are also a significant component of the mosaic.

Alpine Grassland and Shrublands
This habitat always occurs above the upper treeline in the mountains or a short distance below from 5000ft to over 10,000ft in elevation. It is the most predominant habitat type in the Cascade Mountains between 5000ft to 10,000ft and is the coldest of any habitat type.

6.3 COMMON HABITATS

Pasture and Mixed Environs
This habitat is oftentimes, but is not exclusive to landscapes in flat or gently rolling terrain, on well-developed soils, broad river valleys, and generally in areas with access to irrigation water. Pastures are improved lands used to produce perennial herbaceous plants for grass seed and hay and unimproved pastures are predominately non-native grassland sites, often abandoned fields that have little or no active management such as irrigation, fertilization, or herbicide applications. These sites may or may not be grazed by livestock. Various out buildings, barns and isolated “brushy” fencerows are common. Pasture does not have a forest canopy.

Conservation Reserve Program (**CRP**).
The Conservation Reserve Program encourages farmers to convert highly erodible cropland or other environmentally sensitive acreage to perennial vegetative cover, such as native grasses, forbs and shrubs, wildlife plantings, trees, filterstrips, or riparian buffers. This program reduces soil erosion, reduces sedimentation in streams and lakes, improves water quality, establishes wildlife habitat, and enhances forest and wetland resources. Farmers receive an annual rental payment for the term of the multi-year contract. Cost sharing is provided to establish the vegetative cover practices.

Urban and Mixed Environs
Urban habitat occurs throughout Washington and mostly on the west side of the Cascade Mountains, with the exception of Spokane in eastern Washington. Urban development occurs within or adjacent to nearly every habitat type in Washington, and often replaces habitats that are valuable for wildlife.

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Government Accountability Office [GAO]. 2005. Wind power: impacts on wildlife and government responsibilities for regulating development and protecting wildlife. U.S. Government Accountability Office 05-9006,Washington, D.C., USA.

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Washington Department of Fish and Wildlife. 2005. Washington's Comprehensive Wildlife Conservation Strategy. 780pp. http://wdfw.wa.gov/wlm/cwcs/cwcs.htm

Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 172 pp. http://wdfw.wa.gov/hab/phs/phs_list_2008.pdf

Good references for designing survey protocols are the National Wind Coordinating Collaborative Guidance Documents (www.nationalwind.org), listed below. Please note that these documents undergo frequent revisions.

Anderson et al. 1999. Studying Wind Energy/Bird Interactions: A Guidance Document on Metrics and Methods for Determining or Monitoring Potential Impacts On Birds At Existing And Proposed Wind Energy Sites.

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National Wind Coordinating Committee
http://www.nationalwind.org/publications/wildlife/avian99/Avian_booklet.pdf
Anderson et al. 2003. The Proper Use of "Studying Wind Energy/Bird Interactions: A Guidance Document" (addendum to the 1999 document). National Wind Coordinating Committee. http://www.nationalwind.org/publications/proper-use_mm.pdf

Kunz et al. 2007. Assessing Impacts of Wind Energy Development on Nocturnally Active Birds and Bats: A Guidance Document. National Wind Coordinating Committee. http://www.nationalwind.org/pdf/Nocturnal_MM_Final-JWM.pdf

8.0 APPENDICES

8.1 OTHER POTENTIAL LEGAL REQUIREMENTS:

- *State Environmental Policy Act (SEPA) RCW 43.21.C*
- *Fish and Wildlife Title 77 RCW*
- *Growth Management Act (GMA) RCW 36.70A*
- *Hydraulic Project Approval (HPA) RCW 77-55*
- *Critical Area Ordinance (CAO)*
- *Migratory Bird Treaty Act (MBTA)*
- *Endangered Species Act (ESA) Sections 7&10*
- *Army Corps of Engineers (ACOE) 404*
- *Clean Water Act (CWA) 401*
- *Bald Eagle / Golden Eagle Protection Act (BGEPA)*
- *National Environmental Policy Act (NEPA)*

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8.2 HABITAT CLASSIFICATION MITIGATION CHART

Where a wind project will affect habitat in "excellent" condition (based on methods acceptable to WDFW) or Species of Greatest Conservation Need (SGCN) [8], wind project developers should engage in additional consultation with WDFW and the permitting authority regarding suitable mitigation requirements for such habitat.

CLASSIFICATION [1]	HABITAT TYPE [2,4]	MITIGATION	
		Temporary Impact	Permanent Impact
Class I West side	Westside Grasslands/ Herbaceous Balds, Westside Lowland Conifer-Hardwood (Mature) Forest, Westside Oak and Dry (Non-commercial) Douglas-fir Forest and Woodlands, Coastal Dunes	**CONSULTATION [3]**	**CONSULTATION**
Class I East side	Ponderosa Pine Forest and Woodlands (includes Eastside Oak Woodlands)		
Class II West side	Coastal Headlands and Islets, Subalpine Parkland	**0.5:1 MITIGATION/ RESTORATION[7]**	**2:1 ACQUISTION**
Class II East side	Eastside (Interior) Mixed Conifer Forest, Lodgepole Pine Forest and Woodlands, Montane Mixed Conifer Forest, Upland Aspen Forest, Shrub-steppe		
Class III West side	Alpine Grassland and Shrublands, Conservation Reserve Program (CRP) Lands	**0.1:1 MITIGATION/ RESTORATION**	**1:1 ACQUISTION**
Class III East side	Eastside (Interior) Grasslands, CRP Lands		
Class IV	Croplands [5], Pasture, Urban and Mixed Environs	**No Mitigation Required**	**No Mitigation Required**
FORESTRY	Conversion of Commercial Forest Lands [6]	**CONSULTATION**	**CONSULTATION**

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[1] Class 1 and Class II habitats are considered the highest priorities for current statewide conservation action in Washington. Class I habitats have a greater number of associated Species of Greatest Conservation Need (SGCN) than the Class II habitats and Class II habitats have a greater number of associated Species of Greatest Conservation Need (SGCN) than the Class III habitats

[2] Habitat characteristics defined in Chapter 3, *Wildlife-Habitat Relationships in Oregon and Washington* (*WHROW*) (Johnson and O'Neil 2001) and habitats mapped by Ecoregion in Chapter VI, Washington's *Comprehensive Wildlife Conservation Strategy* (*CWCS*) (WDFW 2005).

[3] Non-regulatory meeting between industry, county, consultants, EFSEC, WDFW, etc. to discuss impacts to habitat and species and mitigation options. Regulatory compliance with terms of mitigation may be identified in permit issued by EFSEC or county.

[4] Class I-II (CWCS Priority One and Two) wetlands are not included as they are regulated under the authority of the Department of Ecology and Army Corps of Engineers, and other applicable regulations and policies.

[5] Short-rotation hardwoods as defined in Chapter 76.09 Revised Code of Washington (RCW), Christmas trees and lands farmed or cultivated by agricultural methods in growing cycles shorter than fifteen years and characterized are by a homogenous, cultivated, and maintained stand or are considered croplands. This does not include commercial Forests and state forest lands which are regulated under the Forest Practices Act [Chapter 76.09 RCW] and Forest Practice Rules [Title 222 Washington Administrative Code (WAC)].

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[6] Commercial forests are defined and regulated under the Forest Practices Act (FPA) [Chapter 76.09 RCW]. Wind project developers should consult with WDFW when an FPA conversion is anticipated. Wind project developers are encouraged to minimize conversion.

[7] The mitigation ratio for temporary impacts to native shrub-steppe lithosols is 1:1 due to the increased length of time for restoration. A reduced mitigation ratio may be considered if restoration of native shrub-steppe lithosols results in a higher level of function than pre-construction conditions.

[8] SGSN includes only native Washington fish and wildlife species that are listed as endangered, threatened, or sensitive, or as candidates for these designations. The list also incorporates all federally listed threatened and endangered fish and wildlife species. Endangered, threatened, and sensitive species are legally established in Washington Administrative Codes. Candidate species are established by WDFW policy. Washington State monitor species are those that require management, survey, or data emphasis for one or more of the following reasons: 1) they were classified as endangered, threatened, or sensitive within the previous five years; 2) they require habitat that is of limited availability during some portion of their life cycle; 3) they are indicators of environmental quality; and 4) there are unresolved taxonomic questions that may affect their candidacy for listing as endangered, threatened or sensitive species.

8.3 COARSE SCALE ASSESSMENT

Consideration of the following questions during pre-survey review may not address comprehensive pre-project evaluation needs, but can provide valuable pre-project planning information to wind project developers to guide preliminary discussions with WDFW:

1. Are federal or state threatened, endangered, candidate or sensitive species, known or likely to occur on or near the proposed project area?

2. Does the project area include priority habitats identified in Washington's Comprehensive Wildlife Conservation Strategy (WDFW 2005) and Priority Habitats and Species (WDFW 2008) (http://wdfw.wa.gov/wlm/cwcs/, http://wdfw.wa.gov/hab/phshabs.htm, i.e. - caves, shrub-steppe, cliffs, estuary, juniper savannah, marine/estuarine shorelines, Oregon white oak woodlands, prairies and steppe, vegetated marine/ estuarine, etc. or other habitats that might attract birds or bats for foraging, roosting, breeding, or cover)

3. Is the project area within 2 miles of a raptor nest, or are large numbers of raptors known or likely to occur at or near the site during portions of the year?

4. Does the site or do areas adjacent to the site include unique habitat types?

5. Will development of the project area contribute to habitat fragmentation and loss of habitat connectivity for federal and/or state listed, sensitive, or PHS species?

6. Does the project area contain topographical and/or hydrological features that could concentrate fish or wildlife resources (for example, ridges, peninsulas, aquatic or other landforms that influence fish, bird, bat, or other wildlife movement)?

7. Is the project area at or near a known or likely migrant stopover site, staging areas, migration corridor, or area where wildlife aggregate during one or more season?

8. Is the project area an isolated patch composed of mostly native habitat(s) in a landscape that could concentrate native plants and animals?

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9. Is the project area regularly characterized by seasonal weather conditions such as dense fog or low cloud cover that might increase collision risks at times when birds and bats may be aggregated?

10. Is the project area in proximity to habitats normally associated with bats (e.g. wetlands, hibernacula)? (http://www.pgc.state.pa.us/pgc/cwp/view.asp?a=483&q=171755)

11. Are there other wind projects in the area?

12. Is the site contained within or near an Important Bird Area (IBA)? See: (http://www.audubon.org/chapter/wa/wa/science_IBAWashington.html)

8.4 REFERENCE WEBLINKS:

- Comprehensive Wildlife Conservation Strategy http://wdfw.wa.gov/wlm/cwcs/
- Wildlife research publications (http://wdfw.wa.gov/wlm/research/songbird/shrub_p.htm)
- Species of concern (http://wdfw.wa.gov/wlm/diversty/soc/concern.htm)
- Wildlife science (http://wdfw.wa.gov/wildlife.htm, http://wdfw.wa.gov/hab/phsrecs.htm)
- Priority habitats and species maps and digital information (http://wdfw.wa.gov/hab/release.htm)
- The Washington Department of Natural Resources (http://www.dnr.wa.gov/ResearchScience/Topics/NaturalHeritage/Pages/amp_nh_products.aspx),
- The National Audubon Society (http://www.audubon.org/chapter/wa/wa/science_IBAWashington.html),
- The Nature Conservancy (http://support.nature.org/site/PageServer?pagename=preserve_map),
- Washington's Gap Analysis Program (GAP) (http://www.wdfw.wa.gov/wlm/gap/dataprod.htm),
- Tribal Nations http://www.hanksville.org/sand/contacts/tribal/states.php?whichstate=WA&title=Washington
- Renewable Northwest Project (www.rnp.org)
- National Wind Coordinating Collaborative (nationalwind.org)
- National Renewable Energy Laboratory (www.nrel.gov)
- American Wind Energy Association (www.awea.org)

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8.5 SMALL WIND

In Washington, the development of small wind local ordinances with input from WDFW will aid in natural resource assessment and impact avoidance with recognition of public safety considerations, aesthetics, permitting and construction, and monitoring, etc., of small wind projects at residential and commercial properties. WDFW can assist citizens with project planning by providing valuable information regarding environmentally sensitive areas.

The American Wind Energy Association (AWEA) defines small wind power as electric generators (turbines), having rated capacities of 100 kilowatts and less, that utilize wind energy to produce clean, emissions-free power for individual homes, farms, and small businesses. On-site consumption of utility power is a characteristic of small wind that allows property owners to offset commercially provided electrical power. Small wind turbines can also serve as a primary electrical source or be combined with a solar, battery system, or generator.

The siting of small wind turbines outlined in local (county) building codes and ordinances typically contains such considerations as:

- Setback Distances and Height
- Lot Size
- Aesthetics
- Sound
- Property Values
- Insurance
- Abandonment
- Multiple Turbines
- Urban and Building-Integrated Installations
- Potential of Structural or Electrical Failure
- Soil Studies

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Generally, small wind systems require a land area of at least an acre, Class 2 winds (Class 1 are weakest), and at least 30 feet above any physical wind barriers (i,e., trees, buildings, or bluffs) within 300-500 feet to avoid air turbulence. Tower heights from 65 to 140 are common but particular site conditions should be the primary factor when determining tower height. Winds are faster at higher elevations, and wind power increases by a factor of three as speed increases, so even a small boost in height greatly enhances a turbine's output. Other considerations include the appropriate distance from physical barriers, and setback from the property line, inhabited neighboring structures, utility lines, and/or road right-of-ways. Typically these “set-back” distances are

the tower height plus the length of one blade (the turbine's "total extended height")

WDFW Environmental Technical Assistance

Impacts to native habitats and species, as well as migratory species, from guy wires and lattice-type towers that are characteristic of small wind systems, should be considered, especially near or within environmentally sensitive areas. These risks can be significantly reduced by using monopole towers without guy wires and/or using flight diverters on structures constructed with guy wires.

While small wind power projects are generally small and dispersed, construction of multi-small turbine systems on a property or adjacent properties, and numerous single systems within a favorable wind resource area, could have the potential to adversely impact natural resources. Consultation with WDFW is encouraged to avoid and mitigate these impacts.

Small Wind Weblinks:

Model Zoning Ordinance:

http://www.awea.org/smallwind/toolbox/improve/model_zoning.pdf

In the Public Interest, How and Why to Permit for Small Wind Systems: A Guide for State and Local Governments:

http://www.awea.org/smallwind/pdf/InThePublicInterest.pdf

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Small Wind Information Resources Specific to Washington State:

- http://www.awea.org/smallwind/washington.html
- http://www.dsireusa.org/library/includes/map2.cfm?CurrentPageID=1&State=WA&RE=1&EE=1

8.6 SPECIES AND HABITAT PLANS

In consultation with other governmental and nongovernmental organizations, WDFW has developed a Comprehensive Wildlife Conservation Strategy (CWCS) with the intention to create a new management framework for the protection of Washington's species and habitats in greatest need of conservation.

Guiding principles for Washington's CWCS include conservation of species and habitats with greatest conservation need while recognizing the importance of keeping common species common, and to build and strengthen conservation partnerships with other conservation agencies, tribes, local governments, and non-governmental organizations.

The following planning and conservation efforts in the nine Washington Ecoregions are an important part of the CWCS and may provide guidance and alternatives for mitigation opportunities and project planning:

East Cascades Ecoregion
East Cascades Ecoregional Assessment
Interior Columbia Basin Ecosystem Management Project
Intermountain West Joint Venture Coordinated Bird Conservation Plan (2005)
Northwest Forest Plan (1994)
USFWS Draft Bull Trout Columbia River DPS Recovery Plan (2004)
USFWS Draft Northern Spotted Owl Recovery Plan (2008)
USFWS Grizzly Bear Recovery Plan (1993)
Washington Forest Practices Board Wildlife Strategy (in progress)
Washington Forests and Fish Agreement (1999)
WDFW Bald Eagle Status Report (2001)
WDFW Bull Trout and Dolly Varden Management Plan (2000)
WDFW Draft East Cascades Regional Wildlife Area Management Plan
WDFW Fisher Recovery Plan (2005)
WDFW Game Management Plan (2003)
WDFW Lynx Recovery Plan (2001)
WDFW Mardon Skipper Status Report (1999)
WDFW Outline for Salmon Recovery Plans (2003)
WDFW Peregrine Falcon Status Report (2002)
WDFW Western Gray Squirrel Recovery Plan (2005)
WDFW Western Pond Turtle Recovery Plan (1999)
Yakima, Lake Chelan, Wenatchee and Klickitat Subbasin Plans

Okanogan Ecoregion
Interior Columbia Basin Management Project
Okanogan Ecoregional Assessment
Methow, Okanogan, Upper Columbia, Sanpoil and Spokane Subbasin Plans (2004)
Northwest Forest Plan (1994)
USFWS Draft Bull Trout Columbia Basin DPS Recovery Plan (2002)
USFWS Grizzly Bear Recovery Plan (1993)
Washington Forest Practices Board Wildlife Strategy (in progress)
Washington Forests and Fish Agreement (1999)
WDFW Bald Eagle Status Report (2001)
WDFW Bull Trout and Dolly Varden Management Plan (2000)
WDFW Draft Okanogan Regional Wildlife Area Management Plan
WDFW Ferruginous Hawk Recovery Plan (1996)
WDFW Fisher Recovery Plan (2005)
WDFW Game Management Plan (2003)
WDFW Lynx Recovery Plan (2001)
WDFW Northern Leopard Frog Status Report (1999)
WDFW Outline for Salmon Recovery Plans (2003)
WDFW Peregrine Falcon Status Report (2002)
WDFW Pygmy Whitefish Status Report (1998)
WDFW Sandhill Crane Recovery Plan (2002)
WDFW Sharp-tailed Grouse Management Plan (1995)
WDFW Sharp-tailed Grouse Status Report (1998)
WDFW Western Gray Squirrel Recovery Plan (2005)

Canadian Rockies Ecoregion
Canadian Rockies Ecoregional Assessment
Pend Oreille, Spokane, and Columbia Upper Subbasin Plans (2004)

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Selkirk Mountains Woodland Caribou Herd Augmentation in Washington Cooperative Interagency Plan (1996)
USFWS Draft Bull Trout Columbia Basin DPS Recovery Plan (2002)
USFWS Grizzly Bear Recovery Plan (1993)
USFWS Northern Rocky Mountain Wolf Recovery Plan (1991)
USFWS Selkirk Mountains Woodland Caribou Recovery Plan (1994)
Washington Forest Practices Board Wildlife Strategy (in progress)
Washington Forests and Fish Agreement (1999)
WDFW Bald Eagle Status Report (2001)
WDFW Bull Trout and Dolly Varden Management Plan (2000)
WDFW Common Loon Status Report (2000)
WDFW Fisher Recovery Plan (2005)
WDFW Fisher Status Report (1998)
WDFW Game Management Plan (2003)
WDFW Le Clerc Wildlife Area Plan (2006)
WDFW Lynx Recovery Plan (2001)
WDFW Northern Leopard Frog Status Report (1999)
WDFW Outline for Salmon Recovery Plans (2003)
WDFW Peregrine Falcon Status Report (2002)
WDFW Pygmy Whitefish Status Report (1998)

Blue Mountains Ecoregion
Asotin, Tucannon, Walla Walla and Grande Ronde Subbasin Plans (2004)
Blue Mountains Ecoregional Assessment
Interior Columbia Basin Management Project
Intermountain West Joint Venture Coordinated Bird Conservation Plan (2005)
Land and Resource Management Plan (Umatilla National Forest)
USFWS Draft Bull Trout Columbia Basin DPS Recovery Plan (2002)
Washington Forest Practices Board Wildlife Strategy (in progress)
Washington Forests and Fish Agreement (1999)
WDFW Bald Eagle Status Report (2001)
WDFW Bull Trout and Dolly Varden Management Plan (2000)
WDFW Draft Blue Mountain Regional Wildlife Area Management Plan
WDFW Game Management Plan (2003)
WDFW Margined Sculpin Status Report (1998)
WDFW Outline for Salmon Recovery Plans (2003)
WDFW Peregrine Falcon Status Report (2002)

Columbia Plateau Ecoregion
Columbia Plateau Ecoregional Assessment
Interior Columbia Basin Management Project
Intermountain West Joint Venture Coordinated Bird Conservation Plan (2005)
U.S. Army Yakima Training Center Cultural and Natural Resource Management Plan (2002)
USFWS Draft Bull Trout Columbia Basin DPS Recovery Plan (2002)
WDFW Bald Eagle Status Report (2001)
WDFW Bull Trout and Dolly Varden Management Plan (2000)
WDFW Draft Columbia Plateau Regional Wildlife Area Management Plan
WDFW Ferruginous Hawk Recovery Plan (1996)
WDFW Game Management Plan (2003)
WDFW Greater Sage-Grouse Recovery Plan (2004)
WDFW Margined Sculpin Status Report (1998)
WDFW Outline for Salmon Recovery Plans (2003)
WDFW Peregrine Falcon Status Report (2002)
WDFW Pygmy Rabbit Recovery Plan and Amendments (1995,2001, 2003)
WDFW Sandhill Crane Recovery Plan (2002)
WDFW Upland Sandpiper Recovery Plan (1995)

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Yakima, Crab Creek, Palouse, Columbia Lower and Upper Middle, Walla Walla, and Snake Lower Subbasin Plans (2004)

Northwest Coast Ecoregion
Forest Practices Habitat Conservation Plan (WDNR)
Grays Harbor Estuary Management Plan
Lower Columbia River Estuary Program
National Estuary Program (NEP) Comprehensive Conservation Management Plan
NOAA Fisheries Draft Killer Whale Conservation Plan (2005)
Northwest Coast Ecoregional Assessment
Northwest Forest Plan (1994)
Pacific County Dune Management Plan
USFWS Columbian White-tailed Deer Recovery Plan (1983)
USFWS Draft Bull Trout Coastal/Puget Sound DPS Recovery Plan (2004)
USFWS Draft Northern Spotted Owl Recovery Plan (2008)
USFWS Marbled Murrelet Recovery Plan (1997)
USFWS Oregon Silverspot Butterfly Recovery Plan (2001)
Washington Forests and Fish Agreement (1999)
Washington Forest Practices Board Wildlife Strategy (in progress)
Washington State Coastal Zone Management Plan
WDFW Aquatic Nuisance Species Management Plan
WDFW Bald Eagle Status Report (2001)
WDFW Bull Trout and Dolly Varden Management Plan (2000)
WDFW Common Loon Status Report (2000)
WDFW Fisher Recovery Plan (2005)
WDFW Fisher Status Report (1998)
WDFW Forage Fish Management Plan (1998)
WDFW Killer Whale Status Report (2004)
WDFW Marbled Murrelet Status Report (1993)
WDFW Draft Mazama Pocket Gopher, Streaked Horned Lark and Taylor's Checkerspot Status Report (2005)
WDFW Draft Northwest Coast Regional Wildlife Area Management Plan
WDFW Olympic Mudminnow Status Report (1999)
WDFW Outline for Salmon Recovery Plans (2003)
WDFW Peregrine Falcon Status Report (2002)
WDFW Sea Otter Recovery Plan (2004)
WDFW Snowy Plover Recovery Plan (1995)
WDFW Steller (Northern) Sea Lion Status Report (1993)
WDFW Pygmy Whitefish Status Report (1998)

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Puget Trough Ecoregion
Elochoman and Cowlitz Subbasin Plans (2004)
Forest Practices Habitat Conservation Plan (WDNR)
National Estuary Program (NEP) Comprehensive Conservation Management Plan
Nearshore Fishery Management Plan
Partners in Flight Conservation Plans
Puget Sound and Adjacent Waters Program
Puget Sound Restoration Program
Puget Sound Water Quality Work Plan
Puget Trough Ecoregional Assessment
Shared (Salmon) Strategy for Puget Sound
USFWS Columbian White-tailed Deer Recovery Plan (1983)
USFWS Draft Bull Trout Coastal/Puget Sound DPS Recovery Plan (2004)
USFWS Draft Northern Spotted Owl Recovery Plan (2008)
USFWS Marbled Murrelet Recovery Plan (1997)
Washington Forest Practices Board Wildlife Strategy (in progress)
Washington Forests and Fish Agreement (1999)

WDFW Aquatic Nuisance Species Management Plan
WDFW Bald Eagle Status Report (2001)
WDFW Bull Trout and Dolly Varden Management Plan (2000)
WDFW Draft Mazama Pocket Gopher, Streaked Horned Lark and Taylor's Checkerspot Status Report (2005)
WDFW Draft Puget Trough Regional Wildlife Area Management Plan
WDFW Fisher Recovery Plan (2005)
WDFW Fisher Status Report (1998)
WDFW Forage Fish Management Plan (1998)
WDFW Larch Mountain Salamander Status Report (1993)
WDFW Marbled Murrelet Status Report (1993)
WDFW Mardon Skipper Status Report (1999)
WDFW Oregon Spotted Frog Status Report (1997)
WDFW Outline for Salmon Recovery Plans (2003)
WDFW Peregrine Falcon Status Report (2002)
WDFW Puget Sound Groundfish Management Plan (1998)
WDFW Sea Otter Recovery Plan (2004)
WDFW Steller (Northern) Sea Lion Status Report (1993)
WDFW Western Gray Squirrel Recovery Plan (2005)
WDFW Western Pond Turtle Recovery Plan (1999)
Willamette Valley-Puget Trough-Georgia Basin Ecoregional Assessment

North Cascades Ecoregion
Mt. Baker-Snoqualmie General Management Plan
North Cascades Ecoregional Assessment
North Cascades National Park General Management Plan
Northwest Forest Plan (1994)
USFWS Draft Bull Trout Coastal/Puget Sound DPS Recovery Plan (2004)
USFWS Draft Northern Spotted Owl Recovery Plan (2008)
USFWS Grizzly Bear Recovery Plan (1993)
USFWS Marbled Murrelet Recovery Plan (1997)
Washington Forest Practices Board Wildlife Strategy (in progress)
Washington Forests and Fish Agreement (1999)
WDFW Bald Eagle Status Report (2001)
WDFW Bull Trout and Dolly Varden Management Plan (2000)
WDFW Common Loon Status Report (2000)
WDFW Draft North Cascades Regional Wildlife Area Management Plan
WDFW Fisher Recovery Plan (2005)
WDFW Fisher Status Report (1998)
WDFW Game Management Plan (2003)
WDFW Lynx Recovery Plan (2001)
WDFW Marbled Murrelet Status Report (1993)
WDFW North Cascade (Nooksack) Elk Herd Management Plan (2002)
WDFW Oregon Spotted Frog Status Report (1997)
WDFW Outline for Salmon Recovery Plans (2003)
WDFW Peregrine Falcon Status Report (2002)
WDFW Pygmy Whitefish Status Report (1998)

West Cascades Ecoregion
West Cascades Ecoregional Assessment
Cowlitz and Lewis Subbasin Plans (2004)
Northwest Forest Plan (1994)
USFWS Draft Bull Trout Coastal/Puget Sound DPS Recovery Plan (2004)
USFWS Draft Northern Spotted Owl Recovery Plan (2008)
USFWS Marbled Murrelet Recovery Plan (1997)
Washington Forest Practices Board Wildlife Strategy (in progress)
Washington Forests and Fish Agreement (1999)

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WDFW Bald Eagle Status Report (2001)
WDFW Bull Trout and Dolly Varden Management Plan (2000)
WDFW Draft West Cascades Regional Wildlife Area Management Plan
WDFW Fisher Recovery Plan (2005)
WDFW Fisher Status Report (1998)
WDFW Game Management Plan (2003)
WDFW Larch Mountain Salamander Status Report (1993)
WDFW Marbled Murrelet Status Report (1993)
WDFW Mardon Skipper Status Report (1999)
WDFW Outline for Salmon Recovery Plans (2003)
WDFW Peregrine Falcon Status Report (2002)
WDFW Western Gray Squirrel Recovery Plan (2005)
WDFW Western Pond Turtle Recovery Plan (1999)

8.7 Washington Ecoregion Map

Map showing the nine ecoregions in Washington State. Each ecoregion exhibits special physical and environmental characteristics, including unique combinations of soils, geology and climate, that give rise to a distinctive composition and distribution of plant communities and associated wildlife. The ecoregional boundaries are derived from boundaries originally developed by the U.S. Environmental Protection Agency and USDA Forest Service, and were used by the Washington Department of Natural Resources in their Washington Natural Heritage Plan adopted in 2003. These boundaries are also used by The Nature Conservancy and its partners for developing ecoregional assessments and plans across North America.

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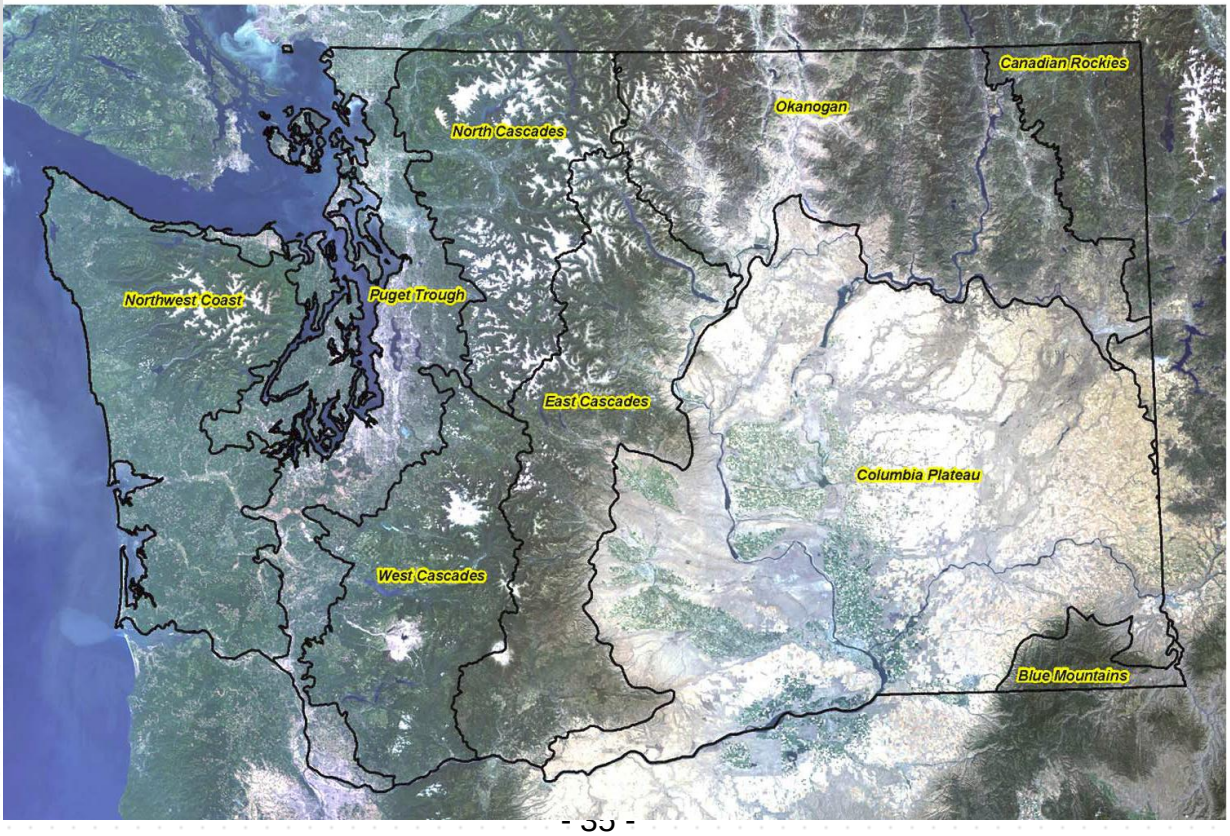
Ecoregions within Washington State